ALGORITMA NAIVE BAYES PREDIKSI DIABETES

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1. Import Library

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn import metrics
```

2. Import Dataset

```
dataset = pd.read_csv('diabetes.csv')
X = dataset.iloc[:, [2, 3]].values
y = dataset.iloc[:, -1].values

print(X)
```

```
[[72 35]
 [66 29]
 [64  0]
 ...
 [72 23]
 [60  0]
 [70 31]]
```

```
print(y)
```

```
[1 0 1 0 1 0 1 0 1 1 0 1 0 1 1 1 1 1 0 1 0 0 1 1 1 1 1 0 0 0 0 1 0 0 0
0 0
 1 1 1 0 0 0 1 0 1 0 0 1 0 0 0 0 1 0 0 1 0 0 0 0 1 0 0 1 0 1 0 0 0 1 0
1 0
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1 1
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1 1
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0 0
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0 0
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0 1
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```

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0 0
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1 0
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1 1
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0 1
 1 0 0 1 0 0 1 0 1 1 1 0 0 1 1 1 0 1 0 1 0 1 0 0 0 0 1 0]

dataset.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

dataset.isna().sum()

Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
```

```
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

```
#untuk model Gaussian hilangkan kolom diskrit
dataset = pd.DataFrame(dataset.drop('Pregnancies',axis=1))
dataset
```

```
     Glucose  BloodPressure  SkinThickness  Insulin   BMI  \
0        148             72             35        0  33.6
1         85             66             29        0  26.6
2        183             64              0        0  23.3
3         89             66             23       94  28.1
4        137             40             35      168  43.1
..       ...            ...            ...      ...   ...
763      101             76             48      180  32.9
764      122             70             27        0  36.8
765      121             72             23      112  26.2
766      126             60              0        0  30.1
767       93             70             31        0  30.4

     DiabetesPedigreeFunction  Age  Outcome
0                       0.627   50        1
1                       0.351   31        0
2                       0.672   32        1
3                       0.167   21        0
4                       2.288   33        1
..                        ...  ...      ...
763                     0.171   63        0
764                     0.340   27        0
765                     0.245   30        0
766                     0.349   47        1
767                     0.315   23        0

[768 rows x 8 columns]
```

```
dataset.describe()
```

```
          Glucose  BloodPressure  SkinThickness     Insulin
BMI  \
count  768.000000     768.000000     768.000000  768.000000
768.000000
mean   120.894531      69.105469      20.536458   79.799479
31.992578
std     31.972618      19.355807      15.952218  115.244002
7.884160
min      0.000000       0.000000       0.000000    0.000000
0.000000
25%     99.000000      62.000000       0.000000    0.000000
```

```
27.300000
50%    117.000000      72.000000      23.000000   30.500000
32.000000
75%    140.250000      80.000000      32.000000  127.250000
36.600000
max    199.000000     122.000000      99.000000  846.000000
67.100000

       DiabetesPedigreeFunction         Age     Outcome
count                768.000000  768.000000  768.000000
mean                   0.471876   33.240885    0.348958
std                    0.331329   11.760232    0.476951
min                    0.078000   21.000000    0.000000
25%                    0.243750   24.000000    0.000000
50%                    0.372500   29.000000    0.000000
75%                    0.626250   41.000000    1.000000
max                    2.420000   81.000000    1.000000
```

3. Pembagian Dataset

```
# Membagi dataset menjadi data pelatihan dan data pengujian
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size =
0.35, random_state = 0)
```

