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LAMPIRAN

Lampiran 1. Source code augmented reality

1. Main Menu

```
using UnityEngine.SceneManagement;

@ Unity Script (1 asset reference) | 0 references
public class MainMenu : MonoBehaviour
{
    0 references
    public void TombolKeluar()
    {
        Application.Quit();
        Debug.Log("Game Close");
    }

    0 references
    public void Mulai()
    {
        SceneManager.LoadScene("MulaiAR");
    }

    0 references
    public void Petunjuk()
    {
        SceneManager.LoadScene("Petunjuk");
    }

    0 references
    public void Tentang()
    {
        SceneManager.LoadScene("Tentang");
    }

    0 references
    public void Kuis()
    {
        SceneManager.LoadScene("Kuis");
    }
}
```

2. Info Script

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

@ Unity Script (8 asset references) | 0 references
public class InfoScript : MonoBehaviour
{
    public GameObject InfoPanel;
    // Start is called before the first frame update
    @ Unity Message | 0 references
    void Start()
    {
        InfoPanel.SetActive(false);
    }

    // Update is called once per frame
    @ Unity Message | 0 references
    void Update()
    {
    }

    0 references
    public void ButtonInfo()
    {
        if (InfoPanel != null)
        {
            bool isActive = InfoPanel.activeSelf;
            InfoPanel.SetActive(!isActive);
        }
    }
}
```

3. Menu Petunjuk

```

using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;

Unity Script (11 asset references) | 0 references
public class Petunjuk : MonoBehaviour
{
    0 references
    public void Hyperlink()
    {
        SceneManager.LoadScene("SampleScene");
    }
}

```

4. Menu Kuis

```

using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.SceneManagement;
using UnityEngine.UI;

Unity Script (2 asset references) | 0 references
public class Kuis : MonoBehaviour
{
    0 references
    public void Hyperlink()
    {
        SceneManager.LoadScene("SampleScene");
    }

    public TextAsset assetSoal;

    private string[] soal;

    private string[,] soalBag;

    int indexSoal;
    int maxSoal;
    bool ambilSoal;
    char kunciJ;

    //komponen UI
    public Text txtSoal, txtOpsiA, txtOpsiB, txtOpsiC, txtOpsiD;

    bool isHasil;
    private float durasi;
    public float durasiPenilaian;

    int jwbBenar, jwbSalah;

```

```

int jwbBenar, jwbSalah;
float nilai;

public GameObject panel;
public GameObject imgPenilaian, imgHasil;
public Text txtHasil;

// Start is called before the first frame update
Unity Message | 0 references
void Start()
{
    durasi = durasiPenilaian;

    soal = assetSoal.ToString().Split('#');

    soalBag = new string[soal.Length, 6];
    maxSoal = soal.Length;
    OlahSoal();

    ambilSoal = true;
    TampilkanSoal();

    print(soalBag[1, 3]);
}

1 reference
private void OlahSoal()
{
    for (int i = 0; i < soal.Length; i++)
    {
        string[] tempSoal = soal[i].Split('+');

```

```

for (int i = 0; i < soal.Length; i++)
{
    string[] tempSoal = soal[i].Split('+');

    for (int j = 0; j < tempSoal.Length; j++)
    {
        soalBag[i, j] = tempSoal[j];
        continue;
    }
    continue;
}

2 references
private void TampilkanSoal()
{
    if (indexSoal < maxSoal)
    {
        if (ambilSoal)
        {
            txtSoal.text = soalBag[indexSoal, 0];
            txtOpsiA.text = soalBag[indexSoal, 1];
            txtOpsiB.text = soalBag[indexSoal, 2];
            txtOpsiC.text = soalBag[indexSoal, 3];
            txtOpsiD.text = soalBag[indexSoal, 4];
            kunciJ = soalBag[indexSoal, 5][0];

            ambilSoal = false;
        }
    }
}

```

```

0 references
public void Opsi(string opsiHuruf)
{
    CheckJawaban(opsiHuruf[0]);

    if (indexSoal == maxSoal - 1)
    {
        isHasil = true;
    }
    else
    {
        indexSoal++;
        ambilSoal = true;
    }

    panel.SetActive(true);
}

1 reference
private float HitungNilai()
{
    return nilai = (float)jwbBenar / maxSoal * 100;
}

public Text txtPenilaian;
1 reference
private void CheckJawaban(char huruf)
{
    string penilaian;

    if (huruf.Equals(kunciJ))
    {
        penilaian = "Benar!";
        jwbBenar++;

```

```

        penilaian = "Benar!";
        jwbBenar++;
    }
    else
    {
        penilaian = "Salah!";
        jwbSalah++;
    }

    txtPenilaian.text = penilaian;
}

// Update is called once per frame
@ Unity Message | 0 references
void Update()
{
    if (panel.activeSelf)
    {
        durasiPenilaian -= Time.deltaTime;

        if (isHasil)
        {
            imgPenilaian.SetActive(true);
            imgHasil.SetActive(false);

            if (durasiPenilaian <= 0)
            {
                txtHasil.text = "Jumlah benar : " + jwbBenar + "\nJumlah salah : " + jwbSalah + "\n\nNilai : " + HitungNilai();

                imgPenilaian.SetActive(false);
                imgHasil.SetActive(true);
            }
        }
    }
}

```



```
        durasiPenilaian = 0;
    }
}
else
{
    imgPenilaian.SetActive(true);
    imgHasil.SetActive(false);

    if (durasiPenilaian <= 0)
    {
        panel.SetActive(false);
        durasiPenilaian = durasi;

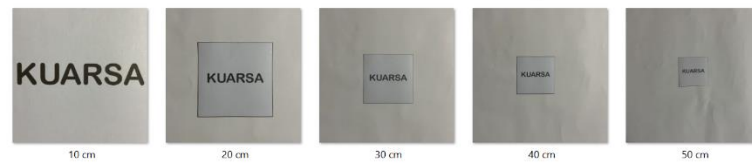
        TampilkanSoal();
    }
}
}
}
```

Lampiran 2. Contoh *query image*1. *Marker Teks*2. *Marker Gambar*3. *Marker Gambar + Teks*

Lampiran 3. Contoh *train image*

1. *Marker Teks*

- Parameter jarak



- Parameter rotasi



- Parameter sudut pandang

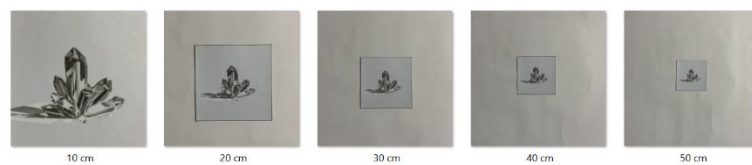


- Parameter cahaya



2. *Marker Gambar*

- Parameter jarak



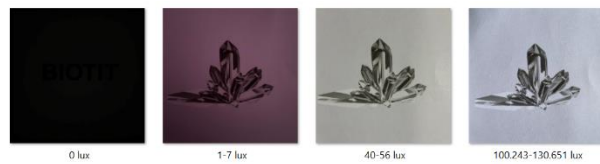
- Parameter rotasi



- Parameter sudut pandang

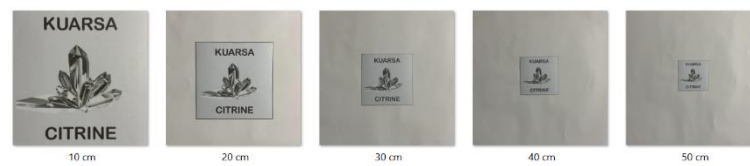


- Parameter cahaya

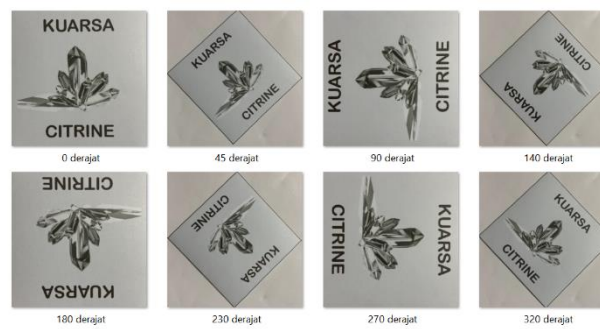


3. Marker Gambar+Teks

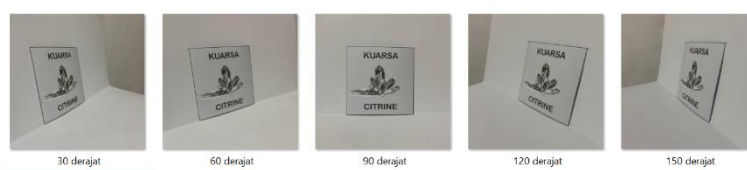
- Parameter jarak



- Parameter rotasi



- Parameter sudut pandang



- Parameter cahaya



Lampiran 4. *Source code* algoritma SIFT

```

import numpy as np
import cv2
from matplotlib import pyplot as plt

# BIOTIT berdasarkan JARAK
img1 = cv2.imread('D:/UNITY 3D AR/algoritma SIFT AR FIX/queryImage/biotit.jpg',0) # queryImage
img2 = cv2.imread('D:/UNITY 3D AR/algoritma SIFT AR FIX/trainImage/biotit/biotit_jarak.jpeg',0) # trainImage

# Initiate SIFT detector
sift = cv2.SIFT_create()

# find the keypoints and descriptors with SIFT
kp1, des1 = sift.detectAndCompute(img1,None)
kp2, des2 = sift.detectAndCompute(img2,None)

# BFMatcher with default params
bf = cv2.BFMatcher()
matches1 = bf.knnMatch(des1,des2, k=2)

# Apply ratio test
good1 = []
for m,n in matches1:
    if m.distance < 0.75*n.distance:
        good1.append([m])

# Cetak jumlah keypoints
print("MINERAL BIOTIT ---JARAK---")
print("Jumlah keypoints query image biotit berdasarkan jarak : ", len(kp1))
print("Jumlah keypoints train image biotit berdasarkan jarak : ", len(kp2))

