TUGAS SESI 11_ENSAMBLE LEARNING

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Tabel:

https://docs.google.com/spreadsheets/d/15zUrhsxscHYxJIlyC7C89Gs17ox7unRnuqWyhFDG7Fg/edit?usp=sharing

Kuis	Tugas	UTS	UAS	Target	RATA_RATA
83	95	89	38	0	76
74	34	49	87	0	61
90	90	59	39	0	70
52	98	43	31	1	56
55	47	59	58	1	55
85	64	56	75	0	70
94	16	29	24	1	41
35	81	95	77	0	72
97	40	91	81	0	77
31	70	65	85	0	63
31	66	56	13	1	42
68	70	16	84	0	60
25	24	16	46	1	28
65	87	33	77	0	66
90	25	13	75	1	51
15	22	90	47	1	44
30	27	86	74	1	54
55	39	31	89	1	54
94	30	74	87	0	71
48	90	17	81	1	59
11	88	82	40	1	55
69	96	79	27	0	68
69	27	83	21	1	50
67	43	93	83	0	72
40	67	10	63	1	45
80	59	64	81	0	71
62	14	95	99	0	68
37	63	16	42	1	40
60	32	26	12	1	33
76	53	12	55	1	49
50	13	68	22	1	38

50	28	65	30	1	43
47	90	90	53	0	70
11	43	60	87	1	50
26	45	77	92	0	60
26	86	30	55	1	49
33	76	61	63	1	58
38	89	64	43	1	59
68	27	53	99	0	62
58	88	13	84	0	61

Kode: https://colab.research.google.com/drive/1gLGlt2IJajv6T0HewTtwQWeyYpqhTiWh?usp=sharing

```
#Import
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.metrics import accuracy_score
from sklearn.model_selection import cross_val_score
from sklearn.ensemble import VotingClassifier
from sklearn.metrics import classification_report
from sklearn.metrics import roc_curve, roc_auc_score
```

```
[ ] #Load Data
    df = pd.read_csv('tugassesi11_ml.csv')
    df.head()
```

	Kuis	Tugas	UTS	UAS	Target	RATA_RATA
0	83	95	89	38	0	76
1	74	34	49	87	0	61
2	90	90	59	39	0	70
3	52	98	43	31	1	56
4	55	47	59	58	1	55

```python
#Identifikasi data
df.info() #Memeriksa Tipe Data
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 40 entries, 0 to 39
Data columns (total 6 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   Kuis        40 non-null     int64
 1   Tugas       40 non-null     int64
 2   UTS         40 non-null     int64
 3   UAS         40 non-null     int64
 4   Target      40 non-null     int64
 5   RATA_RATA   40 non-null     int64
dtypes: int64(6)
memory usage: 2.0 KB
```

```python
# Menghitung persentase duplikasi
percentage_duplicates = (df.duplicated().sum() / df.shape[0]) * 100

print("Jumlah duplikasi : ", df.duplicated().sum()) #Melihat Jumlah Duplikasi Data
print(f"Persentase duplikasi: {percentage_duplicates:.2f}%")
```

```
Jumlah duplikasi :  0
Persentase duplikasi: 0.00%
```

```python
df.describe() #Memeriksa Parameter Statistik
```

	Kuis	Tugas	UTS	UAS	Target	RATA_RATA
count	40.000000	40.000000	40.000000	40.000000	40.000000	40.000000
mean	54.875000	56.050000	55.200000	60.475000	0.550000	56.775000
std	24.362842	27.550373	28.129918	25.802989	0.503831	12.296523
min	11.000000	13.000000	10.000000	12.000000	0.000000	28.000000
25%	34.500000	29.500000	29.750000	39.750000	0.000000	49.000000
50%	55.000000	56.000000	59.500000	63.000000	1.000000	58.500000
75%	70.250000	86.250000	79.750000	83.250000	1.000000	68.000000
max	97.000000	98.000000	95.000000	99.000000	1.000000	77.000000

