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LAMPIRAN

Lampiran 1. Dokumentasi Pengambilan Data



Lampiran 2. Source Code pada bagian *Image Processing*

```

cred = credentials.Certificate("key.json")
firebase_admin.initialize_app(cred, {
    'storageBucket': 'hotspotdetection-e0d38.appspot.com',
    'databaseURL': 'https://hotspotdetection-e0d38-default-rtbd.firebaseio.com'
})

def on_image_exists():
    total_piksel_hotspot = 0
    foreground_percentage = 0
    dr = ""
    hssc = ""
    analysis= ""
    shape= ""

    from firebase import firebase
    from firebase_admin import storage

    # Get the bucket instance
    bucket = storage.bucket()

    # Get the image file you want to load
    blob = bucket.blob("Hotspot/panel.bmp")
    blob_detected = bucket.blob("Hotspot/hotspot_detected.jpg")

    Config = {
        "apiKey": "AIzaSyCnoByLqA1CPNGZIwcB8l45QnJ1JPvoZqo",
        "authDomain": "hotspotdetection-e0d38.firebaseio.com",
        "databaseURL": "https://hotspotdetection-e0d38-default-rtbd.firebaseio.com",
        "projectId": "hotspotdetection-e0d38",
        "storageBucket": "hotspotdetection-e0d38.appspot.com",
        "messagingSenderId": "351921490647",
        "appId": "1:351921490647:web:471a3aa617bdf1c6bfe92"
    }

    key = "3RAR9I2TCHFL7P0E" # API Write Channel Thingspeak
    FBConn = firebase.FirebaseApplication('https://hotspotdetection-e0d38-default-rtbd.firebaseio.com//',
        None) # url database di firebase

```

```

for contour in contours_panel:
    x, y, w, h = cv2.boundingRect(contour)
    aspect_ratio = float(w) / h
    if (cv2.contourArea(contour)) > MIN_HOTSPOT_AREA:
        if aspect_ratio < 1:
            shape = "Linear/Round"
            hssc = shape, ", able to remove"
            analysis = "- Abnormal heat at the power cord junction and long-term
leaf or Being mainly caused by the mixture of bird droppings, dust and rain"
            dr = "Hotspot Detected"
            height, width = im_bw.shape
            total_pixels = height * width
            total_piksel_hotspot = np.sum(get_contour_areas(contours_panel))
            foreground_percentage = (total_piksel_hotspot / total_pixels) * 100
            formatted_percentage = "{:.2f}".format(foreground_percentage)
        elif aspect_ratio == 1:
            shape = "Square"
            hssc = shape, ", unable to remove"
            analysis = "PV panel single internal defects or multiple panel failures
in series and parallel"
            dr = "Hotspot Detected"
            height, width = im_bw.shape
            total_pixels = height * width
            total_piksel_hotspot = np.sum(get_contour_areas(contours_panel))
            foreground_percentage = (total_piksel_hotspot / total_pixels) * 100
            formatted_percentage = "{:.2f}".format(foreground_percentage)
        else:
            shape = "-"
            hssc = "-"
            analysis = "-"
            dr = "No Hotspot Detected"
            total_piksel_hotspot = 0
            foreground_percentage = 0
            Output_image = img
            aspect_ratios.append((aspect_ratio, shape))

print("Number of pixels Hotspot =", total_piksel_hotspot)
print("Hotspot Percentage:", foreground_percentage, "%")
print("Detection Result:", dr)
print("Hot spot shape class:", hssc)
print("Analysis of possible causes:", analysis)