# Cetak jumlah matching
print("Jumlah matching biotit berdasarkan jarak : ", len(good1))

# cv2.drawMatchesKnn expects list of lists as matches.
image1 = cv2.drawMatchesKnn(img1,kp1,img2,kp2,good1,img1,flags=2)

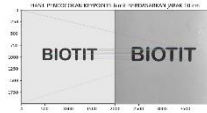
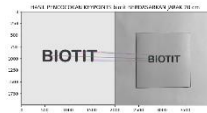
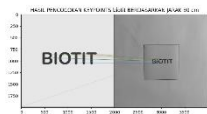
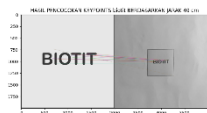

plt.figure(num=1, figsize=(8, 6)),plt.imshow(image1),plt.title("HASIL PENCOCOKAN KEYPOINTS BIOTIT BERDASARKAN JARAK"),plt.show()


```

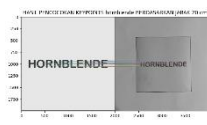
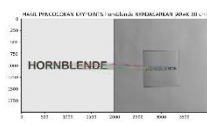
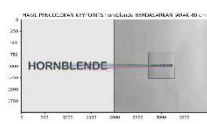
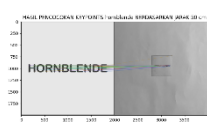
Lampiran 5. Hasil pengujian algoritma SIFT



1. Marker Teks




a. Parameter jarak




Marker Teks	Parameter Jarak	Keypoint Query	Keypoint Train	Matching
<i>Biotit</i>	 10 cm	76	3444	42
	 20 cm		730	40
	 30 cm		307	40
	 40 cm		203	30
	 50 cm		126	29

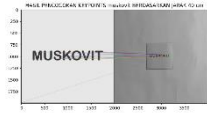
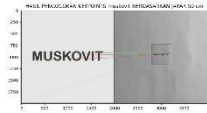
Marker Teks	Parameter Jarak	Keypoint Query	Keypoint Train	Matching
	 10 cm		1977	84





<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	10 cm	152		
			962	84
	20 cm		491	84
			278	79
	30 cm		199	72
	40 cm			
				
	40 cm			
				
	50 cm			

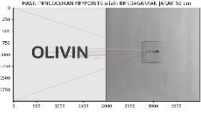
<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
			4339	64
	10 cm		923	62
				
	20 cm			


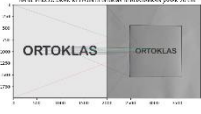
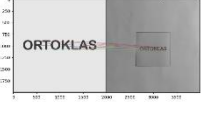
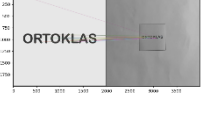
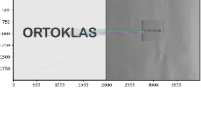
<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 <p>30 cm</p>	115	458	47
	 <p>40 cm</p>		297	44
	 <p>50 cm</p>		165	41




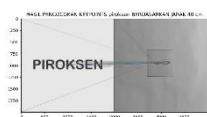

<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	 <p>10 cm</p>	99	1762	66
	 <p>20 cm</p>		897	47
	 <p>30 cm</p>		398	40


<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>40 cm</p>		235	40
	 <p>50 cm</p>		130	39

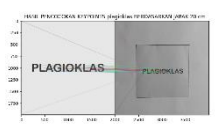
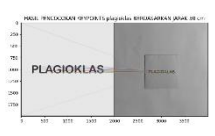
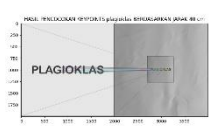
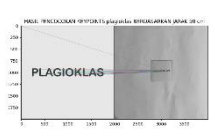
<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>10 cm</p>		4438	51
	 <p>20 cm</p>		788	45
<i>Olivin</i>	 <p>30 cm</p>	73	308	43
	 <p>40 cm</p>		167	43

<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>50 cm</p>		112	43

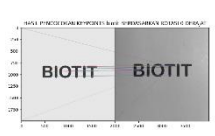
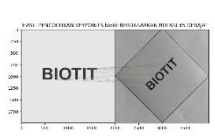
<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 <p>10 cm</p>	108	2120	69
	 <p>20 cm</p>		935	57
	 <p>30 cm</p>		451	55
	 <p>40 cm</p>		258	43
	 <p>50 cm</p>		223	41

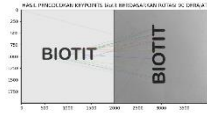





<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Piroksen</i>	 10 cm	116	2362	86
	 20 cm		911	78
	 30 cm		499	78
	 40 cm		274	76
	 50 cm		189	67

<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 10 cm		2405	80


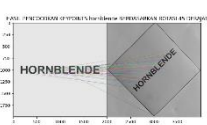
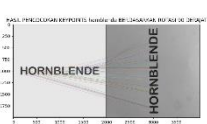
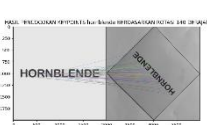

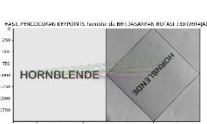

<i>Marker Teks</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 20 cm	113	938	67
	 30 cm		513	63
	 40 cm		365	62
	 50 cm		202	59

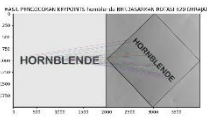
b. Parameter rotasi

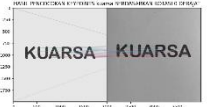




<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 0°		1188	47
	 45°		1149	39


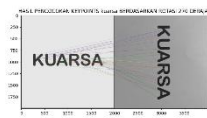

<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	 90°	76	1319	41
	 140°		1594	38
	 180°		1616	46
	 230°		1835	43
	 270°		1249	40
	 320°		1837	39


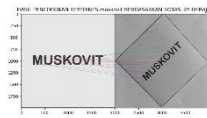
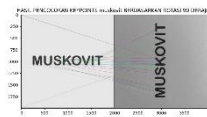
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
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<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	 0°	152	1792	87
	 45°		1690	91
	 90°		1804	90
	 140°		1948	103
	 180°		1543	88
	 230°		2068	88
	 270°		1418	87


<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>320°</p>		2049	79

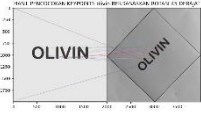






<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 <p>0°</p>	115	1772	78
	 <p>45°</p>		1633	44
	 <p>90°</p>		1332	78
	 <p>140°</p>		1578	59
	 <p>180°</p>		2417	70

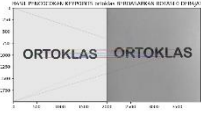

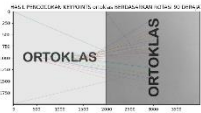

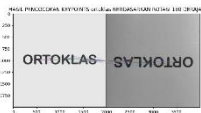


<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>230°</p>		2007	58
	 <p>270°</p>		1594	72
	 <p>320°</p>		2001	62

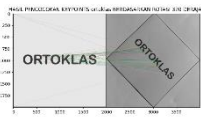
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>0°</p>		1395	51
	 <p>45°</p>		1685	45
	 <p>90°</p>		1408	55

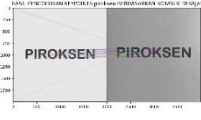
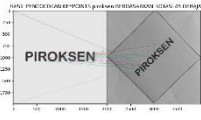
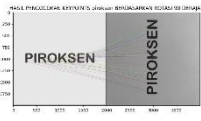


<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	 140°	99	1572	54
	 180°		1578	53
	 230°		1885	49
	 270°		1199	51
	 320°		1822	54

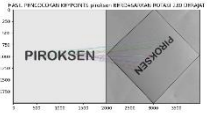
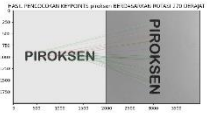
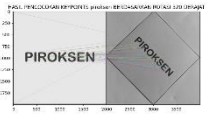
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 0°		1175	45

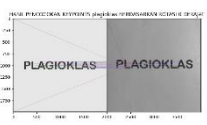
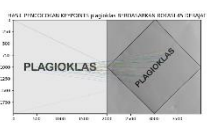
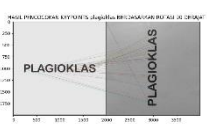
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>45°</p>	73	1352	39
	 <p>90°</p>		1398	45
	 <p>140°</p>		1431	41
	 <p>180°</p>		1442	38
	 <p>230°</p>		1441	36
	 <p>270°</p>		1190	45
	 <p>320°</p>		1420	47

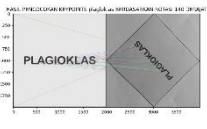
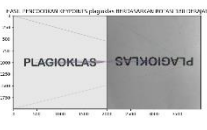
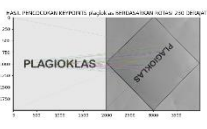
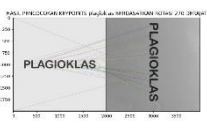

<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 0°	108	1683	70
	 45°		1442	52
	 90°		1737	66
	 140°		1712	64
	 180°		2214	60
	 230°		1936	59
	 270°		2026	62

<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>320°</p>		1933	67

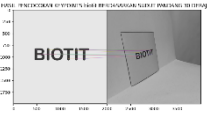
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Piroksen</i>	 <p>0°</p>	116	1877	90
	 <p>45°</p>		1463	71
	 <p>90°</p>		1707	70
	 <p>140°</p>		1774	60
	 <p>180°</p>		1914	64

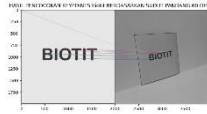

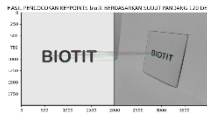

<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>230°</p>		1622	65
	 <p>270°</p>		2027	72
	 <p>320°</p>		1785	66


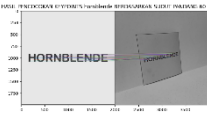
<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>0°</p>		1245	74
	 <p>45°</p>		1391	66
	 <p>90°</p>		1276	62

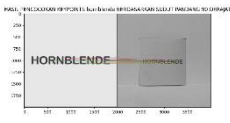
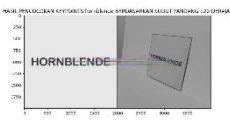

<i>Marker Teks</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 140°	113	1422	66
	 180°		1665	70
	 230°		1828	67
	 270°		1159	66
	 320°		1792	52


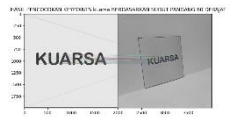
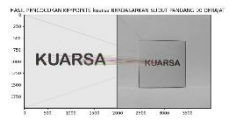
c. Parameter sudut pandang



<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		604	24



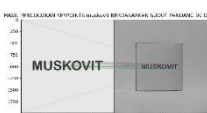

Marker Teks	Parameter Sudut Pandang	Keypoint Query	Keypoint Train	Matching
<i>Biotit</i>	 <p>60°</p>	76	661	47
	 <p>90°</p>		683	49
	 <p>120°</p>		679	25
	 <p>150°</p>		464	11

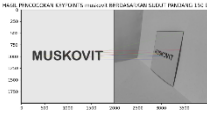
Marker Teks	Parameter Sudut Pandang	Keypoint Query	Keypoint Train	Matching
	 <p>30°</p>		641	33
	 <p>60°</p>		950	85

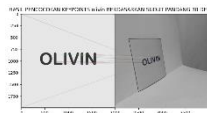




<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	 <p>90°</p>	152	962	93
	 <p>120°</p>		933	66
	 <p>150°</p>		663	12






<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 <p>30°</p>	115	602	40
	 <p>60°</p>		792	73
	 <p>90°</p>		894	78


<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>120°</p>		893	58
	 <p>150°</p>		591	22

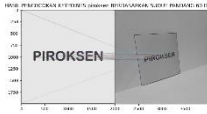



<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>30°</p>		696	32
	 <p>60°</p>		792	46
<i>Muskovit</i>	 <p>90°</p>	99	852	55
	 <p>120°</p>		831	42



<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>150°</p>		591	11

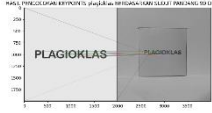


<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>30°</p>	73	681	36
	 <p>60°</p>		747	38
	 <p>90°</p>		768	50
	 <p>120°</p>		724	37
	 <p>150°</p>		509	19