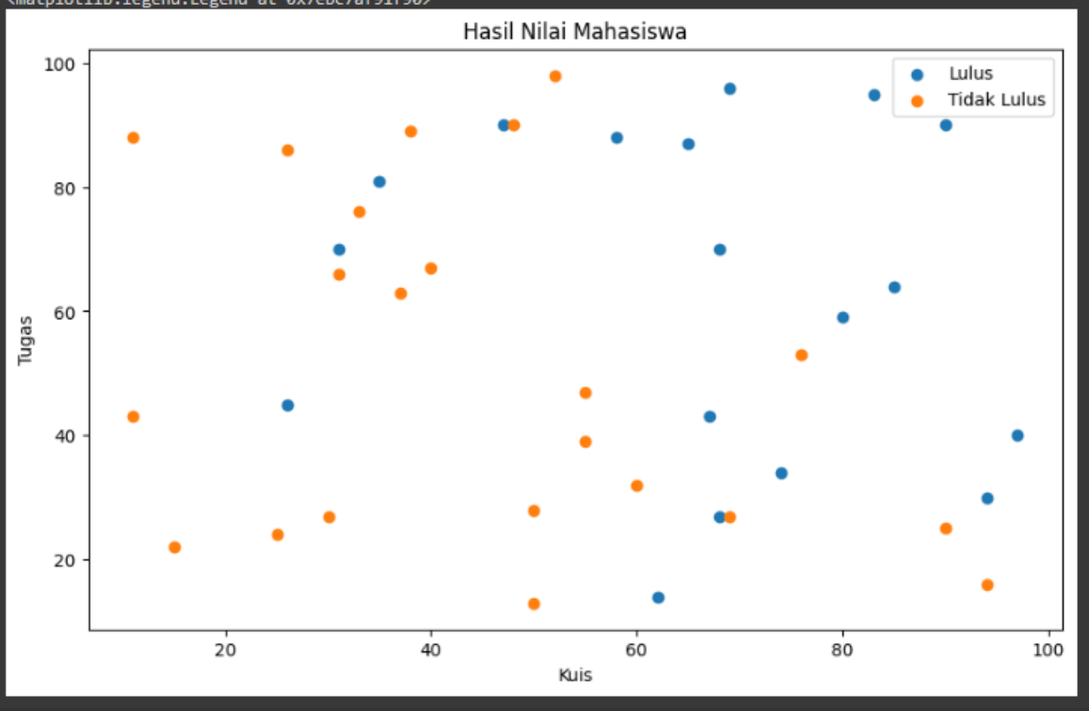
```python
#cleaning data
df.drop_duplicates(inplace=True) #Menghapus Data Duplikat
```

```python
print("Jumlah Duplikasi : ", df.duplicated().sum()) #Melihat Jumlah Duplikasi Data
```

```
Jumlah Duplikasi :  0
```