```

```

data_to_upload = {
    'Hotspot': shape
}

result = FBConn.post('/Panel_1/', data_to_upload)

# ===== Kirim Jml Hotspot ke Firebase =====

for contour in contours_panel:
    x, y, w, h = cv2.boundingRect(contour)

    if (cv2.contourArea(contour)) > 357:
        cv2.rectangle(img_contrast, (x, y), (x + w, y + h), (0, 0, 255), 2)
        cv2.rectangle(ROI, (x, y), (x + w, y + h), (0, 0, 0), 2)

cv2.drawContours(imgcopy, largest_item, -1, (0, 0, 255), 2)

# ===== fungsi menampilkan cdf =====

hist_ori, bins = np.histogram(ROI.flatten(), 256, [0, 256])
pdf_ori = hist_ori / sum(hist_ori)
cdf_ori = np.cumsum(pdf_ori)
hist_he, bins = np.histogram(he_copy.flatten(), 256, [0, 256])
pdf_he = hist_he / sum(hist_he)
cdf_he = np.cumsum(pdf_he)
hist_contrast, bins = np.histogram(img_contrast_copy.flatten(), 256, [0, 256])
pdf_contrast = hist_contrast / sum(hist_contrast)
cdf_contrast = np.cumsum(pdf_contrast)

# ===== fungsi menampilkan cdf =====

# =====MENGIRIM GAMBAR KE FIREBASE =====

firebase = pyrebase.initialize_app(Config)
storage = firebase.storage()
path_on_cloud = "Hotspot/hotspot_detected.jpg"
cv2.imwrite("output/hotspot_detected.jpg", ROI)
path_local = "output/hotspot_detected.jpg"
storage.child(path_on_cloud).put(path_local)
ref = db.reference('/Token')
token = ref.get()
print(token)

if shape != "-":
    deviceTokenEmulator = 'cwISBYwESN-
b6iprsiVMnt:APA91bFq3xhCGii60PDSMkk13GHS9Ja9zz5WL16D7PkdbvGPCv5dRx4mITNAzx1lakjULLB
Zcit9JcQfgPlg4TAp45630Bh-ZeQwCG95c8PhwE30D3CREHjgv8iHEu-IjPJ9VI0qRqro'
    headers = {
        'Content-Type': 'application/json',
        'Authorization': 'key=' + serverToken,
    }

    body = {

        'notification': {'title': 'Peringatan',
                        'body': 'Hotspots detected, check them out'
                        },
        'to':
            deviceTokenEmulator,
        'priority': 'high',
    }
    response = requests.post("https://fcm.googleapis.com/fcm/send",
headers=headers, data=json.dumps(body))
    print(response.status_code)
    print(response.json())

```

Lampiran 3. Source Code pada bagian Aplikasi Mobile

```

public class MainActivity extends AppCompatActivity {

    public static final int PICK_IMAGE = 1;
    private TextView status, panel;
    private TextView note;
    private Button download;
    private Button upload;
    private ImageView img;
    private RequestQueue mQueue;
    public String Status;
    public String dataUP;
    public String TAG = "PUSH_Android";

    final Handler handler = new Handler();
    final int delay = 1000; // 1000 milliseconds == 1 second
    StorageReference storageReference;
    private ConnectivityManager connectivityManager;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        getSupportActionBar().setSubtitle("Photovoltaic");
        status = findViewById(R.id.status);
        note = findViewById(R.id.note);
        panel = findViewById(R.id.name);
        upload = findViewById(R.id.btnUpload);
        img = findViewById(R.id.thumbnail);
        mQueue = Volley.newRequestQueue(this);

        FirebaseMessaging.getInstance().getToken()
            .addOnCompleteListener(new OnCompleteListener<String>() {
                @Override
                public void onComplete(Task<String> task) {
                    if (!task.isSuccessful()) {
                        Log.w(TAG, "Fetching FCM registration token failed", task.getException());
                        return;
                    }
                    VariabelGlobal.token_push = task.getResult();
                    kirimToken();
                    Log.d(TAG, VariabelGlobal.token_push);
                }
            });

        handler.postDelayed(new Runnable() {
            public void run() {
                if (isNetworkAvailable()) {
                    getImage();
                    note.setTextColor(Color.parseColor("#037109"));
                    note.setText("Connected");
                } else {
                    note.setTextColor(Color.parseColor("#B62602"));
                    note.setText("Check Your Internet Connection");
                }

                handler.postDelayed(this, delay);
            }
        }, delay);

        upload.setOnClickListener(v -> {
            Intent intent = new Intent();
            intent.setType("image/*");
            intent.setAction(Intent.ACTION_GET_CONTENT);
            startActivityForResult(Intent.createChooser(intent, "Select Picture"), PICK_IMAGE);
        });
    }
}