<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 30°	108	733	35
	 60°		881	64
	 90°		987	64
	 120°		987	48
	 150°		683	28

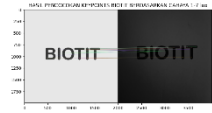

<i>Marker Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		649	27

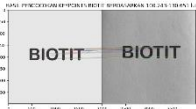
Marker Teks	Parameter Sudut Pandang	Keypoint Query	Keypoint Train	Matching
<i>Piroksen</i>	 60°	116	674	69
	 90°		929	76
	 120°		926	57
	 150°		676	14



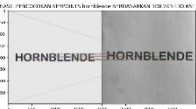
Marker Teks	Parameter Sudut Pandang	Keypoint Query	Keypoint Train	Matching
	 30°		749	41
	 60°		822	52

Marker Teks	Parameter Sudut Pandang	Keypoint Query	Keypoint Train	Matching
<i>Plagioklas</i>	 <p>90°</p>	113	989	71
	 <p>120°</p>		925	56
	 <p>150°</p>		696	25


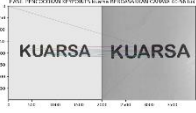
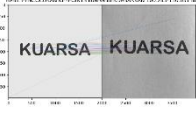
d. Parameter cahaya

Marker Teks	Parameter Cahaya	Keypoint Query	Keypoint Train	Matching
<i>Biotit</i>	Cahaya dalam ruangan gelap 0 lux	76	0	0
	 <p>Cahaya dalam ruangan redup 1 - 7 lux</p>		43	34
	 <p>Cahaya dalam ruangan terang</p>		1596	46

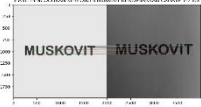
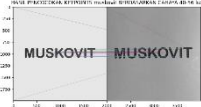

<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	40 - 56 lux			
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		4777	42

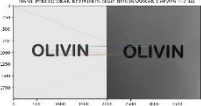
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		93	82
<i>Hornblende</i>	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	152	2058	103
	 <p>Luar ruangan cahaya matahari</p>		4402	94

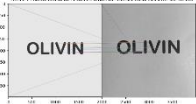

<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	100.243 – 130.651 lux			



<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	Cahaya dalam ruangan gelap 0 lux	115	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		596	59
	 Cahaya dalam ruangan terang 40 – 56 lux		2220	64
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		7607	62

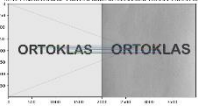
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam			




<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	ruangan gelap 0 lux	99	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		760	55
	 Cahaya dalam ruangan terang 40 – 56 lux		1471	71
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		4920	61

<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 Cahaya dalam		476	34

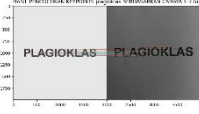
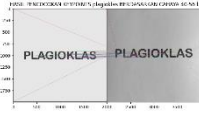
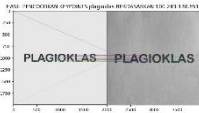
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	ruangan redup 1 – 7 lux	73		
	 Cahaya dalam ruangan terang 40 – 56 lux		3098	46
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		4833	35

<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	Cahaya dalam ruangan gelap 0 lux	108	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		563	60
	 Cahaya dalam		3669	72

<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	ruangan terang 40 – 56 lux			
	 <p>ORTOKLAS</p> <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		6071	67

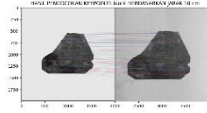
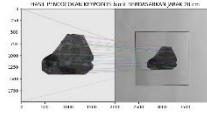
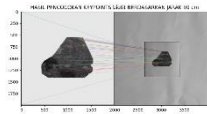
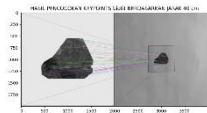
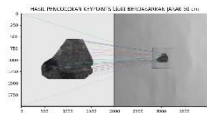
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>PIROKSEN</p> <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		563	54
<i>Piroksen</i>	 <p>PIROKSEN</p> <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	116	3351	89
	 <p>PIROKSEN</p> <p>Luar ruangan</p>		5286	88

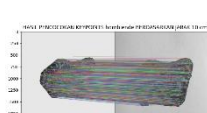
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	cahaya matahari 100.243 – 130.651 lux			

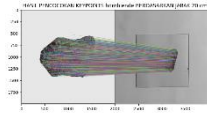
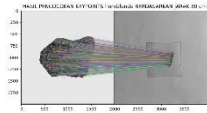
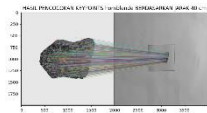
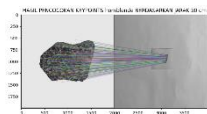
<i>Marker Teks</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	Cahaya dalam ruangan gelap 0 lux	113	0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		648	56
	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>		3120	71
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		4222	66

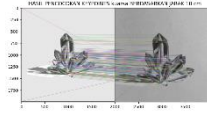
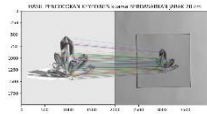
2. Marker Gambar

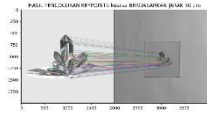
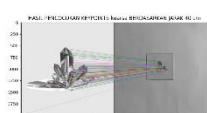
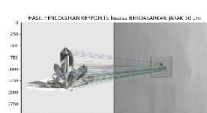
a. Parameter jarak

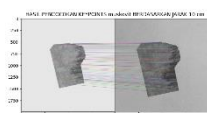
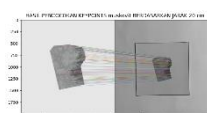

<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	 10 cm	1246	6397	70
	 20 cm		580	69
	 30 cm		393	67
	 40 cm		188	66
	 50 cm		103	59

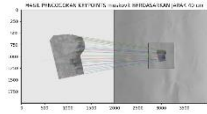
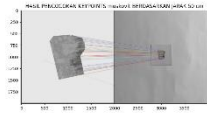
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 10 cm		16661	1925


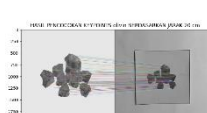
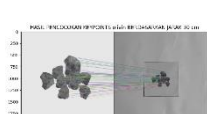
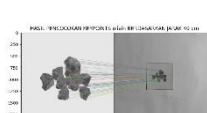
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	 20 cm	10830	4972	1801
	 30 cm		2590	1116
	 40 cm		1772	842
	 50 cm		1104	569

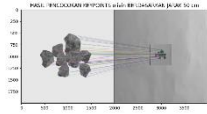
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 10 cm		7597	353
	 20 cm		1716	324

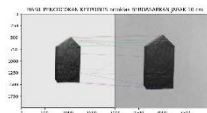
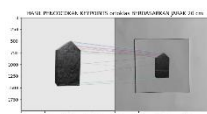
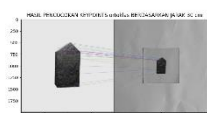
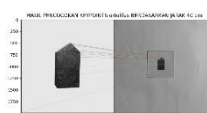
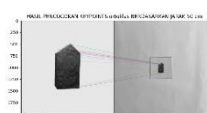
<i>Marker</i> Gambar	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 30 cm	836	1161	303
	 40 cm		773	275
	 50 cm		473	211

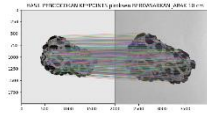
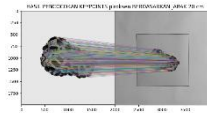
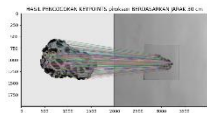
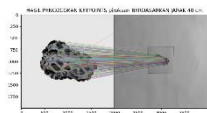
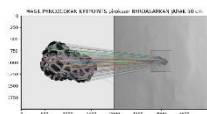
<i>Marker</i> Gambar	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Muskovit</i>	 10 cm	460	13328	110
	 20 cm		867	96
	 30 cm		449	87

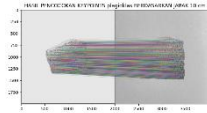
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>40 cm</p>		347	75
	 <p>50 cm</p>		235	74

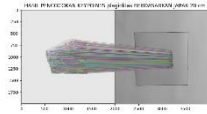



<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>10 cm</p>	516	13524	145
	 <p>20 cm</p>		1019	126
	 <p>30 cm</p>		531	122
	 <p>40 cm</p>		426	109

<i>Marker</i> Gambar	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>50 cm</p>		277	98

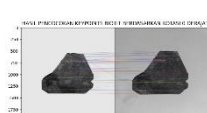

<i>Marker</i> Gambar	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 <p>10 cm</p>	1122	8211	33
	 <p>20 cm</p>		538	33
	 <p>30 cm</p>		364	32
	 <p>40 cm</p>		185	26
	 <p>50 cm</p>		108	22

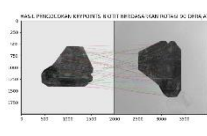
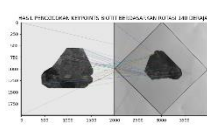
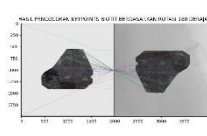
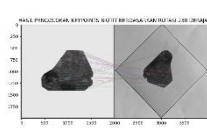
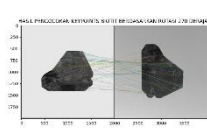
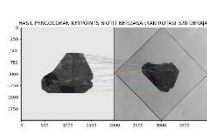
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Piroksen</i>	 10 cm	6407	11649	1147
	 20 cm		3864	1047
	 30 cm		2222	762
	 40 cm		1445	558
	 50 cm		944	457

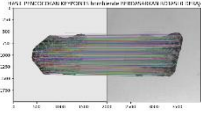
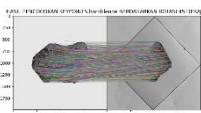

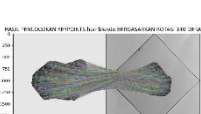
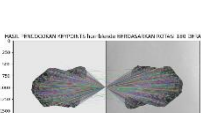

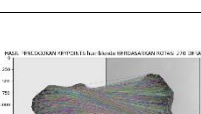
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 10 cm		12533	1405

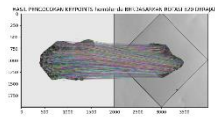
<i>Marker Gambar</i>	<i>Parameter Jarak</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 20 cm	4269	3610	1392
	 30 cm		2523	1098
	 40 cm		1623	688
	 50 cm		852	360

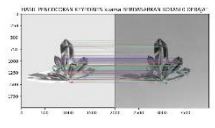
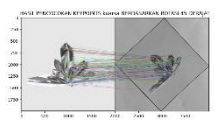
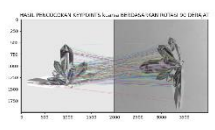
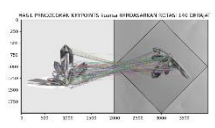
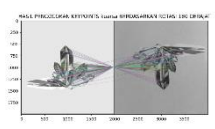
b. Parameter rotasi

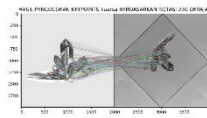
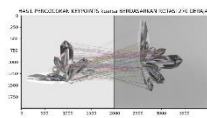
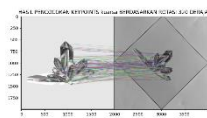
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 0°		2679	77
	 45°		1117	53

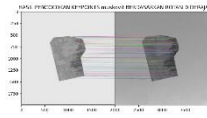
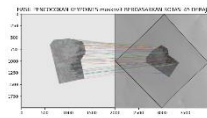
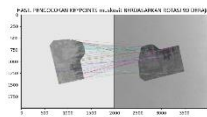
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	 <p>90°</p>	1246	2707	82
	 <p>140°</p>		1159	77
	 <p>180°</p>		3277	81
	 <p>230°</p>		1085	49
