Tugas Pemodelan dan Simulasi

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Logistic Regression

Dataset berisi 8 kolom atribut dan 1 kolom label yang berisi 2 kelas yaitu 1 dan 0. Angka 1 menandakan bahwa orang tersebut positif diabetes dan 0 menandakan sebaliknya. Terdapat 768 sampel yang merupakan 768 pasien perempuan keturunan suku Indian Pima.

Model machine learning yang akan kita buat bertujuan untuk mengklasifikasikan apakah seorang pasien positif diabetes atau tidak

Tahapan latihan kali ini adalah:

1. Import data dan ubah data ke dalam Dataframe.
2. Bagi dataset.
3. Melakukan standarisasi.
4. Membuat dan melatih model.
5. Evaluasi model.

```
import pandas as pd
import numpy as np
```

```
df = pd.read_csv('/content/sample_data/diabetes.csv')
```

```
df.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigre
0	6	148	72	35	0	33.6	
1	1	85	66	29	0	26.6	
2	8	183	64	0	0	23.3	
3	1	89	66	23	94	28.1	
4	0	137	40	35	168	43.1	

```
#mengecek nilai yang missing value
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Pregnancies               768 non-null    int64
 1   Glucose                   768 non-null    int64
 2   BloodPressure             768 non-null    int64
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
 8   Outcome                   768 non-null    int64  
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

```
#Replace nilai Nol
import numpy as np
zero_not_allowed = ['Glucose', 'BloodPressure','SkinThickness','Insulin', 'BMI']

for column in zero_not_allowed:
    df[column] = df[column].replace(0, np.NaN)
    mean = int(df[column].mean(skipna=True))
    df[column]= df[column].replace(np.NaN, mean)
```

```
df.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigre
0	6	148.0	72.0	35.0	155.0	33.6	
1	1	85.0	66.0	29.0	155.0	26.6	
2	8	183.0	64.0	29.0	155.0	23.3	
3	1	89.0	66.0	23.0	94.0	28.1	
4	0	137.0	40.0	35.0	168.0	43.1	

```
# memisahkan atribut pada dataset dan menyimpannya pada sebuah variabel
X = df[df.columns[:8]]

# memisahkan label pada dataset dan menyimpannya pada sebuah variabel
y = df['Outcome']
```

```
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import confusion_matrix, classification_report

# standarisasi nilai-nilai dari dataset
scaler = StandardScaler()
scaler.fit(X)
X = scaler.transform(X)
```

```
from sklearn.model_selection import train_test_split

# memisahkan data untuk training dan testing
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.2, random_state=42)
```

```
from sklearn import linear_model

# latih model dengan fungsi fit
model = linear_model.LogisticRegression() #membuat sebuah objek logistic regression.
model.fit(X_train, y_train)
```

```
▾ LogisticRegression
LogisticRegression()
```

```
model.score(X_test, y_test)

     0.7532467532467533
```

```
cm = confusion_matrix(y_test, y_pred)
cm

     array([[70, 29],
            [15, 40]])
```

```
print(classification_report(y_test, y_pred))

                   precision    recall  f1-score   support

                0       0.82      0.71      0.76        99
                1       0.58      0.73      0.65        55

         accuracy                           0.71       154
        macro avg       0.70      0.72      0.70       154
     weighted avg       0.74      0.71      0.72       154
```

k-NN

```
from sklearn.neighbors import KNeighborsClassifier

from sklearn.metrics import confusion_matrix
from sklearn.metrics import f1_score
from sklearn.metrics import accuracy_score
```

```
# Define the model --> K-NN, value K got from square root leng y_test, K=11
classifire = KNeighborsClassifier(n_neighbors=11, metric='euclidean')
```

```
#fit model
classifire.fit(X_train, y_train)

     ▾                   KNeighborsClassifier
     KNeighborsClassifier(metric='euclidean', n_neighbors=11)
```

