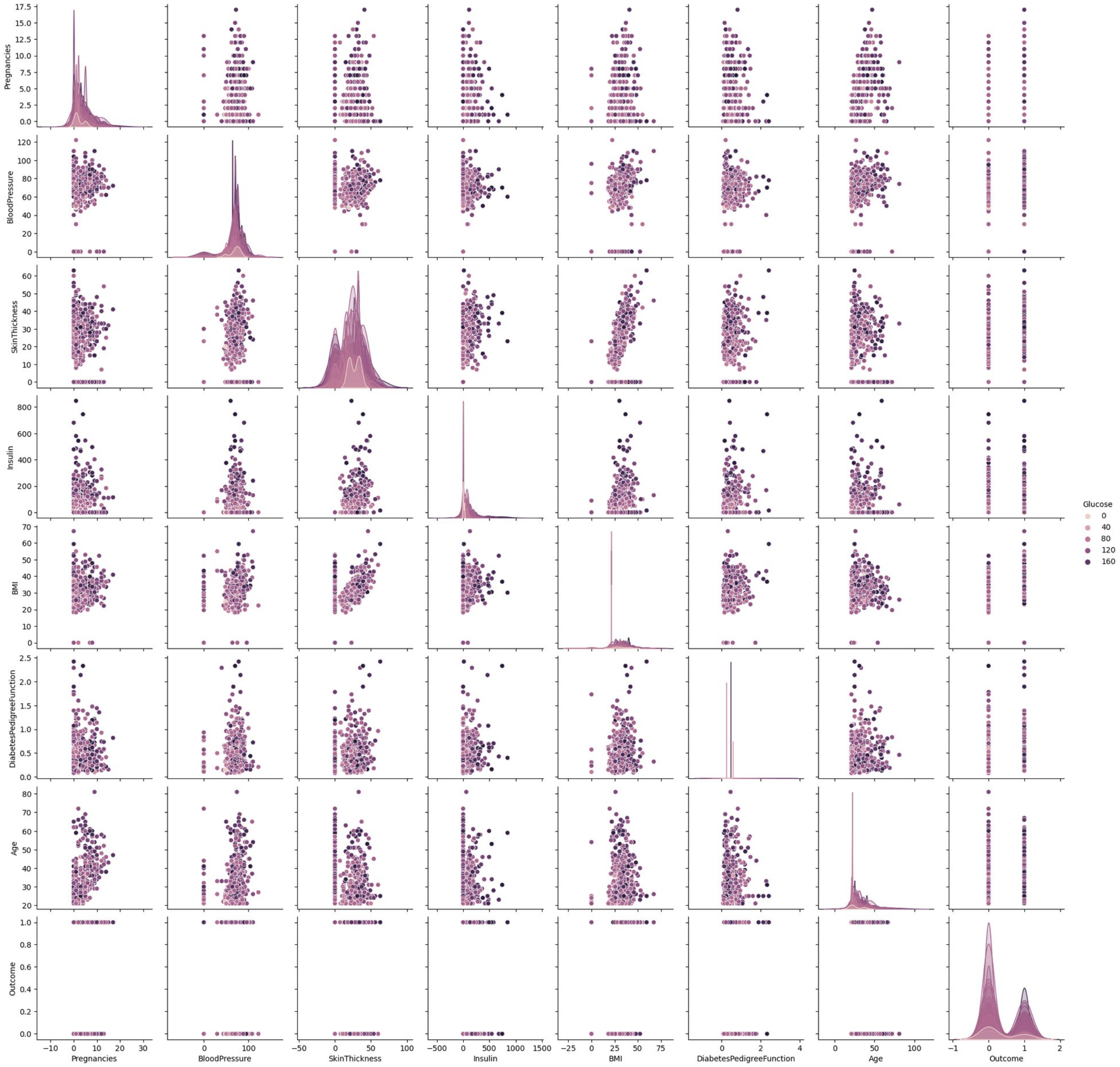
Naufal Alif Anargya-2311110041-SD0401

Tugas 5

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy_score, recall_score,
precision_score

data = pd.read_csv('Training.csv')

print(data.head())
print(data.info())
print(data.describe())
sns.pairplot(data, hue='Glucose')
plt.show()

print(data.isnull().sum())