	 <p>270°</p>		384	79
	 <p>320°</p>		1277	46

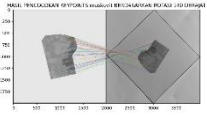
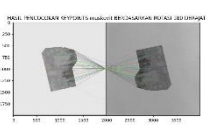
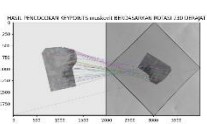
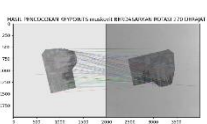
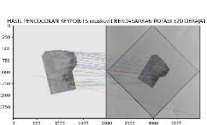
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	 0°	10830	12272	2124
	 45°		6415	1739
	 90°		12251	2131
	 140°		6327	2028
	 180°		11953	1974
	 230°		5303	1827
	 270°		10760	2255

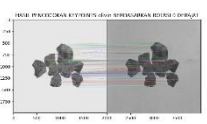
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>320°</p>		5366	1808

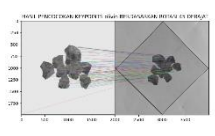
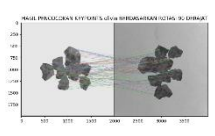
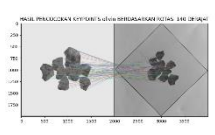
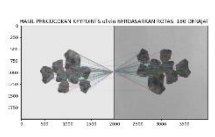
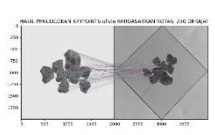
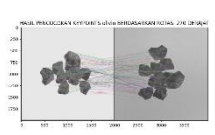
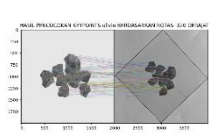
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 <p>0°</p>	836	4647	357
	 <p>45°</p>		2641	338
	 <p>90°</p>		4712	344
	 <p>140°</p>		2476	347
	 <p>180°</p>		5731	332

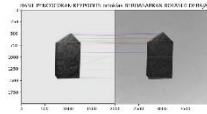
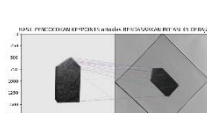



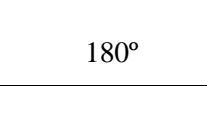

<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>230°</p>		2098	334
	 <p>270°</p>		3318	358
	 <p>320°</p>		2089	319

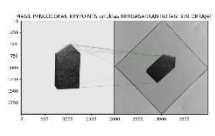
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>0°</p>		4115	114
	 <p>45°</p>		1263	100
	 <p>90°</p>		4078	112

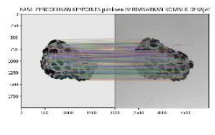
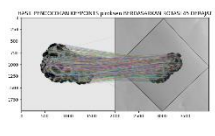
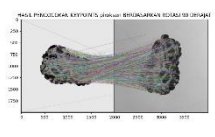
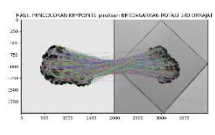
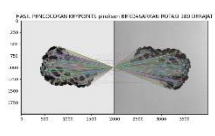
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	 140°	460	1367	110
	 180°		5442	98
	 230°		1269	101
	 270°		1098	122
	 320°		1018	107

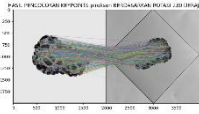
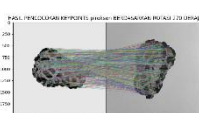
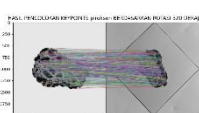
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 0°		4085	164

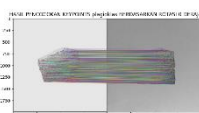
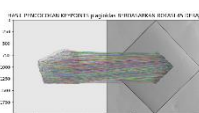

<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>45°</p>	516	1405	148
	 <p>90°</p>		1898	159
	 <p>140°</p>		1250	152
	 <p>180°</p>		4679	159
	 <p>230°</p>		1493	146
	 <p>270°</p>		2292	158
	 <p>320°</p>		1383	160

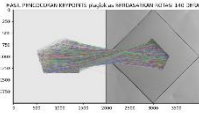
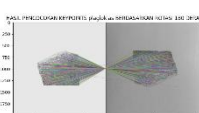
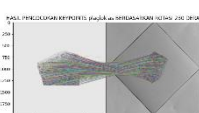
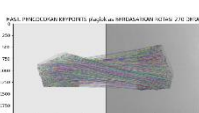
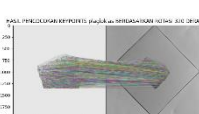
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 0°	1122	1663	34
	 45°		1100	29
	 90°		1649	32
	 140°		1125	24
	 180°		5187	34
	 230°		1139	36
	 270°		1130	32

<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>320°</p>		1109	20

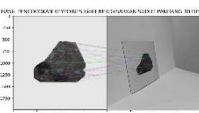
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Piroksen</i>	 <p>0°</p>	6407	9284	1223
	 <p>45°</p>		4357	1102
	 <p>90°</p>		9279	1209
	 <p>140°</p>		4620	1202
	 <p>180°</p>		9107	1102

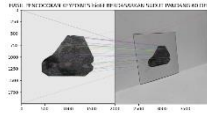
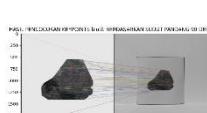
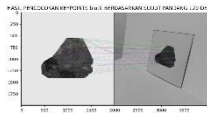
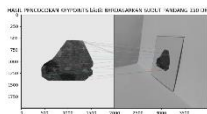
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 230°		4849	1156
	 270°		8119	1204
	 320°		4696	1144

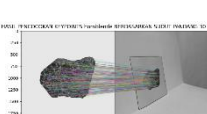
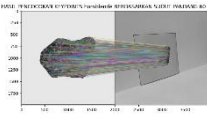
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 0°		6661	1416
	 45°		3389	1152
	 90°		6650	1429

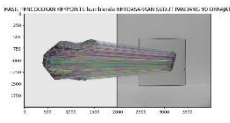
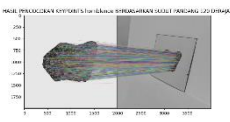
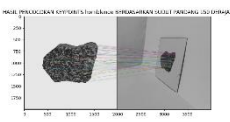
<i>Marker Gambar</i>	<i>Parameter Rotasi</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 140°	4269	4390	1441
	 180°		6518	1337
	 230°		3362	1194
	 270°		6536	1426
	 320°		3681	1226

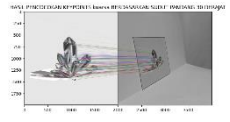
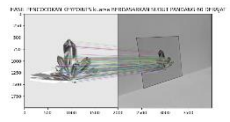
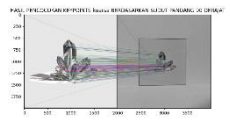
c. Parameter sudut pandang

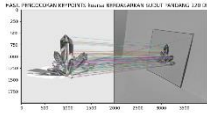
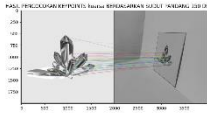
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		514	43

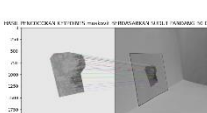
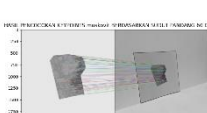
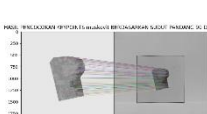
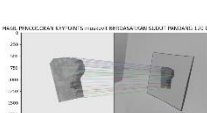
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	 60°	1246	540	57
	 90°		668	106
	 120°		667	44
	 150°		539	22

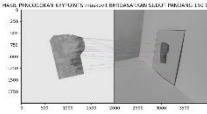
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		2802	521
	 60°		3124	1377

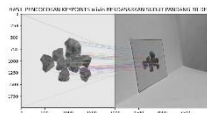
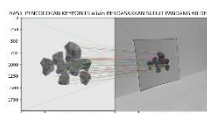

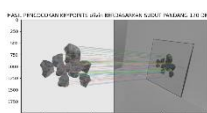
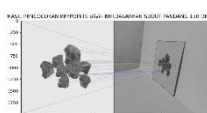
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Hornblende</i>	 90°	10830	3778	1796
	 120°		3550	1158
	 150°		2658	92

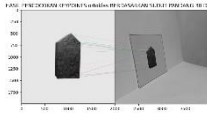
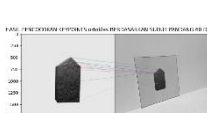



<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 30°	836	1152	195
	 60°		1207	314
	 90°		1293	349

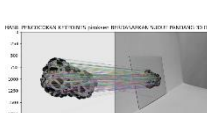
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 <p>120°</p>		1233	283
	 <p>150°</p>		1033	75

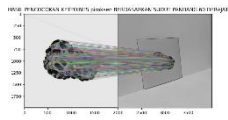
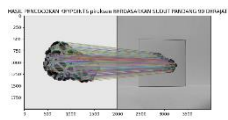
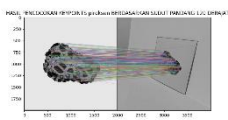
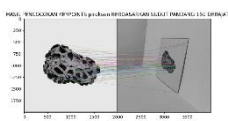
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	 <p>30°</p>	460	589	42
	 <p>60°</p>		613	103
	 <p>90°</p>		663	127
	 <p>120°</p>		649	86

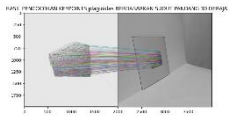
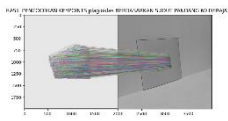
<i>Marker</i> Gambar	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>150°</p>		616	28

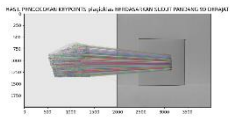
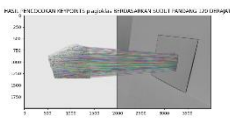
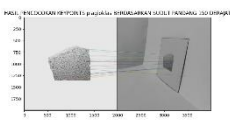
<i>Marker</i> Gambar	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>30°</p>	516	728	81
	 <p>60°</p>		739	136
	 <p>90°</p>		842	182
	 <p>120°</p>		817	112
	 <p>150°</p>		660	43

<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 30°	1122	433	19
	 60°		523	22
	 90°		526	36
	 120°		511	17
	 150°		382	12

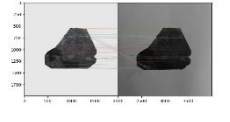
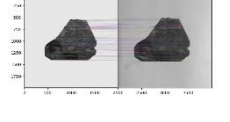
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		2368	429

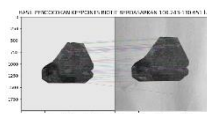
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Piroksen</i>	 60°	6407	2748	926
	 90°		3183	1072
	 120°		2852	727
	 150°		2112	113

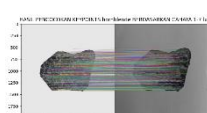
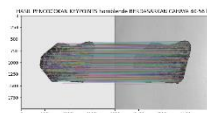
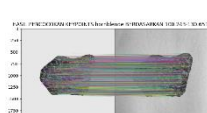
<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		2144	321
	 60°		2260	990

<i>Marker Gambar</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 <p>90°</p>	4269	2471	1188
	 <p>120°</p>		2436	828
	 <p>150°</p>		2243	34

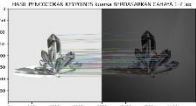
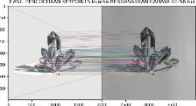
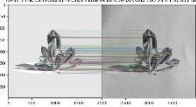
d. Parameter cahaya

<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	Cahaya dalam ruangan gelap 0 lux	1246	0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		148	50
	 <p>Cahaya dalam ruangan terang</p>		3457	82

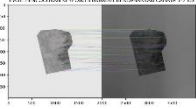
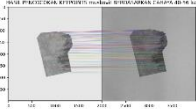
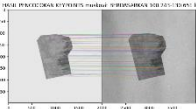
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	40 – 56 lux			
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		14141	64

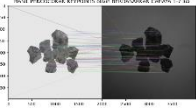
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		1963	1158
<i>Hornblende</i>	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	10830	12982	1861
	 <p>Luar ruangan cahaya matahari</p>		20490	1682

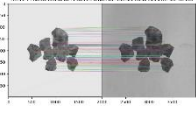
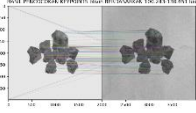
<i>Marker</i> Gambar	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	100.243 – 130.651 lux			

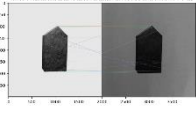
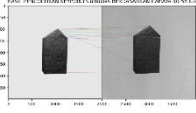
<i>Marker</i> Gambar	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	Cahaya dalam ruangan gelap 0 lux	836	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		375	230
	 Cahaya dalam ruangan terang 40 – 56 lux		7364	323
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		23587	301

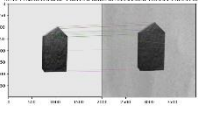
