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LAMPIRAN

Coding

```
!pip install openpyxl scikit-learn seaborn matplotlib

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

import seaborn as sns

from sklearn.metrics import confusion_matrix, accuracy_score, recall_score, roc_auc_score, roc_curve, auc

from sklearn.preprocessing import label_binarize


from google.colab import files

uploaded = files.upload()

file_path = "pibs.xlsx"

df = pd.read_excel(file_path)


conf_matrix = confusion_matrix(df["stage"], df["pibs"])

accuracy = accuracy_score(df["stage"], df["pibs"])

sensitivity = recall_score(df["stage"], df["pibs"], average="macro")


tn = conf_matrix.sum() - conf_matrix.sum(axis=0) - conf_matrix.sum(axis=1) + conf_matrix.diagonal()

fp = conf_matrix.sum(axis=0) - conf_matrix.diagonal()

specificity = (tn / (tn + fp)).mean()


'asses = sorted(df["stage"].unique())

abel_binarize(df["stage"], classes=unique_classes)

abel_binarize(df["pibs"], classes=unique_classes)
```

```
auc_roc = roc_auc_score(y_true, y_pred, average="weighted", multi_class="ovr")

print(f"Accuracy: {accuracy:.4f}")
print(f"Sensitivity: {sensitivity:.4f}")
print(f"Specificity: {specificity:.4f}")
print(f"AUC-ROC: {auc_roc:.4f}")
print("Confusion Matrix:\n", conf_matrix)

plt.figure(figsize=(6,5))
sns.heatmap(conf_matrix, annot=True, fmt="d", cmap="Blues", xticklabels=unique_classes, yticklabels=unique_classes)
plt.xlabel("Predicted Stage")
plt.ylabel("Actual Stage")
plt.title("Confusion Matrix Heatmap")
plt.show()

plt.figure(figsize=(8,6))
for i, label in enumerate(unique_classes):
    fpr, tpr, _ = roc_curve(y_true[:, i], y_pred[:, i])
    roc_auc = auc(fpr, tpr)
    plt.plot(fpr, tpr, label=f"Stage {label} (AUC = {roc_auc:.2f})")

plt.plot([0, 1], [0, 1], "k--", label="Random Chance")
plt.xlabel("False Positive Rate")
plt.ylabel("True Positive Rate")
\UC-ROC Curve")
()
```

Coding hasil uji chi square, cohen, mcc

```
!pip install seaborn openpyxl scikit-learn
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from scipy.stats import chi2_contingency
from sklearn.metrics import cohen_kappa_score, matthews_corrcoef

from sklearn.metrics import confusion_matrix
conf_matrix = confusion_matrix(df["stage"], df["pibs"])

# 1. Uji Chi-Square
chi2, p_value, dof, expected = chi2_contingency(conf_matrix)

# 2. Cohen's Kappa Score
kappa_score = cohen_kappa_score(df["stage"], df["pibs"])

# 3. Matthews Correlation Coefficient (MCC)
mcc = matthews_corrcoef(df["stage"], df["pibs"])

stat_results = pd.DataFrame({
  "Metode Uji Statistik": ["Chi-Square", "p-value", "Cohen's Kappa", "Matthews Correlation Coefficient (MCC)"],
            [chi2, p_value, kappa_score, mcc]

_results)
```


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no	age	Sex	Site	plt	pdw	mpv	pct	t	n	m	Stage pibs	Stage pTNM	grading	status	surgery
1	61	2	7	352	7,9	8,4	0,3	4	1	0	3	3		2	1
2	32	2	7	394	9,2	9	0,35	4	1	0	3	3		2	1
3	62	1	7	250	8,3	8,7	0,22	4	0	0	2	2	Well Diff	2	2
4	70	2	7	278	8	8,5	0,24	2	0	0	2	2	Well diff	1	1
5	54	1	7	375	9,9	9,6	0,36	4	1	0	3	3	Well Diff	1	1
6	23	1	7	390	8,8	8,5	0,33	4	1	0	3	3		1	1
7	77	1	7	511	8,6	9	0,46	4	1	0	3	3		1	1
8	54	2	7	280	9,4	8,8	0,25	4	0	0	2	2		1	1
9	72	2	7	206	9,4	9,4	0,19	3	0	0	1	2	Poor Diff	1	1
10	66	1	7	303	7,5	8,3	0,25	4	0	0	2	2		1	1
11	68	2	7	258	8,9	8,8	0,1	1	1	0	3	3	well diff	1	1
12	49	1	7	439	7,3	7,5	0,33	3	1	0	3	3	Well diff	1	1
13	60	2	7	257	8,5	7,8	0,2	3	0	0	2	2	Well Diff	1	1
14	58	1	7	697	9,7	9,5	0,34	2	0	1	4	4	Well Diff	1	1
15	57	1	7	273	10,9	10	0,27	3	1	0	3	3	Well Diff	1	1
16	59	1	7	281	10	9,9	0,28	2	1	0	3	3	Well Diff	1	1
17	47	1	7	211	8,5	8,9	0,19	4	0	0	1	2	Well diff	1	1
18	69	1	7	419	9,7	9,5	0,4	3	1	0	3	3	Well diff	1	1
19	56	2	7	337	9,4	9,5	0,31	3	1	0	3	3	well diff	1	1
20	49	1	7	437	7,7	8,3	0,36	3	1	0	3	3	Well Diff	1	1
21	42	1	7	422	8,2	8,4	0,36	3	1	0	3	3		1	1
	29	1	7	533	10,5	10,5	0,35	4	1	1	4	4		1	1
	45	2	7	533	0	0	0	4	1	1	4	4		1	1