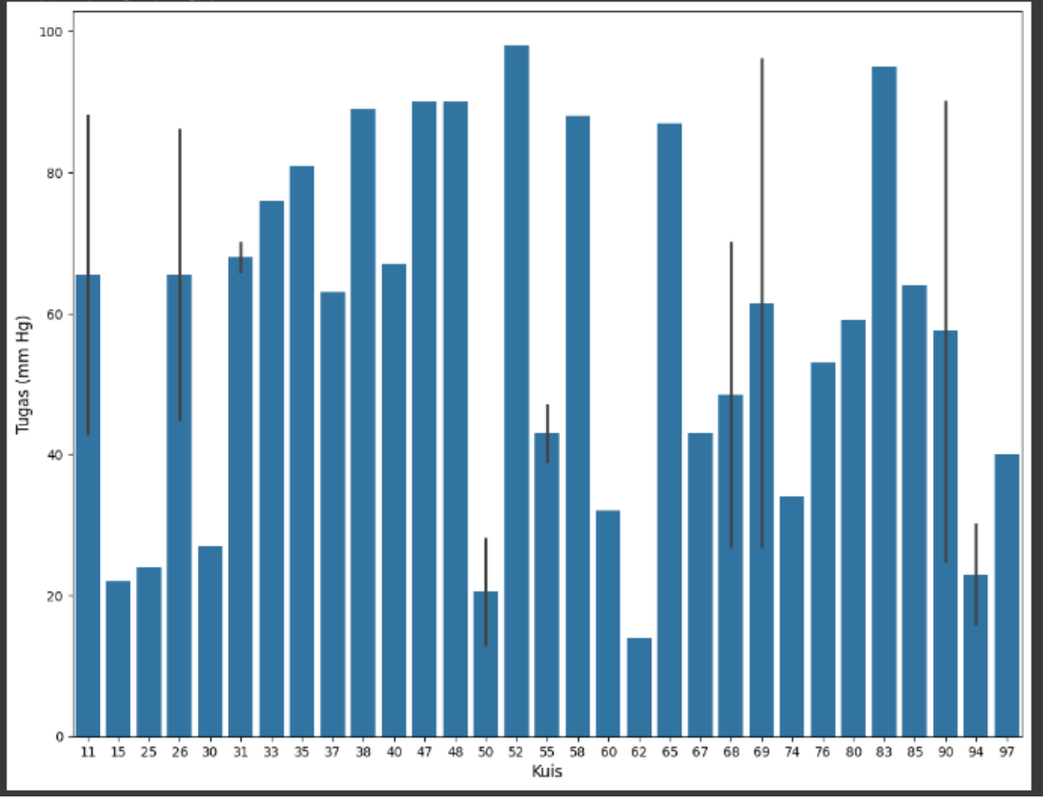
```
plt.figure(figsize=(10,6))

#Target = 0 (Lulus)
plt.scatter(x = df[df['Target']==0]['Kuis'], y = df.Tugas[df.Target==0])
#Target = 1 (Tidak Lulus)
plt.scatter(x = df[df['Target']==1]['Kuis'], y = df.Tugas[df.Target==1],);

plt.title("Hasil Nilai Mahasiswa")
plt.xlabel("Kuis")
plt.ylabel("Tugas")
plt.legend(["Lulus", "Tidak Lulus"])
```

```
<matplotlib.legend.Legend at 0x7ebc7af91f90>
```




```
plt.figure(figsize=(13,10))
sns.barplot(x=df["Kuis"],y=df["Tugas"])
plt.xlabel('Kuis',fontsize=12)
plt.ylabel('Tugas (mm Hg)',fontsize=12)
```

```
Text(0, 0.5, 'Tugas (mm Hg)')
```



```
# #Feature Engineering
# #Mengganti Kolom Sex
# df["sex"].replace({"Male" : 1,
#                    "Female" : 0}, inplace=True)
# #Mengganti Kolom Chest Pain
# df["chest_pain_type"].replace({"Typical angina" : 1,
#                                "Atypical angina" : 2,
#                                "Non-anginal pain" : 3,
#                                "Asymptomatic" : 4}, inplace=True)
# #Mengganti Kolom Fasting Blood Sugar
# df["fasting_blood_sugar"].replace({"Greater than 120 mg/ml" : 1,
#                                    "Lower than 120 mg/ml" : 0}, inplace=True)
# #Mengganti Kolom Resting Electrocardiographic
# df["rest_ecg"].replace({"Normal" : 0,
#                         "ST-T wave abnormality" : 1,
#                         "Left ventricular hypertrophy" : 2}, inplace=True)
# #Mengganti Kolom Exercise Induced Angina
# df["exercise_induced_angina"].replace({"Yes" : 1,
#                                        "No" : 0}, inplace=True)
# #Mengganti Kolom Slope
# df["slope"].replace({"Upsloping" : 1,
#                      "Flat" : 2,
#                      "Downsloping" : 3}, inplace=True)
# #Mengganti Vessels Colored By Flourosopy
# df["vessels_colored_by_flourosopy"].replace({"Zero" : 0,
#                                              "One" : 1,
#                                              "Two" : 2,
#                                              "Three" : 3,
#                                              "Four" : 4}, inplace=True)
# #Mengganti Kolom
# df["thalassemia"].replace({"Normal" : 3,
#                            "Fixed Defect" : 6,
#                            "Reversable Defect" : 7,
#                              "No" : 0}, inplace=True)

df['Target'].replace({
    "Lulus":0,
    "Tidak Lulus":1,
}, inplace=True)
df.head()
```