<i>Marker</i> Gambar	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	Cahaya dalam			

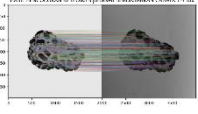
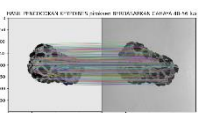
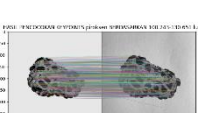
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Muskovit</i>	ruangan gelap 0 lux	460	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		98	55
	 Cahaya dalam ruangan terang 40 – 56 lux		2527	115
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		17441	103

<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 Cahaya dalam		277	114

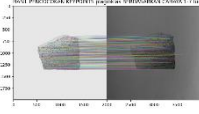
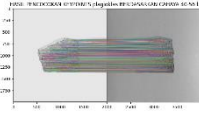
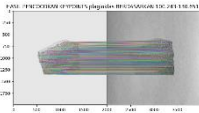
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Olivin</i>	ruangan redup 1 – 7 lux	516		
	 Cahaya dalam ruangan terang 40 – 56 lux		3222	170
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		21005	142

<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Ortoklas</i>	Cahaya dalam ruangan gelap 0 lux	1122	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		123	18
	 Cahaya dalam		5007	27

<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	ruangan terang 40 – 56 lux			
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		29050	26

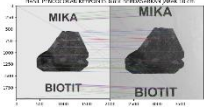
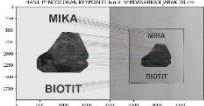
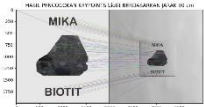
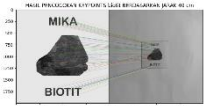
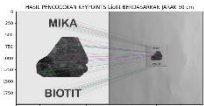
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		1787	768
<i>Piroksen</i>	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	6407	9397	1098
	 <p>Luar ruangan</p>		12083	969

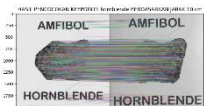
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	cahaya matahari 100.243 – 130.651 lux			

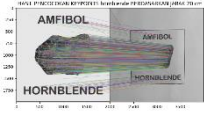
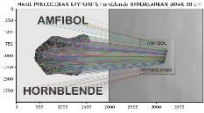
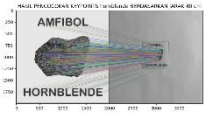
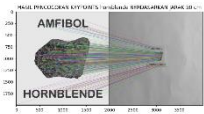
<i>Marker Gambar</i>	<i>Parameter Cahaya</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Plagioklas</i>	Cahaya dalam ruangan gelap 0 lux	4269	0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		1023	509
	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>		5656	1372
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		9432	1200

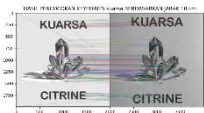
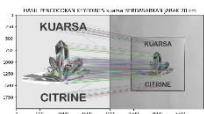
3. Marker Gambar+Teks

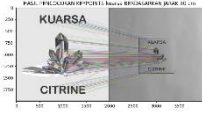
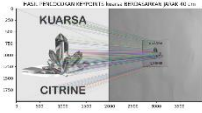
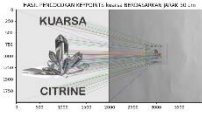
a. Parameter jarak

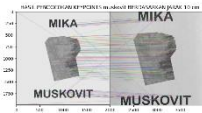
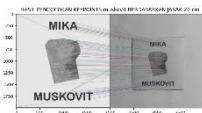
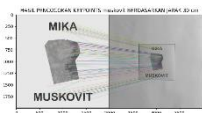
Marker Gambar+Teks	Parameter Jarak	Keypoint Query	Keypoint Train	Matching
<i>Biotit</i>	 10 cm	1405	6402	149
	 20 cm		1258	135
	 30 cm		802	127
	 40 cm		431	122
	 50 cm		292	114

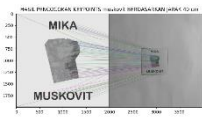
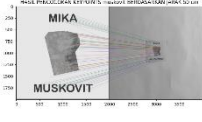
Marker Gambar+Teks	Parameter Jarak	Keypoint Query	Keypoint Train	Matching
	 10 cm		18019	1961

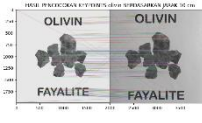
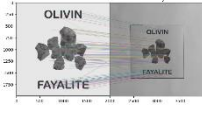
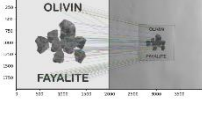
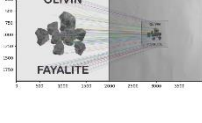
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Hornblende</i>	 20 cm	11048	6245	1863
	 30 cm		3710	1378
	 40 cm		2375	1031
	 50 cm		1461	751

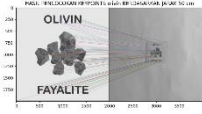
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 10 cm		5218	421
	 20 cm		2315	436


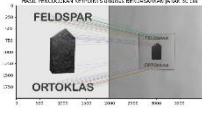
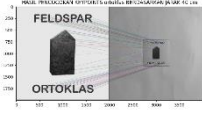
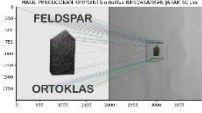
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 30 cm	969	1621	415
	 40 cm		1094	338
	 50 cm		761	315

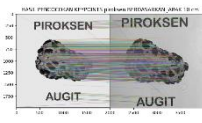
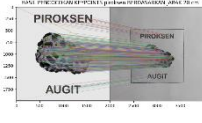
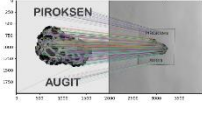
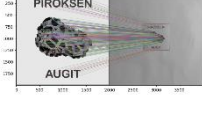
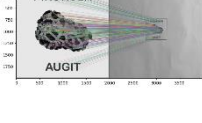
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Muskovit</i>	 10 cm	587	12741	231
	 20 cm		1310	190
	 30 cm		965	172

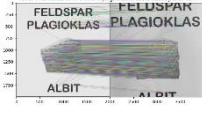
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>40 cm</p>		575	162
	 <p>50 cm</p>		458	130

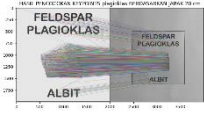
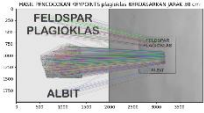


<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>10 cm</p>	656	5584	246
	 <p>20 cm</p>		1536	206
	 <p>30 cm</p>		1102	195
	 <p>40 cm</p>		757	189

<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>50 cm</p>		497	175


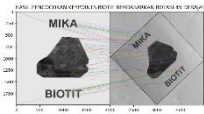
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 <p>10 cm</p>	1346	3714	178
	 <p>20 cm</p>		1405	164
	 <p>30 cm</p>		1018	157
	 <p>40 cm</p>		592	152
	 <p>50 cm</p>		376	146

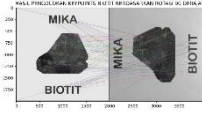
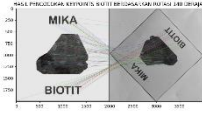

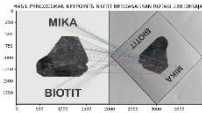
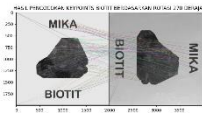
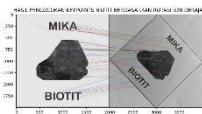
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Piroksen</i>	 10 cm	6562	10393	1232
	 20 cm		4797	1190
	 30 cm		2939	896
	 40 cm		1717	631
	 50 cm		1242	540

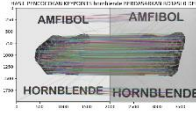
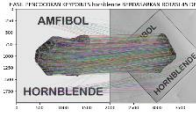
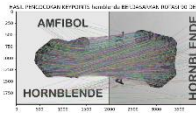
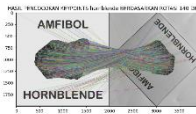
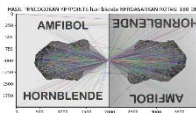
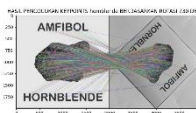
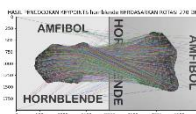
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 10 cm		12576	1692

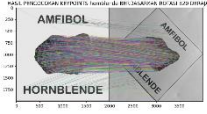
<i>Marker</i> Gambar+Teks	Parameter Jarak	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 20 cm	4616	4733	1577
	 30 cm		3580	1311
	 40 cm		2281	876
	 50 cm		1281	525

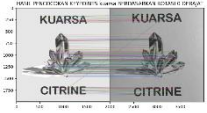
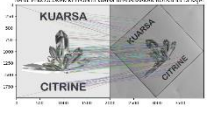
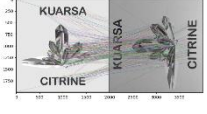
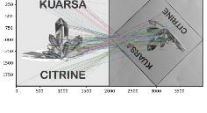
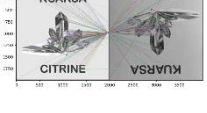
b. Parameter rotasi

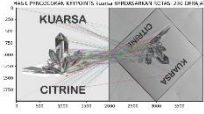
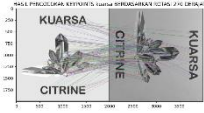
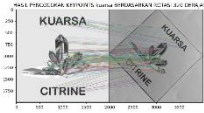
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 0°		6007	146
	 45°		1625	146

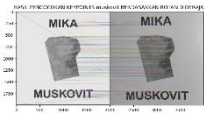
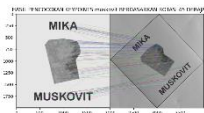

Marker Gambar+Teks	Parameter Rotasi	Keypoint Query	Keypoint Train	Matching
<i>Biotit</i>	 <p>90°</p>	1405	6306	157
	 <p>140°</p>		2109	140
	 <p>180°</p>		2520	151
	 <p>230°</p>		1923	145
	 <p>270°</p>		6030	157
	 <p>320°</p>		2030	142


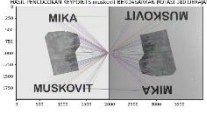
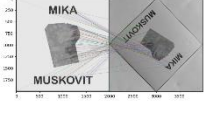
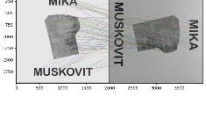

<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Hornblende</i>	 0°	11048	16779	2168
	 45°		6236	1918
	 90°		16790	2169
	 140°		8715	2061
	 180°		12438	2086
	 230°		7577	2021
	 270°		16588	2154

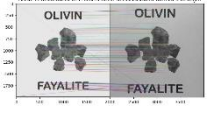
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>320°</p>		7607	1971

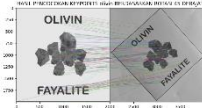
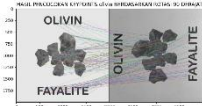
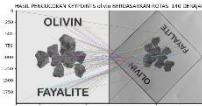
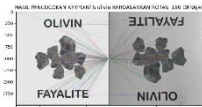
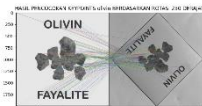
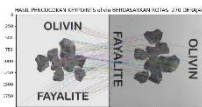
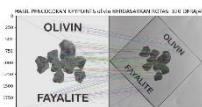
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 <p>0°</p>	969	4165	466
	 <p>45°</p>		2486	410
	 <p>90°</p>		4710	435
	 <p>140°</p>		3286	424
	 <p>180°</p>		3162	428

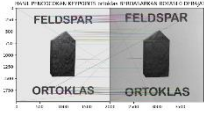



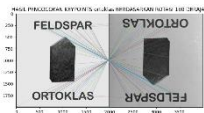


<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>230°</p>		3180	432
	 <p>270°</p>		4696	417
	 <p>320°</p>		3031	420


<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>0°</p>		5302	211
	 <p>45°</p>		1835	158
	 <p>90°</p>		4516	198

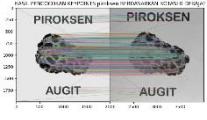
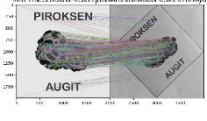
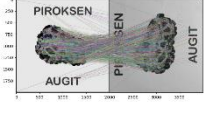
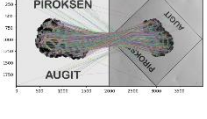
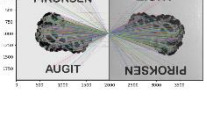
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Muskovit</i>	 140°	587	2319	179
	 180°		3613	203
	 230°		2241	186
	 270°		5661	202
	 320°		2094	168

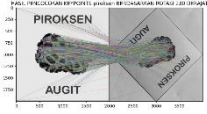
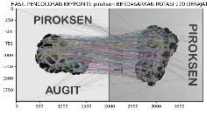