24	63	1	7	403	7,9	8,3	0,33	4	1	0	3	3		1	1
25	67	2	7	316	8,5	8,3	0,26	3	0	0	2	2		1	1
26	48	1	7	250	8	8,3	0,21	4	1	0	2	3		1	1
27	60	1	7	457	8,6	8,8	0,1	4	1	0	3	3		1	1
28	60	2	7	321	9,5	9,1	0,26	2	1	0	3	3	Well Diff	1	1
29	51	2	7	548	7,4	7,9	0,44	4	1	0	3	3	Well diff	1	1
30	56	2	7	328	8,2	8,3	0,27	3	0	0	2	2	Well Diff	1	2
31	41	2	7	508	8,5	9	0,46	4	1	0	3	3	Musinosum	1	1
32	68	2	7	675	9,5	9,3	0,4	4	1	1	3	4	Moderate diff	1	1
33	51	2	7	217	7,6	7,7	0,21	3	1	0	3	3	Moderate diff	1	1
34	61	2	7	401	14	6,7	0,25	4	1	0	3	3	Moderate diff	1	1
35	47	1	7	278	8,5	9,2	0,25	2	1	0	3	3	Moderate diff	1	1
36	57	2	7	696	9,2	9,7	0,34	4	1	1	4	4		1	1
37	69	2	7	355	6,6	7,6	0,27	4	0	0	2	2		1	2
38	61	2	7	387	15,3	6,8	0,26	4	1	0	3	3		1	2
39	66	1	7	373	11,6	10,2	0,38	3	0	0	2	2		1	2
40	37	1	7	235	8,2	9,7	0,23	2	0	0	1	1	Well diff	1	2
41	58	1	7	301	8,5	9,2	0,18	4	0	0	2	2	Well Diff	1	2
42	41	2	7	351	8,4	8,5	0,3	3	1	0	3	3	Well Diff	1	2
	39	1	7	380	9,1	8,9	0,34	4	1	0	3	3	Well Diff	1	2
	62	1	7	188	10,3	9,8	0,18	2	0	0	1	1	Well Diff	1	2

45	45	2	7	330	9,3	9	0,3	4	0	0	3	2	Poor diff	1	2
46	51	1	7	677	9,5	10,1	0,5	3	0	1	4	4		1	1
47	42	2	7	349	8,1	8,1	0,3	3	1	0	3	3	Poor Diff	1	1
48	45	2	6	446	8,4	8,9	0,4	3	0	0	3	2	Well diff	2	1
49	72	1	6	333	9,4	9,1	0,21	4	1	0	3	3	Well Diff	1	1
50	62	2	6	455	7,1	7,8	0,35	3	1	0	3	3	Well diff	1	1
51	78	1	6	241	9,3	9	0,22	2	0	0	1	1	Moderate diff	1	1
52	59	2	6	218	9,9	9,4	0,2	2	0	0	1	1	Well diff	1	1
53	53	2	6	262	10,3	9,6	0,25	3	1	0	3	3	Well diff	1	2
54	64	1	6	274	9,7	9,5	0,16	3	0	0	2	2	Moderate diff	1	2
55	60	2	5	650	10,3	10	0,4	3	1	1	4	4		2	1
56	52	2	5	361	7	7,8	0,28	4	0	0	2	2		1	1
57	68	1	5	245	8,4	8,8	0,22	4	0	0	2	2	Well Diff	1	1
58	53	1	5	372	8,7	8,7	0,32	3	0	0	3	2	Well diff	1	1
59	65	1	5	683	9,5	9,3	0,48	4	1	1	4	4		1	2
60	60	2	5	328	9,3	9,2	0,3	4	1	0	3	3	Moderate diff	1	1
61	48	2	5	391	7,9	8,7	0,34	4	1	0	3	3	Moderate diff	1	1
62	55	2	5	491	9,3	9,2	0,45	3	1	0	3	3	Moderate diff	1	1
	53	1	5	273	7,7	7,9	0,22	4	1	0	2	3	Moderate diff	1	1
	63	1	5	314	8,9	8,9	0,28	4	0	0	3	2		1	1