```
# Tes hasil Predikksi
y_pred = classifire.predict(X_test)
y_pred

     array([1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0,
            1, 0, 1, 1, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0,
            0, 0, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0,
            0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0,
            0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1,
            0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1, 1, 1,
            0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0])
```

```
# Evaluate the model
cm = confusion_matrix(y_test, y_pred)
cm

     array([[81, 18],
            [20, 35]])
```

```
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.82      0.71      0.76        99
           1       0.58      0.73      0.65        55

    accuracy                           0.71       154
   macro avg       0.70      0.72      0.70       154
weighted avg       0.74      0.71      0.72       154
```

Random Forest

```
from sklearn.ensemble import RandomForestClassifier
clf = RandomForestClassifier(random_state=10)
clf.fit(X_train,y_train)
y_pred =clf.predict(X_test)
acc = accuracy_score(y_test,y_pred)
print(acc)
```

```
0.7402597402597403
```

```
cm = confusion_matrix(y_test, y_pred)
cm
```

```
array([[70, 29],
       [15, 40]])
```

```
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.82      0.71      0.76        99
           1       0.58      0.73      0.65        55

    accuracy                           0.71       154
   macro avg       0.70      0.72      0.70       154
weighted avg       0.74      0.71      0.72       154
```

Decision Tree

```
from sklearn.tree import DecisionTreeClassifier
clf = DecisionTreeClassifier(max_depth=4)
```

```
clf.fit(X_train, y_train)
```

```
▾      DecisionTreeClassifier
DecisionTreeClassifier(max_depth=4)
```

```
clf.score(X_train, y_train)
```

```
0.8045602605863192
```

```
y_pred= clf.predict(X_test)
```

```
from sklearn.metrics import accuracy_score
accuracy_score(y_pred, y_test)
```

```
0.7142857142857143
```

```
cm = confusion_matrix(y_test, y_pred)
cm
```

```
array([[70, 29],
       [15, 40]])
```

```
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.82      0.71      0.76        99
           1       0.58      0.73      0.65        55

    accuracy                           0.71       154
   macro avg       0.70      0.72      0.70       154
weighted avg       0.74      0.71      0.72       154
```

Dapat diambil kesimpulan dari Evaluasi Model:

Visualize Decision Tree

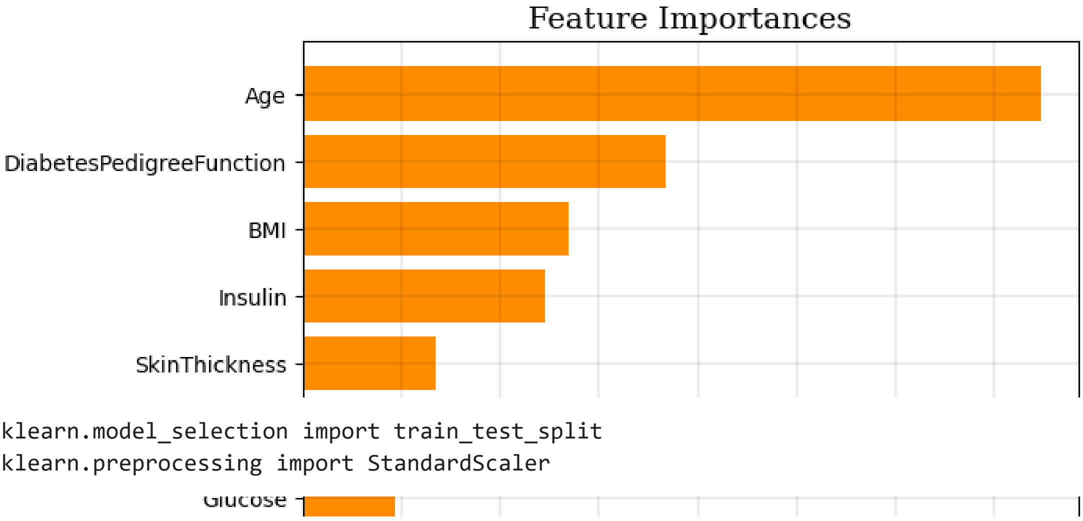
```
from sklearn.tree import DecisionTreeClassifier
from sklearn import tree
from sklearn.metrics import accuracy_score
from sklearn.metrics import confusion_matrix