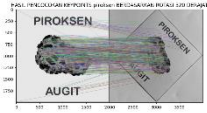
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 0°		4175	266




Marker Gambar+Teks	Parameter Rotasi	Keypoint Query	Keypoint Train	Matching
<i>Olivin</i>	 <p>45°</p>	656	2362	222
	 <p>90°</p>		3349	259
	 <p>140°</p>		2532	229
	 <p>180°</p>		2197	239
	 <p>230°</p>		2484	254
	 <p>270°</p>		4152	265
	 <p>320°</p>		2558	245

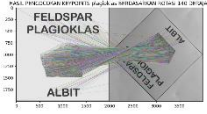
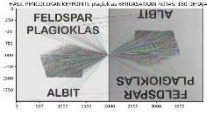
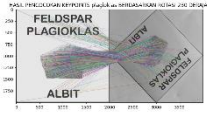


<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 0°	1346	3719	184
	 45°		1705	167
	 90°		3574	161
	 140°		2069	173
	 180°		1336	154
	 230°		2525	163
	 270°		2992	164

<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>320°</p>		2351	159

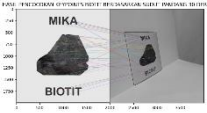
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Piroksen</i>	 <p>0°</p>	6562	10476	1269
	 <p>45°</p>		5530	1207
	 <p>90°</p>		10423	1285
	 <p>140°</p>		6155	1209
	 <p>180°</p>		8499	1201

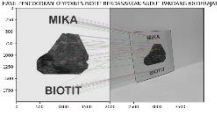
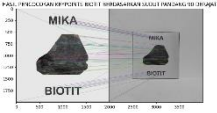
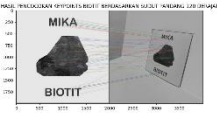
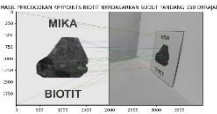
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>230°</p>		6074	1282
	 <p>270°</p>		10525	1278
	 <p>320°</p>		5740	1267

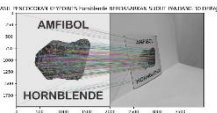
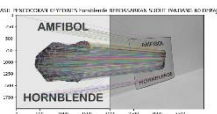
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>0°</p>		7179	1645
	 <p>45°</p>		4570	1390
	 <p>90°</p>		7186	1652

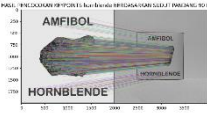
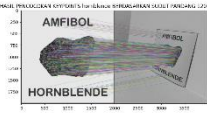
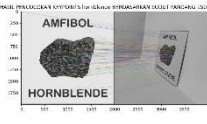
<i>Marker</i> Gambar+Teks	Parameter Rotasi	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 140°	4616	6301	1603
	 180°		6804	1543
	 230°		5291	1447
	 270°		8657	1714
	 320°		5395	1515

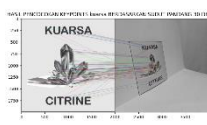
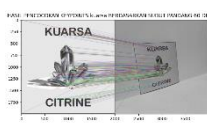
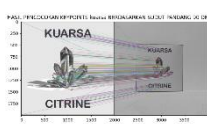
c. Parameter sudut pandang

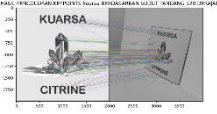

<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 30°		819	83


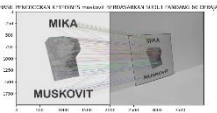
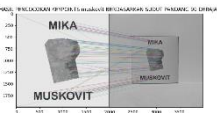

<i>Marker Gambar+Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
<i>Biotit</i>	 60°	1405	827	122
	 90°		920	150
	 120°		911	96
	 150°		813	53

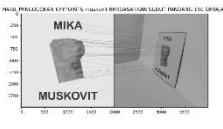
<i>Marker Gambar+Teks</i>	<i>Parameter Sudut Pandang</i>	<i>Keypoint Query</i>	<i>Keypoint Train</i>	<i>Matching</i>
	 30°		3642	619
	 60°		4444	1612

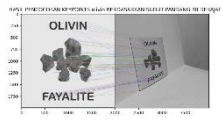
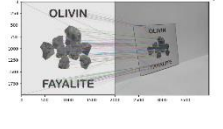
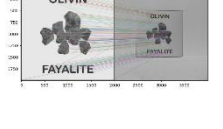
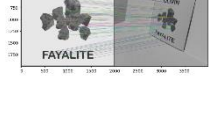
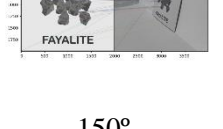
<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Hornblende</i>	 90°	11048	4927	1981
	 120°		4339	1222
	 150°		3451	141

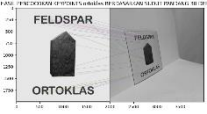

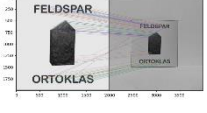


<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	 30°	969	1712	208
	 60°		1873	405
	 90°		1954	471

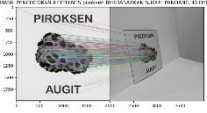
<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 120°		1727	354
	 150°		1514	83


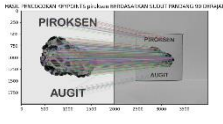
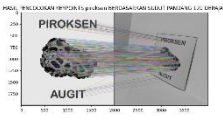
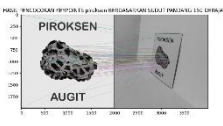
<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Muskovit</i>	 30°	587	1063	76
	 60°		1150	153
	 90°		1167	198
	 120°		1099	140


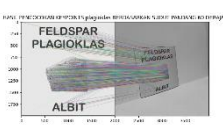
<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 <p>150°</p>		846	48

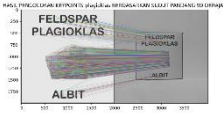
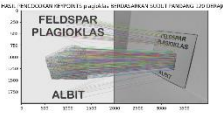

<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Olivin</i>	 <p>30°</p>	656	1317	101
	 <p>60°</p>		1346	213
	 <p>90°</p>		1396	252
	 <p>120°</p>		1284	180
	 <p>150°</p>		1035	65

<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Ortoklas</i>	 30°	1346	1176	63
	 60°		1291	138
	 90°		1370	171
	 120°		1211	123
	 150°		944	37

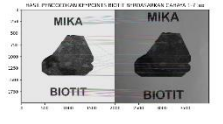
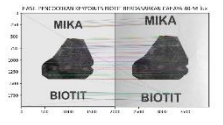
<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	 30°		3009	484


<i>Marker</i> Gambar+Teks	<i>Parameter Sudut</i> Pandang	<i>Keypoint</i> Query	<i>Keypoint</i> Train	<i>Matching</i>
<i>Piroksen</i>	 60°	6562	3505	1038
	 90°		3622	1190
	 120°		3469	839
	 150°		2516	128

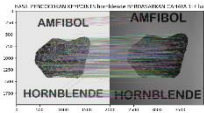
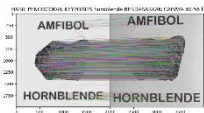
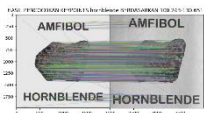
<i>Marker</i> Gambar+Teks	<i>Parameter Sudut</i> Pandang	<i>Keypoint</i> Query	<i>Keypoint</i> Train	<i>Matching</i>
	 30°		3118	464
	 60°		3360	1183

<i>Marker</i> Gambar+Teks	Parameter Sudut Pandang	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Plagioklas</i>	 90°	4616	3867	1571
	 120°		3846	1047
	 150°		3089	77

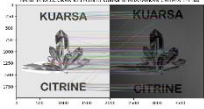
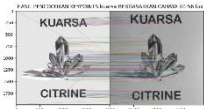

d. Parameter cahaya

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Biotit</i>	Cahaya dalam ruangan gelap 0 lux	1405	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		605	114
	 Cahaya dalam ruangan terang		10278	159

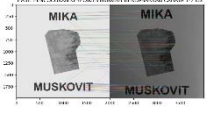
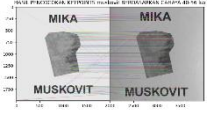

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	40 – 56 lux			
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		9225	146

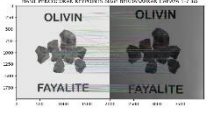
<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		2468	887
<i>Hornblende</i>	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	11048	18284	1975
	 <p>Luar ruangan cahaya matahari</p>		18532	1843

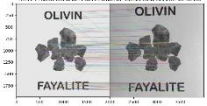

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	100.243 – 130.651 lux			



<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Kuarsa</i>	Cahaya dalam ruangan gelap 0 lux	969	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		716	322
	 Cahaya dalam ruangan terang 40 – 56 lux		4871	456
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		7853	412


<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	Cahaya dalam			

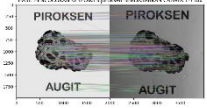


<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Muskovit</i>	ruangan gelap 0 lux	587	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		524	127
	 Cahaya dalam ruangan terang 40 – 56 lux		5894	209
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		7631	180

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 Cahaya dalam		790	223

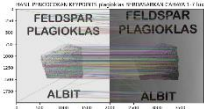


<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Olivin</i>	ruangan redup 1 – 7 lux	656		
	 Cahaya dalam ruangan terang 40 – 56 lux		4347	245
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		6668	238

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Ortoklas</i>	Cahaya dalam ruangan gelap 0 lux	1346	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		597	144
	 Cahaya dalam		4007	170

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	ruangan terang 40 – 56 lux			
	 <p>Luar ruangan cahaya matahari 100.243 – 130.651 lux</p>		6086	156

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	Cahaya dalam ruangan gelap 0 lux		0	0
	 <p>Cahaya dalam ruangan redup 1 – 7 lux</p>		3432	916
<i>Piroksen</i>	 <p>Cahaya dalam ruangan terang 40 – 56 lux</p>	6562	11754	1205
	 <p>Luar ruangan</p>		11961	1149

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
	cahaya matahari 100.243 – 130.651 lux			

<i>Marker</i> Gambar+Teks	Parameter Cahaya	<i>Keypoint</i> <i>Query</i>	<i>Keypoint</i> <i>Train</i>	<i>Matching</i>
<i>Plagioklas</i>	Cahaya dalam ruangan gelap 0 lux	4616	0	0
	 Cahaya dalam ruangan redup 1 – 7 lux		1893	758
	 Cahaya dalam ruangan terang 40 – 56 lux		7896	1622
	 Luar ruangan cahaya matahari 100.243 – 130.651 lux		10253	1422

Lampiran 6. Soal *pre-test* dan *post-test*

Nama :

Kode responden :

1. Semua mineral adalah “kristalin” berarti semua mineral.....
 - a. Selalu ditemukan sebagai kristal
 - b. Mempunyai belahan
 - c. Mempunyai struktur dalam atom yang teratur
 - d. Selalu berbentuk persegi
 - e. Tidak larut dalam air
2. Faktor apa yang dapat mempengaruhi warna mineral.....