4. Feature Scaling

```
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)

print(X_train)
```

```
[[-1.02605237  0.69644524]
 [-3.62767905 -1.30803161]
 [ 0.01459831  0.69644524]
 [-0.24556436 -1.30803161]
 [-3.62767905 -1.30803161]
 [ 0.74305378  1.26020435]
 [ 0.43085857  0.63380534]
 [-0.7658897  -1.30803161]
 [-0.9219873  -1.30803161]
 [-0.4536945  -1.30803161]
 [ 0.63898871 -1.30803161]
 [ 0.22272844  0.07004622]
 [ 0.22272844 -0.11787348]
 [ 0.22272844  1.19756445]
 [ 0.11866337  0.44588563]
```

```
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[ 1.26337911 -1.30803161]
```

```
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```

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```
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```

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[ 0.22272844 -1.30803161]
[-0.2975969   0.13268612]
[-0.08946676  0.32060583]
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[ 0.01459831  1.94924327]
[ 0.11866337 -0.18051338]
[ 0.22272844 -0.05523358]
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[ 0.22272844 -1.30803161]
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[ 0.63898871 -1.30803161]
[ 0.74305378 -1.30803161]
[ 0.11866337  0.57116543]
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[ 0.01459831 -0.43107299]
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[ 0.01459831  0.38324573]
[ 0.01459831  0.75908514]
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[ 0.63898871 -1.30803161]
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[-0.71385716  1.13492455]
[ 0.43085857  1.32284425]
```

```
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[-0.50572703 -0.24315328]
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[ 1.05524898 -0.55635279]
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[ 0.32679351  1.00964474]
[ 0.32679351 -1.30803161]
[-0.6097921   1.19756445]
[-0.9219873   1.07228465]
[ 0.74305378 -1.30803161]
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[ 0.53492364 -1.30803161]
[-0.71385716 -1.30803161]
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[ 0.01459831 -1.30803161]
[-0.24556436 -1.30803161]
```

```
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 [ 1.05524898  0.13268612]
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 [-0.24556436  0.07004622]
 [ 0.22272844 -1.30803161]
 [ 0.63898871 -1.30803161]]
```

```
print(X_test)
```

```
[[ 0.32679351  1.38548415]
 [ 0.22272844  0.57116543]
 [-0.40166196 -1.30803161]
 [ 0.11866337 -0.11787348]
```

```
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[ 0.32679351  0.38324573]
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[ 0.01459831  1.51076396]
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[ 0.01459831  1.19756445]
```

```
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[-1.13011743 -0.05523358]
[-0.19353183  0.50852553]
[ 1.47150925 -1.30803161]
[ 0.01459831 -1.30803161]
[-3.62767905 -1.30803161]
[ 1.88776952  1.57340386]
[ 0.22272844  0.25796593]
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[ 0.22272844 -1.30803161]
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[ 0.43085857 -1.30803161]
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[ 0.01459831  1.19756445]
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[ 0.53492364 -0.61899269]
[ 0.63898871  1.38548415]
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[ 0.63898871  1.13492455]
[ 0.11866337  1.63604376]
[ 0.11866337 -1.30803161]
[ 0.53492364  0.82172504]
[-0.9219873  -0.36843309]
```

```
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[ 0.01459831  1.07228465]
[ 0.53492364 -0.61899269]
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[ 1.47150925  1.26020435]
[ 0.74305378  0.75908514]
[ 0.84711884 -1.30803161]
[-0.40166196 -0.6816326 ]
[-1.02605237 -0.30579319]
[ 0.84711884 -0.11787348]
[ 0.53492364  1.00964474]
[ 0.43085857  1.19756445]
[ 1.99183458  1.00964474]
[-0.19353183  1.13492455]
[ 0.43085857 -0.24315328]
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```

```
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[ 0.53492364  1.57340386]
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[-0.9219873  -1.30803161]
[ 0.74305378 -1.30803161]
```

```
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[-0.40166196 -0.24315328]
[-0.50572703  0.75908514]
[ 1.05524898 -1.30803161]
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[-0.71385716  0.57116543]
[ 0.11866337  0.75908514]
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[ 0.22272844 -0.24315328]
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[ 0.79508631  0.25796593]
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[ 0.95118391  1.13492455]
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[ 0.79508631  2.07452307]
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[ 0.22272844 -0.18051338]
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[ 0.22272844 -1.30803161]
[ 0.95118391  1.44812406]
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[ 0.95118391  0.57116543]
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[ 0.22272844  1.19756445]
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[ 0.53492364 -1.30803161]
[ 0.22272844  1.19756445]
```

```
 [-0.2975969  -0.49371289]
 [ 0.32679351 -1.30803161]
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 [ 0.53492364  1.51076396]
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 [-3.62767905 -1.30803161]
 [-0.71385716 -0.61899269]
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 [ 0.32679351  0.38324573]
 [ 0.74305378  1.19756445]
 [-0.71385716  0.44588563]
 [-3.62767905 -1.30803161]
 [ 0.79508631 -0.36843309]
 [ 0.32679351 -1.30803161]]
```

5. Pelatihan Model Naive Bayes Pada Data Pelatihan

```
from sklearn.naive_bayes import GaussianNB
classifier = GaussianNB()
classifier.fit(X_train, y_train)
```

```
GaussianNB()
```

6. Prediksi Hasil Data Pengujian

```
y_pred = classifier.predict(X_test)

print("Accuracy: " ,metrics.accuracy_score(y_test,y_pred))
```

```
Accuracy:  0.6765799256505576
```

7. Evaluasi Model

```
# Menghitung dan menampilkan confusion matrix dan akurasi
from sklearn.metrics import confusion_matrix, accuracy_score
cm = confusion_matrix(y_test, y_pred)
print("\nConfusion Matrix:")
print(cm)
print("\nAkurasi:", accuracy_score(y_test, y_pred))
```