	Kuis	Tugas	UTS	UAS	Target	RATA_RATA
0	83	95	89	38	0	76
1	74	34	49	87	0	61
2	90	90	59	39	0	70
3	52	98	43	31	1	56
4	55	47	59	58	1	55

```
#Persiapan data menjadi model
sc=StandardScaler()
X=df.drop('Target',axis=1)
Y=df['Target']
df=sc.fit(X).transform(X)
```

```
[ ] #Pisahkan data train dan test
    X_train,X_test,y_train,y_test=train_test_split(X,Y,test_size=0.25,random_state=3)
```

```
[ ] #Menyusun model, evaluasi dan klasifikasi
    def model(X_train,y_train):
        models=[]
       #Random Forest Classifier
        rfc=RandomForestClassifier()
        rfc.fit(X_train,y_train)
        models.append(rfc)
        #XGBoost
        xgb=GradientBoostingClassifier(n_estimators=100,learning_rate=1.0,max_depth=1)
        xgb.fit(X_train,y_train)
        models.append(xgb)
```

```
models=model(X_train,y_train) #Penampung Nilai X Train dan y Train
```

+ Code

```
[ ] Model=['RandomForestClassifier','XgBoost']
```

```
[ ] # Inisialisasi model-modelnya
    rf = RandomForestClassifier()
    gb = GradientBoostingClassifier()

    # Fit model ke data latih
    rf.fit(X_train, y_train)
    gb.fit(X_train, y_train)

    # Simpan model dalam sebuah list
    models = [rf, gb]

    # Menghitung Akurasi
    train_accuracy=[]
    test_accuracy=[]
    for i in range(len(models)):
        yhat = models[i].predict(X_test)
        yhat_t = models[i].predict(X_train)
        train_accuracy.append(accuracy_score(yhat_t, y_train))
        test_accuracy.append(accuracy_score(yhat, y_test))
```