 - a. Lama pembentukan mineral
 - b. Pelapukan karena hujan dan panas di permukaan bumi
 - c. Ukuran butir
 - d. Adanya pengotoran dalam ikatan kimia mineral
 - e. Lapisan pembungkus permukaan mineral
3. Yang termasuk mineral di antara nama-nama di bawah ini.....
 - a. Mika
 - b. Batubara
 - c. Peridotit
 - d. Kuarsit
 - e. Marmer
4. Berikut ini adalah syarat suatu materi disebut mineral, kecuali.....
 - a. Terbentuk alami
 - b. Memiliki sistem kristal tertentu
 - c. Terbentuk secara organik
 - d. Mempunyai sifat fisik tertentu
 - e. Memiliki komposisi kimia tertentu
5. Komposisi kimia kuarsa adalah.....
 - a. SiO_2
 - b. AlSiO_2
 - c. FeS_2
 - d. CaCO_3
 - e. NHCO_2

6. Belahan mineral merupakan salah satu ciri fisik dalam identifikasi mineral. Mineral yang mempunyai belahan satu arah sempurna adalah.....
 - a. Muskovit
 - b. Kalsit
 - c. Galena
 - d. Kuarsa
 - e. Pirit
7. Mineral ini dapat memiliki warna putih, ungu, kuning, coklat, pink, biru, atau tidak berwarna. Karakteristik lainnya adalah mempunyai kilap kaca, ceratnya putih, pecahannya *konkoidal* dan *brittle*. Strukturnya dapat *prismatic*, *granular*, bahkan *amorf*. Secara umum mineral ini dapat ditemukan dalam batuan beku, sedimen, dan metamorf. Mineral ini sekilas mirip dengan kalsit, namun mineral ini bereaksi dengan HCl. Mineral yang dimaksud adalah.....
 - a. Mika
 - b. Muskovit
 - c. Biotit
 - d. Aragonit
 - e. Kuarsa
8. Material yang bersifat padat, terbentuk secara alamiah, anorganik, dengan komposisi kimia tertentu dan memiliki struktur kristalin disebut.....
 - a. Mineral
 - b. Batuan
 - c. Matriks
 - d. Semen
 - e. Mikrit
9. Salah satu jenis sifat dalam suatu mineral adalah *sectile*, yang berarti.....
 - a. Dapat dipotong
 - b. Mudah pecah
 - c. Dapat dipintal
 - d. Dapat dilenturkan
 - e. Mudah terbakar

10. Berikut ini beberapa nama batuan dan mineral

- (1) Biotit
- (2) Sekis
- (3) Feldspar
- (4) Kuarsit

Yang merupakan nama mineral adalah.....

- a. (1), (2)
- b. (1), (4)
- c. (1), (3)
- d. (2), (3)
- e. (2), (4)

Lampiran 7. *Task* skenario

No.	<i>Task</i>	Skenario	<i>Goal</i>
1.	T1	Temukan petunjuk penggunaan aplikasi	Peserta mampu menggunakan fitur <i>dropdown</i>
2.	T2	Tampilkan objek 3D dan info mineral kuarsa	Peserta mampu menggunakan <i>marker</i> untuk memvisualisasikan objek 3D mineral
3.	T3	Temukan pengertian mineral	Peserta mampu menggunakan fitur materi
4.	T4	Temukan penjelasan sifat fisik mineral tentang belahan dan pecahan	Peserta mampu menggunakan fitur <i>swipe/slide</i>
5.	T5	Kerjakan kuis dan peroleh nilai kuis	Peserta mampu menggunakan fitur kuis

Lampiran 8. Kuesioner

No	Pernyataan	STS	TS	N	S	SS
Manfaat Aplikasi						
1.	Penggunaan aplikasi <i>augmented reality</i> mineral dapat meningkatkan pemahaman saya tentang sifat-sifat mineral dalam OSN Kebumian	0	0	0	0	0
2.	Penggunaan aplikasi <i>augmented reality</i> mineral dapat memberikan pengalaman belajar yang lebih menarik dan interaktif dalam mempelajari materi OSN Kebumian tentang mineral	0	0	0	0	0
3.	Aplikasi <i>augmented reality</i> mineral dapat membantu saya mengidentifikasi jenis-jenis mineral dalam kompetisi OSN Kebumian	0	0	0	0	0
4.	Aplikasi <i>augmented reality</i> mineral efektif dalam membantu pemahaman konsep-konsep mineralogis	0	0	0	0	0
5.	Aplikasi <i>augmented reality</i> mineral dapat menjadi alat yang efektif untuk meningkatkan daya tarik OSN Kebumian bagi peserta	0	0	0	0	0
Kemudahan Aplikasi						
6.	Aplikasi <i>augmented reality</i>	0	0	0	0	0

No	Pernyataan	STS	TS	N	S	SS
	mineral mudah digunakan untuk memahami informasi tentang mineral dalam OSN Kebumian					
7.	Antarmuka pengguna aplikasi <i>augmented reality</i> mineral sangat intuitif	0	0	0	0	0
8.	Navigasi dan interaksi dengan konten mineral menggunakan aplikasi <i>augmented reality</i> mineral mudah dimengerti	0	0	0	0	0
9.	Aplikasi <i>augmented reality</i> mineral dalam OSN Kebumian memberikan kemudahan dalam memahami sifat dan karakteristik mineral	0	0	0	0	0
10.	Petunjuk atau panduan penggunaan aplikasi <i>augmented reality</i> mineral sangat jelas dan membantu	0	0	0	0	0
Konten Aplikasi						
11.	Informasi yang disajikan oleh aplikasi <i>augmented reality</i> tentang mineral relevan dengan materi yang diajarkan dalam OSN Kebumian	0	0	0	0	0
12.	Aplikasi <i>augmented reality</i> mineral menyajikan informasi tentang jenis-jenis mineral dan sifat-sifatnya dengan sangat baik sesuai dengan materi OSN Kebumian	0	0	0	0	0
13.	Keterbacaan informasi yang	0	0	0	0	0

No	Pernyataan	STS	TS	N	S	SS
	disajikan oleh aplikasi <i>augmented reality</i> tentang mineral OSN Kebumihan sangat jelas					
14.	Penjelasan yang diberikan oleh aplikasi <i>augmented reality</i> mineral tentang karakteristik fisik dan kimia mineral sudah akurat	0	0	0	0	0
15.	Aplikasi <i>augmented reality</i> mineral memberikan ilustrasi visual yang membantu dalam memahami konsep-konsep mineral	0	0	0	0	0
<i>Interface Aplikasi</i>						
16.	Antarmuka aplikasi <i>augmented reality</i> mineral mudah dipahami dan ramah pengguna	0	0	0	0	0
17.	Antarmuka aplikasi <i>augmented reality</i> mineral memfasilitasi navigasi antara berbagai fitur atau modul informasi dengan sangat baik	0	0	0	0	0
18.	Antarmuka pengguna aplikasi <i>augmented reality</i> mineral memberikan petunjuk yang jelas tentang cara mengakses informasi terkait mineral	0	0	0	0	0
19.	Responsivitas antarmuka aplikasi <i>augmented reality</i> mineral terhadap interaksi pengguna sangat cepat	0	0	0	0	0
20.	Antarmuka aplikasi <i>augmented</i>	0	0	0	0	0

No	Pernyataan	STS	TS	N	S	SS
	<i>reality</i> mineral sangat intuitif dalam memberikan informasi terkait mineral secara visual					

Lampiran 9. Berita acara seminar hasil



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<http://eng.unhas.ac.id/informatika>, Email : informatika@unhas.ac.id

DAFTAR HADIR SEMINAR HASIL

Nama/Stambuk : 1. Pirda D121181012

Judul Skripsi/T.A : “ Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran Macam Macam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur”

Hari/Tanggal : Rabu, 11 Oktober 2023

Jam : 13.00 Wita – Selesai

Tempat : Ruang Lab. AIMP Departemen Teknik Informatika Gowa

No.	Jabatan	Nama Dosen	Tanda Tangan
L.	Pembimbing I	1. A. Ais Prayogi Alimuddin, ST., M. Eng	1.
	Pembimbing II	2. Prof. Dr. Eng. Intan Sari Areni, ST., M. T	2.
II.	Anggota Penguji	3. Anugrayani Bustamin, ST., M. T	3.
		4. Mukarramah Yusuf, B. Sc., M. Sc., Ph. D	4.

PANITIA UJIAN

Ketua,

A. Ais Prayogi Alimuddin, ST., M. Eng

Sekretaris,

Prof. Dr. Eng. Intan Sari Areni, ST., M. T



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BERITA ACARA SEMINAR HASIL

Pada hari ini Rabu, tanggal 11 Oktober 2023 Pukul 13.00 WITA - Selesai bertempat di Ruang Lab.AIMP Departemen Teknik Informatika, telah dilaksanakan Seminar Hasil bagi Saudara :

Nama : Pirda
No. Stambuk : D121181012
Fakultas/Departemen : Teknik/Teknik Informatika
Judul Skripsi : " Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran Macam Macam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur "

Yang dihadiri oleh Tim Penguji Seminar Hasil sebagai berikut :

No.	N a m a	Jabatan	Tanda tangan
1.	A. Ais Prayogi Alimuddin, ST., M. Eng	Pemb I/Ketua	1.
2.	Prof. Dr. Eng. Intan Sari Areni, ST., M. T	Pemb II/Sekretaris	2.
3.	Anugrayani Bustamin, ST., M. T	Anggota	3.
4.	Mukarramah Yusuf, B. Sc., M. Sc., Ph. D	Anggota	4.

Hasil keputusan Tim Penguji Seminar Hasil : Lulus / Tidak lulus dengan nilai angka 85 dan huruf A

Makassar, 11 Oktober 2023

Ketua/Sekretaris Panitia Ujian,

A. Ais Prayogi Alimuddin, ST., M. Eng



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<http://eng.unhas.ac.id/informatika>, Email : informatika@unhas.ac.id

Nomor : 1164/UN4.7.7/TD.06/2023
Lamp : -
Hal : Penerbitan Surat Penugasan Panitia
Seminar Hasil Strata Satu (S1)

Kepada Yth :

Wakil Dekan Bidang Akademik dan Kemahasiswaan
Fakultas Teknik Universitas Hasanuddin

Di-

Gowa

Dengan hormat,

Berdasarkan Persetujuan Pembimbing Mahasiswa, Bersama ini diusulkan susunan Panitia Seminar Hasil Strata Satu (S1) bagi mahasiswa Departemen Teknik Informatika Fakultas Teknik tersebut di bawah ini :