65	55	2	5	674	9,5	9,4	0,35	4	0	1	4	4	Well diff	1	1
66	68	2	5	686	9,2	9,7	0,51	4	0	1	4	4		1	1
67	59	2	5	416	9,3	9,1	0,38	4	1	0	**3**	**3**	Well diff	1	1
68	86	1	5	327	8,9	7,8	0,29	4	1	0	3	3		1	2
69	53	1	5	399	7,3	8	0,32	4	1	0	3	3	Well Diff	1	2
70	61	1	4	307	6,6	7,9	0,24	3	0	0	2	2		2	1
71	50	2	4	422	9	9,5	0,41	3	1	1	3	4	Well Diff	2	1
72	55	2	4	592	8,5	9,9	0,54	4	1	0	3	3	Poor Diff	2	1
73	62	1	4	415	11,1	10,3	0,43	4	0	0	2	2	Well Diff	2	2
74	51	2	4	571	10,7	10,2	0,38	3	1	1	4	4	Well diff	2	1
75	63	1	4	333	7,6	7,9	0,26	4	0	0	2	2		1	1
76	51	2	4	655	7,5	8,4	0,55	4	1	0	3	3		1	1
77	60	1	4	518	7,7	8,2	0,43	3	1	0	3	3		1	1
78	96	2	4	382	8,2	8,5	0,32	4	1	0	3	3		1	1
79	69	1	4	325	7,4	7,8	0,25	4	0	0	2	2		1	1
80	59	2	4	180	11,3	10,2	0,18	2	0	0	1	1	Well diff	1	1
81	61	2	4	420	6,9	7,9	0,33	4	1	0	3	3	Well diff	1	1
82	50	2	4	301	8,1	8,6	0,26	3	0	0	2	2	Well diff	1	1
83	72	1	4	387	9,6	9,2	0,36	4	1	0	3	3	Moderate diff	1	1
84	48	2	4	260	8,5	8,8	0,23	3	0	0	2	2	Moderate diff	1	1
85	59	1	4	420	10,5	9	0,38	3	1	0	3	3	Limfoma	1	1
	65	1	4	421	7,2	7,8	0,33	3	1	0	3	3	Well Diff	1	1
	49	1	4	433	9	9,5	0,41	4	1	0	3	3		1	2

88	59	2	4	189	13,2	11,2	0,21	2	0	0	1	1	Well diff	1	2
89	68	1	4	311	8,9	9,2	0,29	4	1	0	**3**	**3**	Well Diff	1	2
90	40	2	4	518	8,4	8,7	0,45	2	1	0	3	3	Well Diff	1	2
91	49	2	4	375	9,3	9,3	0,35	3	0	0	3	2	Well diff	1	2
92	54	2	3	243	8,6	9,4	0,23	4	0	0	2	2	Well diff	2	1
93	43	1	3	361	7	7,8	0,28	4	1	0	2	3		1	2
94	71	2	3	347	11,8	10,4	0,26	3	0	0	2	2	Well Diff Musin	1	2
95	62	2	3	519	8,1	8,6	0,44	4	1	0	3	3	Well diff	1	2
96	54	2	3	803	9	9,3	0,67	4	0	1	4	4	Well Diff	1	2
97	34	1	2	271	10,3	9,4	0,25	3	1	0	3	3	Musinosum	1	1
98	54	1	2	435	7,3	7,9	0,34	4	1	0	3	3	Well Diff Musin	1	1
99	56	1	2	357	11,1	9,9	0,25	4	0	0	2	2	Well Diff	1	1
100	49	1	2	361	7	7,8	0,28	3	0	0	2	2	Well diff	1	1
101	60	1	2	339	9,9	9,4	0,32	4	1	0	3	3	Well diff	1	2
102	31	1	2	709	10,8	10,7	0,18	3	0	1	4	4	Well Diff	1	2
103	64	1	1	696	9,7	9,6	0,4	3	1	1	4	4	Well Diff	2	2
104	44	1	1	360	12,3	11,1	0,2	4	1	0	2	3		1	1
105	49	1	1	188	7,6	7,3	0,12	1	0	0	1	1		1	1
106	52	1	1	355	10,5	10	0,36	2	1	0	3	3	Poor Diff	1	1
107	61	1	1	307	7,4	8,3	0,3	3	0	0	2	2	Poor Diff	1	1
108	59	1	1	429	8,3	8,4	0,38	3	1	0	3	3	Well diff	1	1
	56	1	1	354	7	7,9	0,28	4	0	0	2	2	Poor Diff	1	1
	63	2	1	289	7,9	7,9	0,1	4	0	0	2	2	Musinosum	1	1

111	34	1	1	748	8,4	8,2	0,61	4	0	0	3	2	Moderate diff	1	1
112	53	2	1	341	9,2	9,1	0,31	4	1	0	3	3	Moderate diff	1	1
113	52	2	1	610	9,5	9,9	0,41	2	2	1	4	4	Moderate diff	1	1
114	20	1	1	389	7,6	8,3	0,32	4	1	0	3	3	Limfoma	1	1
115	83	1	1	301	9,5	9,8	0,27	2	1	0	3	3	Well Diff	1	2
116	53	1	1	375	9,9	9,6	0,36	4	1	0	3	3	Well Diff	1	1
		1: male 2: female	1: ascending 2: transverse 3: descending		4: sigmoid 5: prox rectum 6: mid rectum		7: distal rectum							1: survive 2: die	1: definitive 2: palliative