```
Confusion Matrix:
[[176   4]
```

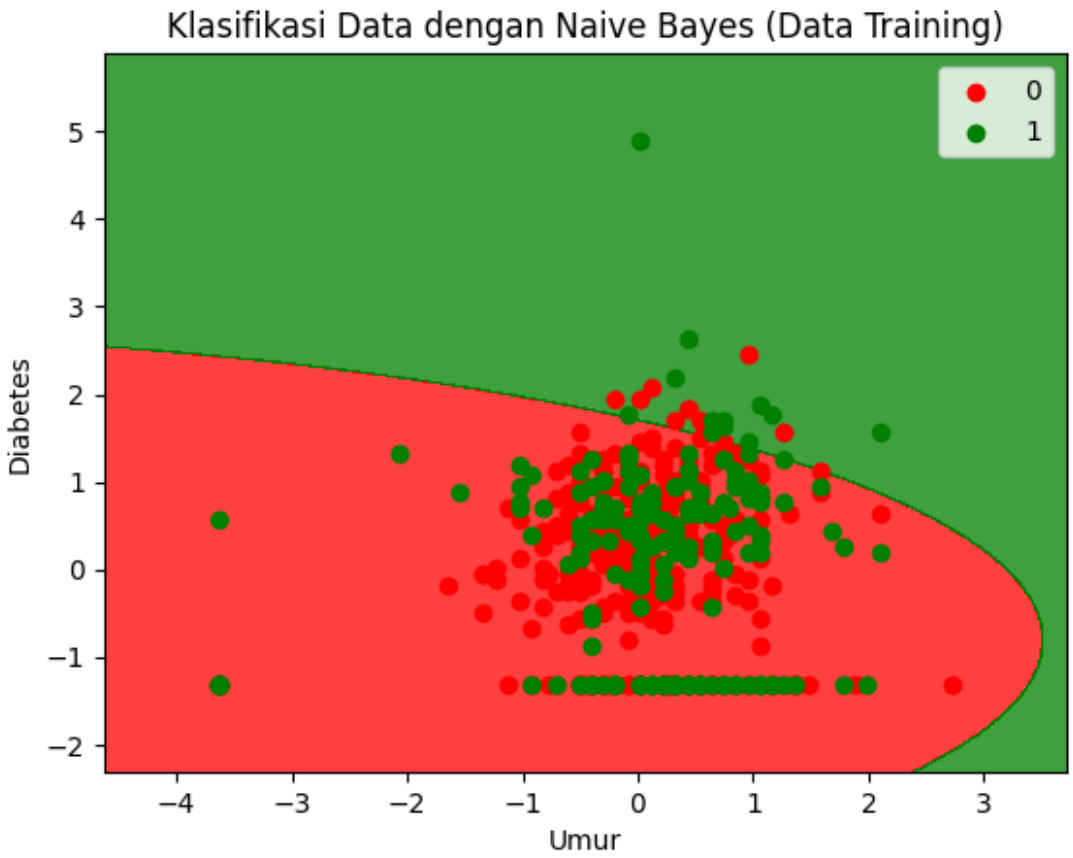
```
 [ 83   6]]

Akurasi: 0.6765799256505576
```

8. Visualisasi Hasil Data Pelatihan

```
from matplotlib.colors import ListedColormap
X_set, y_set = X_train, y_train
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop =
X_set[:, 0].max() + 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop =
X_set[:, 1].max() + 1, step = 0.01))
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(),
X2.ravel()]).T).reshape(X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'green')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Klasifikasi Data dengan Naive Bayes (Data Training)')
plt.xlabel('Umur')
plt.ylabel('Diabetes')
plt.legend()
plt.show()
```

```
C:\Users\Acer\AppData\Local\Temp\ipykernel_53388\324515528.py:10:
UserWarning: *c* argument looks like a single numeric RGB or RGBA
sequence, which should be avoided as value-mapping will have
precedence in case its length matches with *x* & *y*.  Please use the
*color* keyword-argument or provide a 2D array with a single row if
you intend to specify the same RGB or RGBA value for all points.
  plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
```



9. Visualisasi Hasil Data Pengujian

```
from matplotlib.colors import ListedColormap
X_set, y_set = X_test, y_test
X1, X2 = np.meshgrid(np.arange(start = X_set[:, 0].min() - 1, stop =
X_set[:, 0].max() + 1, step = 0.01),
                     np.arange(start = X_set[:, 1].min() - 1, stop =
X_set[:, 1].max() + 1, step = 0.01))
plt.contourf(X1, X2, classifier.predict(np.array([X1.ravel(),
X2.ravel()]).T).reshape(X1.shape),
             alpha = 0.75, cmap = ListedColormap(('red', 'green')))
plt.xlim(X1.min(), X1.max())
plt.ylim(X2.min(), X2.max())
for i, j in enumerate(np.unique(y_set)):
    plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
                c = ListedColormap(('red', 'green'))(i), label = j)
plt.title('Klasifikasi Data dengan Naive Bayes (Data Testing)')
plt.xlabel('Umur')
plt.ylabel('Diabetes')
plt.legend()
plt.show()
```

```
C:\Users\Acer\AppData\Local\Temp\ipykernel_53388\369509195.py:10:
UserWarning: *c* argument looks like a single numeric RGB or RGBA
sequence, which should be avoided as value-mapping will have
precedence in case its length matches with *x* & *y*.  Please use the
*color* keyword-argument or provide a 2D array with a single row if
you intend to specify the same RGB or RGBA value for all points.
  plt.scatter(X_set[y_set == j, 0], X_set[y_set == j, 1],
```