Nama / Stambuk	: Pirda	D121181012
Judul TA	: Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran MacamMacam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur	

Dengan ini kami sampaikan Susunan Panitia Seminar Hasil Program Strata Satu (S1) Departemen Teknik Informatika Fakultas Teknik Universitas Hasanuddin dengan susunan sebagai berikut :

Pembimbing I/ Ketua	: 1. A. Ais Prayogi Alimuddin, ST., M.Eng
Pembimbing II / Sekretaris	: 2. Prof. Dr.Eng. Intan Sari Areni, ST., M.T
Anggota	: 3. Anugrayani Bustami, S.T., M.T
	: 4. Mukarramah Yusuf, B.Sc.,M.Sc., Ph.D

Untuk dapat diterbitkan surat penugasannya

Demikian penyampaian kami, atas perhatian dan kerjasamanya diucapkan terima kasih.

Gowa, 9 Oktober 2023

Ketua Departemen Tek.Informatika,



Prof. Dr. Ir. Indrabayu.,ST, MT, M.Bus.Sys., IPM, ASEAN.Eng
Nip.19750716 200212 1 004

Tembusan :
1. Arsip



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Telp. (0411) 586015, 586262 Fax (0411) 586015
<http://eng.unhas.ac.id>, Email : teknik@unhas.ac.id

SURAT PENUGASAN
No. 22517/UN4.7.1/TD.06/2023

- Dari : Dekan Fakultas Teknik Universitas Hasanuddin
Kepada : Mereka yang tercantum namanya dibawah ini
Isi : 1. Bahwa berdasarkan peraturan Akademik Universitas Hasanuddin Tahun 2018 pasal 18 (SK.Rektor Unhas nomor : 2781/UN4.1/KEP/2018), dengan ini menugaskan Saudara sebagai PANITIA SEMINAR HASIL Program Strata Satu (S1) Departemen Teknik Informatika Fakultas Teknik Universitas Hasanuddin dengan susunan sebagai berikut :
- Pembimbing I / Ketua : 1. A. Ais Prayogi Alimuddin, ST., M.Eng
Pembimbing II / Sekretaris : 2. Prof. Dr.Eng. Intan Sari Areni, ST., M.T
Anggota : 3. Anugrayani Bustami, S.T., M.T
4. Mukarramah Yusuf, B.Sc.,M.Sc., Ph.D

Untuk menguji bagi mahasiswa tersebut dibawah ini :

- Nama/NIM : Pirda D121181012
Program Studi : Teknik Informatika
Judul thesis/Skripsi : Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran MacamMacam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur
2. Waktu seminar ditetapkan oleh Panitia Seminar Hasil Program Strata Satu (S1)
 3. Agar Surat Penugasan ini dilaksanakan sebaik-baiknya dengan penuh rasa tanggung jawab.
 4. Surat penugasa ini berlaku sejak tanggal ditetapkan sampai dengan berakhirnya seminar tersebut dengan ketentuan bahwa segala sesuatu akan ditinjau dan diperbaiki sebagaimana mestinya apabila dikemudia hari terdapat kekeliruan dalam keputusan ini.

Ditetapkan di Gowa
Pada tanggal 9 Oktober 2023
a.n. Dekan,
Wakil Dekan Bidang Akademik dan Kemahasiswaan
Fakultas Teknik Unhas



Dr. Amil Ahmad Ilham, ST., M.IT
NIP. 197310101998021001

- Tembusan :
1. Dekan Fak. Teknik Unhas
 2. Ketua Departemen Teknik Informatika FT-UH
 3. Mahasiswa yang bersangkutan



- Dokumen ini telah ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan BSrE
- UU ITE No 11 Tahun 2008 Pasal 5 Ayat 1
- "Informasi Elektronik dan/atau Dokumen Elektronik dan/atau hasil cetaknya merupakan alat bukti hukum yang sah"

Lampiran 10. Berita acara sidang tutup



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<http://eng.unhas.ac.id/informatika>, Email : informatika@unhas.ac.id

DAFTAR HADIR UJIAN SKRIPSI MAHASISWA
FAKULTAS TEKNIK UNHAS

Nama/Stambuk : I. Pirda D121181012

Judul Skripsi/T.A : “ Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran Macam Macam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur“

Hari/Tanggal : Jumat, 22 Maret 2024

Jam : 13.00 Wita – Selesai

Tempat : Ruang Lab. AIMP Departemen Teknik Informatika Gowa

No.	Jabatan	Nama Dosen	Tanda Tangan
L.	Pembimbing I	1. A. Ais Prayogi Alimuddin, ST., M. Eng	1.
	Pembimbing II	2. Prof. Dr. Eng. Intan Sari Areni, ST., M. T	2.
II.	Anggota Penguji	3. Mukarramah Yusuf, B.Sc., M.Sc., Ph.D	3.
		4. Anugrayani Bustamin, ST., M. T	4.

PANITIA UJIAN

Ketua,

A. Ais Prayogi Alimuddin, ST., M. Eng

Sekretaris,
Prof. Dr. Eng. Intan Sari Areni, ST., M. T



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<http://eng.unhas.ac.id/informatika>, Email : informatika@unhas.ac.id

BERITA ACARA UJIAN SKRIPSI

Pada hari ini Jumat, tanggal 22 Maret 2024 Pukul 13.00 WITA - Selesai bertempat di Lab. AIMP Departemen Teknik Informatika Gowa, telah dilaksanakan Ujian Skripsi bagi Saudara :

Nama : Pirda
No. Stambuk : D121181012
Fakultas/Departemen : Teknik /Teknik Informatika
Judul Skripsi : “ Implementasi Algoritma SIFT pada Aplikasi Media Pembelajaran Macam Macam Mineral Berbasis Augmented Reality Studi Kasus : SMAN 9 Luwu Timur“

Yang dihadiri oleh Tim Penguji Ujian Skripsi sebagai berikut :

No.	N a m a	Jabatan	Tanda tangan
1.	A. Ais Prayogi Alimuddin, ST., M. Eng	Pemb I/Ketua	1.
2.	Prof. Dr. Eng. Intan Sari Areni, ST., M. T	Pemb II/Sekretaris	2.
3.	Mukarramah Yusuf, B. Sc., M. Sc., Ph. D	Anggota	3.
4.	Anugrayani Bustamin, ST., M. T	Anggota	4.

Hasil keputusan Tim Penguji Ujian Skripsi/Tugas Akhir : Lulus / ~~Tidak Lulus~~ dengan nilai angka dan huruf

Gowa, 22 Maret 2024

Ketua/Sekretaris Panitia Ujian,

A. Ais Prayogi Alimuddin, ST., M. Eng



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Telp. (0411) 586015, 586262 Fax (0411) 586015
<http://eng.unhas.ac.id>, Email : teknik@unhas.ac.id

SURAT PENUGASAN
No. 6544/UN4.7.1/TD.06/2024

- Dari : Dekan Fakultas Teknik Universitas Hasanuddin.
Kepada : Mereka yang tercantum namanya di bawah ini.
Isi : 1. Bahwa merujuk kepada Peraturan Rektor Universitas Hasanuddin Nomor : 29/UN4.1/2023 tentang Penyelenggaraan Program Sarjana Universitas Hasanuddin, dengan ini menugaskan Saudara sebagai PENGUJI/PANITIA UJIAN SARJANA Program Strata Satu (S1) Departemen Teknik Informatika Fakultas Teknik Universitas Hasanuddin dengan susunan sebagai berikut :
- Pembimbing I / Ketua : 1. A. Ais Prayogi Alimuddin, ST., M.Eng.
Pembimbing II / Sekretaris : 2. Prof. Dr.Eng. Intan Sari Areni, ST., M.T
Anggota : 3. Mukarramah Yusuf, B.Sc., M.Sc., Ph.D
4. Anugrayani Bustamin, ST., M.T

untuk menguji bagi mahasiswa tersebut di bawah ini :

Nama/NIM : Pirda D121 18 1012
Program Studi : Teknik Informatika
Judul Thesis/Skripsi : “ Implementasi Algoritma Sift Pada Aplikasi Media Pembelajaran Macam-Macam Mineral Berbasis Augmented Reality (Studi Kasus: Sman 9 Luwu Timur) “

- Waktu Ujian ditetapkan oleh Panitia Ujian Sarjana Program Strata Satu (S1).
- Agar Surat penugasan ini dilaksanakan sebaik-baiknya dengan penuh rasa tanggung jawab.
- Surat penugasan ini berlaku sejak tanggal ditetapkan sampai dengan berakhirnya Ujian Sarjana tersebut, dengan ketentuan bahwa segala sesuatunya akan ditinjau dan diperbaiki sebagaimana mestinya apabila dikemudian hari ternyata terdapat kekeliruan dalam keputusan ini.

Ditetapkan di Gowa,
Pada tanggal 20 Maret 2024
a.n. Dekan
Wakil Dekan Bidang Akademik dan Kemahasiswaan
Fakultas Teknik Unhas



Dr. Amil Ahmad Ilham, ST., M.IT
NIP.197310101998021001

Tembusan :

- Dekan Fak. Teknik Unhas
- Ketua Departemen Teknik Informatika FT-UH
- Kasubag. Umum dan Perlengkapan FT-UH



• Dokumen ini telah ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan BSrE
• UU ITE No 11 Tahun 2008 Pasal 5 Ayat 1
Informasi Elektronik dan/atau Dokumen Elektronik dan/atau hasil cetaknya merupakan alat bukti hukum yang sah

Lampiran 11. Lembar perbaikan skripsi

LEMBAR PERBAIKAN SKRIPSI




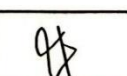
“IMPLEMENTASI ALGORITMA SIFT PADA APLIKASI
MEDIA PEMBELAJARAN MACAM-MACAM MINERAL
BERBASIS AUGMENTED REALITY
(STUDI KASUS: SMAN 9 LUWU TIMUR)”

OLEH:

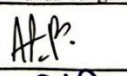
PIRDA
D121181012

Skripsi ini telah dipertahankan pada Ujian Akhir Sarjana tanggal 22 Maret 2024.
 Telah dilakukan perbaikan penulisan dan isi skripsi berdasarkan usulan dari penguji dan pembimbing skripsi.

Persetujuan Perbaikan oleh Tim Penguji:

	Nama	Tanda Tangan
Ketua	A. Ais Prayogi Alimuddin, S.T., M.Eng.	
Sekretaris	Prof. Dr. Eng. Intan Sari Areni, S.T., M.T.	
Anggota	Mukarramah Yusuf, B.Sc., M.Sc., Ph.D.	
	Anugrayani Bustamin, S.T., M.T.	

Persetujuan Perbaikan oleh Pembimbing:

Pembimbing	Nama	Tanda Tangan
I	A. Ais Prayogi Alimuddin, S.T., M.Eng.	
II	Prof. Dr. Eng. Intan Sari Areni, S.T., M.T.	