# Implementasi decision tree menggunakan scikit-learn

model = DecisionTreeClassifier(criterion = "gini", max_depth = 10)
model = model.fit(X_train, y_train)
```

```
# Identifikasi feature
import matplotlib.pyplot as plt
importance = model.feature_importances_
indices = np.argsort(importance)

importance_plt = plt.barh(list(df.columns[: -1]), importance[indices], color = "darkorange")
importance_plt = plt.title("Feature Importances", fontsize = 14, fontfamily = "serif")
importance_plt = plt.grid(color='black', linewidth=0.1)
```



```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
```

```
X = df['Age']
y = df['DiabetesPedigreeFunction']
X = X[:,np.newaxis]
```

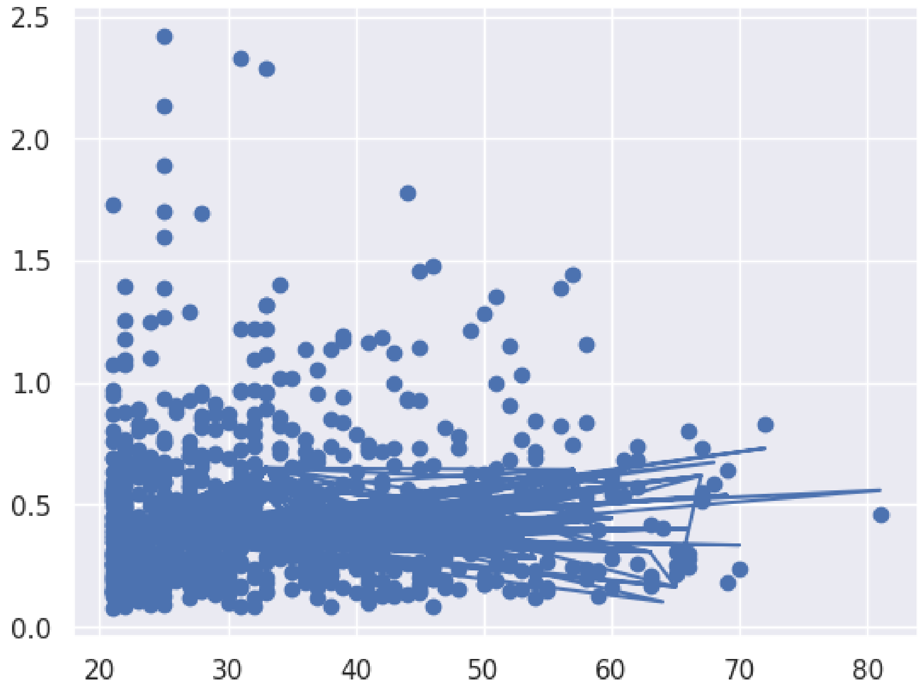
```
<ipython-input-67-7324a49b1a46>:3: FutureWarning: Support for multi-dimensional indexing (e.g. `obj[:
  X = X[:,np.newaxis]
```

```
from sklearn.svm import SVR
model  = SVR(C=1000, gamma=0.05, kernel='rbf')
model.fit(X,y)
```

```
▾          SVR
SVR(C=1000, gamma=0.05)
```

```
plt.scatter(X, y)
plt.plot(X, model.predict(X))
```

```
[<matplotlib.lines.Line2D at 0x7fcba4857370>]
```



Dapat dilihat kecendurangan umur yang menyebabkan seseorang bisa terkena diabetes adalah kisaran 20 - 50 tahun. Umur seseorang dapat mempengaruhi kecenderungan untuk pasien memiliki diabetes.

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