```

```

public void getImage() {
    storageReference = FirebaseStorage.getInstance().getReference().child("Hotspot/hotspot_detected.jpg");
    storageReference.getBytes(Long.MAX_VALUE).addOnSuccessListener(new OnSuccessListener<byte[]>() {
        @Override
        public void onSuccess(byte[] bytes) {
            Bitmap bitmap = BitmapFactory.decodeByteArray(bytes, 0, bytes.length);
            panel.setText("Panel 1");
            getdata();
            img.setImageBitmap(bitmap);
        }
    }).addOnFailureListener(new OnFailureListener() {
        @Override
        public void onFailure(Exception exception) {
            // Handle any errors that occurred while retrieving the data
            img.setImageResource(R.drawable.ic_baseLine_image_24);
            panel.setText("No Panel Image");
            status.setText("Detection Result : No Hotspot Detected");
        }
    });
}

private void getdata() {

    DatabaseReference databaseReference = FirebaseDatabase.getInstance().getReference().child("Panel_1");
    Query lastQuery = databaseReference.orderByKey().limitToLast(1);
    lastQuery.addListenerForSingleValueEvent(new ValueEventListener() {
        @Override
        public void onDataChange(DataSnapshot dataSnapshot) {
            for (DataSnapshot childSnapshot : dataSnapshot.getChildren()) {
                System.out.println(childSnapshot.getKey());
                String akhir = childSnapshot.getKey();
                DatabaseReference databaseReference2 =
                FirebaseDatabase.getInstance().getReference().child("Panel_1").child(akhir).child("Hotspot");
                databaseReference2.addValueEventListener(new ValueEventListener() {
                    @Override
                    public void onDataChange(DataSnapshot dataSnapshot2) {
                        String value = dataSnapshot2.getValue().toString();
                        String analisis = "";
                        if(value.equalsIgnoreCase("Linear/Round")){
                            analisis = "Abnormal heat at the power cord junction and long-term leaf or Being
mainly caused by the mixture of bird droppings, dust and rain";
                        }
                        else{
                            analisis = "PV panel single internal defects or multiple panel failures in series
and parallel";
                        }
                        status.setText("Detection Result : Hotspot Detected" + "\n"+
                            "Shape Class : "+value + "\n"
                            +"Analysis of possible causes : "+analisis);
                    }
                    @Override
                    public void onCancelled(DatabaseError databaseError) {
                    }
                });
            }
        }
        @Override
        public void onCancelled(DatabaseError databaseError) {
            note.setTextColor(Color.parseColor("#B62602"));
            note.setText("Check Your Internet Connection");
        }
    });
}

public void kirimToken(){
    FirebaseDatabase database = FirebaseDatabase.getInstance();
    DatabaseReference myRef = database.getReference().child("Token");
    myRef.setValue(VariabelGlobal.token_push);
}
}

```

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B. RIWAYAT PENDIDIKAN

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2017	S1	Universitas Hasanuddin	Teknik Informatika

C. PUBLIKASI 5 TAHUN TERAKHIR

Judul	Nama Jurnal/Konferensi
<i>Hot spot Detection in Photovoltaic Module using Otsu Thresholding Method</i> (Artikel Prosiding)	2020 IEEE International Conference on Communication, Networks and Satellite, Comnetsat 2020 - Proceedings, 2020, pp. 408–412 https://ieeexplore.ieee.org/document/9328987
<i>A review on image processing techniques for damage detection on photovoltaic panels</i> (Artikel Jurnal Internasional)	ICIC Express Letters, 2021, 15(7), pp. 779–790 http://www.ijicic.org/el-15(7).htm
<i>A New Approach for Hot Spot Solar Cell Detection based on Multi-level Otsu Algorithm</i> (Artikel Prosiding)	2021 International Seminar on Intelligent Technology and Its Application: Intelligent Systems, ISITIA 2021, 2021, pp. 278–282

Judul	Nama Jurnal/Konferensi
	https://ieeexplore.ieee.org/document/9502239
<i>Improving the Image Quality of Grayscale Thermal Images Taking from Photovoltaic Panel with Contrast Enhancement Method</i> (Artikel Jurnal Internasional)	International Journal of Innovative Computing, Information and Control (IJICIC), 2023, Vol. 19, no. 1, pp. 197–212 http://www.ijicic.org/ijicic-190114.pdf