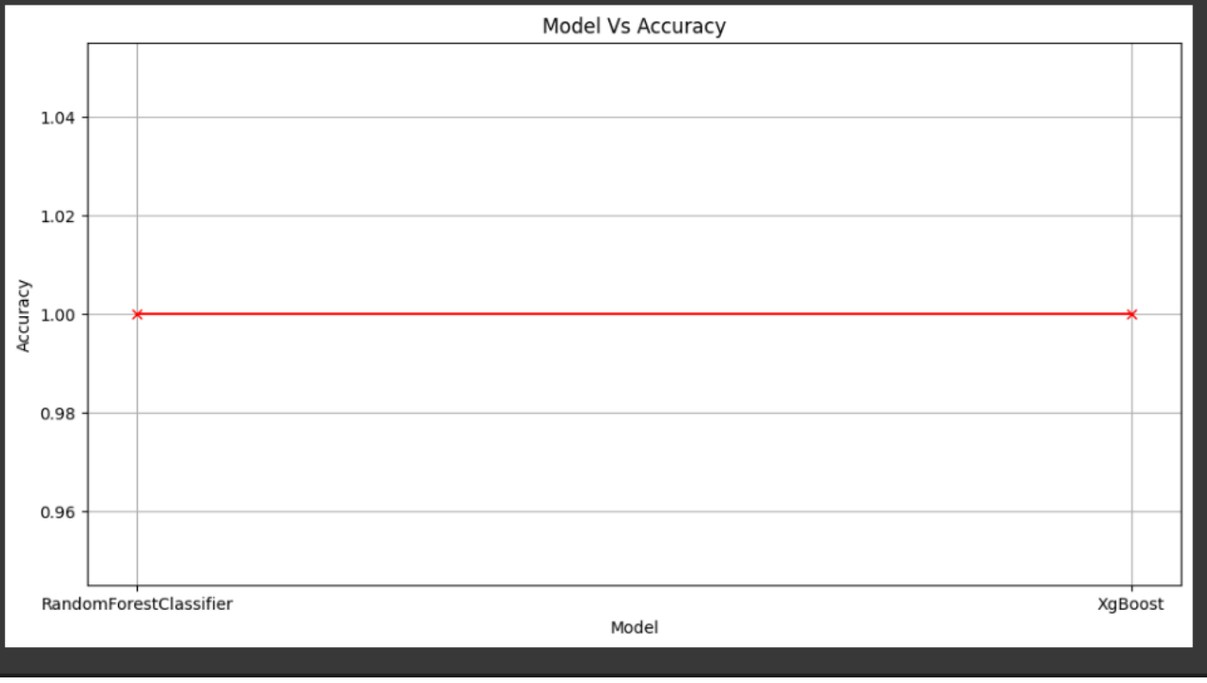
```
[ ] Accuracy_score=pd.DataFrame({
        'Model':Model,
        'Train_Accuracy':train_accuracy,
        'Test_Accuracy':test_accuracy
    })
```

```
[ ] Accuracy_score #Melihat Skor Akurasi
```

	Model	Train_Accuracy	Test_Accuracy
0	RandomForestClassifier	1.0	1.0
1	XgBoost	1.0	1.0

```
[ ] score=dict(zip(Model, Accuracy_score['Test_Accuracy'].values)) #Membuat Dictionary Dari Hasil Akurasi
    score={k: v for k, v in sorted(score.items(), key=lambda item: item[1])} #Mengurutkan Dictionary Berdasarkan Nilai Akurasi
```

```
#Membuat Grafik Perbandingan Model dan Akurasi
plt.figure(figsize=(12,6))
plt.plot(list(score.keys()),list(score.values()),marker='x',color='red')
plt.xlabel('Model')
plt.ylabel('Accuracy')
plt.title('Model Vs Accuracy')
plt.grid()
```




```
#Model Terbaik
best_model = Accuracy_score.loc[Accuracy_score['Test_Accuracy'].idxmax()]
print("Model terbaik berdasarkan akurasi pada data uji:")
print(best_model)
```

```
Model terbaik berdasarkan akurasi pada data uji:
Model                RandomForestClassifier
Train_Accuracy                          1.0
Test_Accuracy                           1.0
Name: 0, dtype: object
```

```
[ ] # Ambil model dengan akurasi tertinggi dari Accuracy_score
    best_model_name = Accuracy_score.loc[Accuracy_score['Test_Accuracy'].idxmax()]['Model']
    best_model_index = Model.index(best_model_name)
    best_model = models[best_model_index]

    # Lakukan prediksi pada data uji
    y_pred = best_model.predict(X_test)

    #Model Evaluation
    print(accuracy_score(y_test,y_pred))
```

```
1.0
```

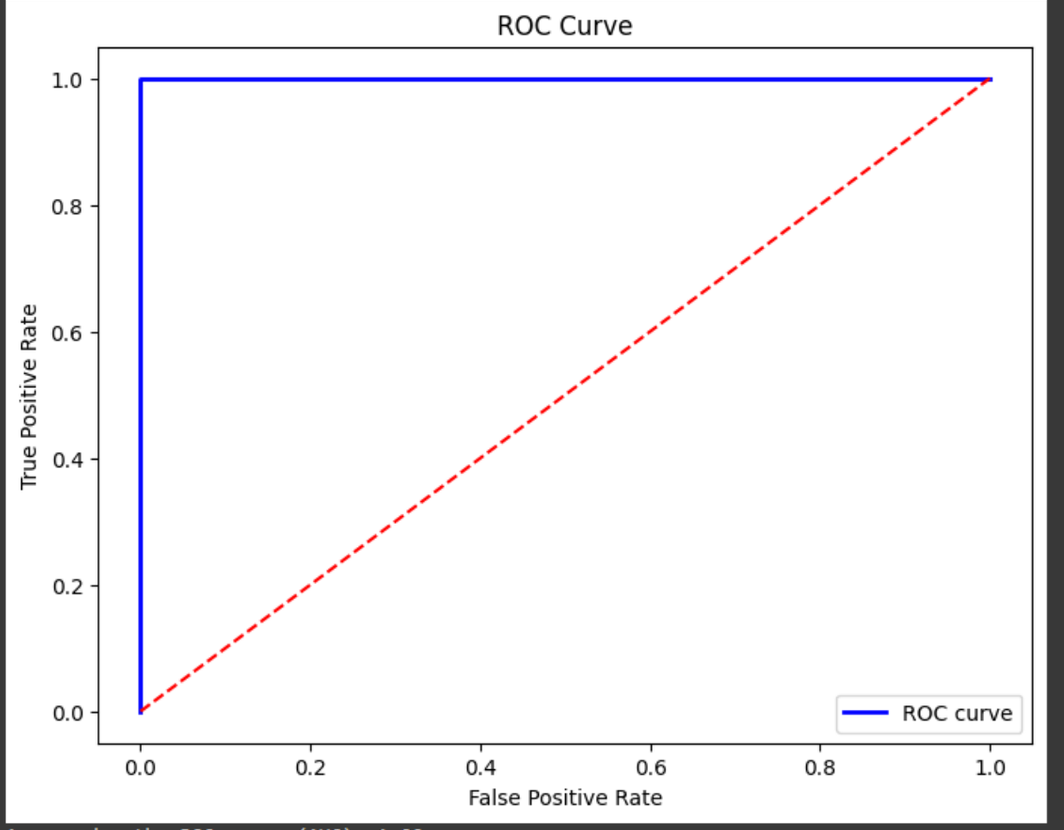
```
[ ] # Prediksi pada data baru (contoh: data test)
    # Misalnya, kita akan menggunakan satu baris dari data uji sebagai contoh
    sample_data = X_test.iloc[0].values.reshape(1, -1)
    prediction = gb.predict(sample_data)
    print("Prediction:", prediction)
```

```
Prediction: [1]
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid feature names, but GradientBoostingClassifier was fitted with feature names
  warnings.warn(
```

```
[ ]  # Evaluasi model dengan mencetak laporan klasifikasi
     print("Laporan Klasifikasi untuk Model Terbaik:")
     print(classification_report(y_test, y_pred))
```

```
Laporan Klasifikasi untuk Model Terbaik:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         4
           1       1.00      1.00      1.00         6

    accuracy                           1.00        10
   macro avg       1.00      1.00      1.00        10
weighted avg       1.00      1.00      1.00        10
```

```
[ ]  # Mendapatkan nilai keputusan dari model terbaik
     y_scores = best_model.predict_proba(X_test)[:, 1]

     # Menghitung false positive rate, true positive rate, dan threshold
     fpr, tpr, thresholds = roc_curve(y_test, y_scores)

     # Plotting ROC curve
     plt.figure(figsize=(8, 6))
     plt.plot(fpr, tpr, color='blue', lw=2, label='ROC curve')
     plt.plot([0, 1], [0, 1], color='red', linestyle='--')
     plt.xlabel('False Positive Rate')
     plt.ylabel('True Positive Rate')
     plt.title('ROC Curve')
     plt.legend()
     plt.show()

     # Hitung Area di Bawah Kurva ROC (AUC)
     auc = roc_auc_score(y_test, y_scores)
     print(f"Area under the ROC curve (AUC): {auc:.2f}")
```




```
Area under the ROC curve (AUC): 1.00
```