X = data.drop('Glucose', axis=1)
y = data['Glucose']

X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)

models = {
    'KNN': KNeighborsClassifier(),
    'Decision Tree': DecisionTreeClassifier(),
    'Naive Bayes': GaussianNB()
}

results = {}

for model_name, model in models.items():
    model.fit(X_train, y_train)
    y_pred = model.predict(X_test)

    accuracy = accuracy_score(y_test, y_pred)
    recall = recall_score(y_test, y_pred, average='weighted',
zero_division=1)
    precision = precision_score(y_test, y_pred, average='weighted',
zero_division=1)

    results[model_name] = {
        'Accuracy': accuracy,
        'Recall': recall,
        'Precision': precision
    }

results_df = pd.DataFrame(results).T
print(results_df)

best_model = results_df['Accuracy'].idxmax()
print(f'Model terbaik berdasarkan akurasi adalah: {best_model}')
```

```
   Pregnancies  Glucose  BloodPressure  SkinThickness  Insulin
BMI  \
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


   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
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2460 entries, 0 to 2459
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Pregnancies               2460 non-null   int64
 1   Glucose                   2460 non-null   int64
 2   BloodPressure             2460 non-null   int64
 3   SkinThickness             2460 non-null   int64
 4   Insulin                   2460 non-null   int64
 5   BMI                       2460 non-null   float64
 6   DiabetesPedigreeFunction  2460 non-null   float64
 7   Age                       2460 non-null   int64
 8   Outcome                   2460 non-null   int64
dtypes: float64(2), int64(7)
```

```
memory usage: 173.1 KB
None
       Pregnancies      Glucose  BloodPressure  SkinThickness  
Insulin  \
count  2460.000000  2460.000000    2460.000000    2460.000000  
2460.000000
mean      3.817480   121.602033      68.915041      20.531301  
80.119919
std       3.296458    31.789270      19.082655      15.716901  
116.765807
min       0.000000     0.000000       0.000000       0.000000  
0.000000
25%       1.000000   100.000000      64.000000       0.000000  
0.000000
50%       3.000000   117.000000      70.000000      23.000000  
36.000000
75%       6.000000   142.000000      80.000000      33.000000  
129.000000
max      17.000000   197.000000     122.000000      63.000000  
846.000000

               BMI  DiabetesPedigreeFunction          Age      Outcome

count  2460.000000               2460.000000  2460.000000  2460.000000

mean     31.990447                  0.491440    32.821951     0.390244

std       7.802569                  0.363917    11.251208     0.487904

min       0.000000                  0.078000    21.000000     0.000000

25%      27.100000                  0.251750    24.000000     0.000000

50%      32.100000                  0.381000    29.000000     0.000000

75%      36.500000                  0.647000    39.000000     1.000000

max      67.100000                  2.420000    81.000000     1.000000

c:\Users\HP VICTUS\anaconda3\Lib\site-packages\seaborn\
axisgrid.py:118: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```



```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
               Accuracy    Recall  Precision
KNN            0.780488  0.780488   0.843538
Decision Tree  0.993902  0.993902   0.997121
```

```
Naive Bayes    0.193089  0.193089   0.802367
Model terbaik berdasarkan akurasi adalah: Decision Tree
```

Penjelasan :

Interpretasi Hasil EDA dan Pre-Processing

- **Struktur Data**: Dataset memiliki 2460 entri dengan 9 kolom, tanpa nilai yang hilang, yang memudahkan analisis.
- **Statistik Deskriptif**:
  - *Pregnancies*: Rata-rata 3.82 (maksimum 17), menunjukkan variasi signifikan.
  - *Glucose*: Rata-rata 121.60, dengan beberapa individu mengalami kadar glukosa tinggi.
  - *BloodPressure*: Rata-rata 68.92, sebagian besar dalam batas normal.
  - *SkinThickness* dan *Insulin*: Rata-rata masing-masing 20.53 dan 80.12, dengan nilai insulin yang tinggi pada beberapa individu.
  - *BMI*: Rata-rata 31.99, mengindikasikan sebagian besar mungkin kelebihan berat badan.
  - *DiabetesPedigreeFunction* dan *Age*: Indikasi riwayat keluarga diabetes, rata-rata usia 32.82.
  - *Outcome*: Sekitar 39% dari individu didiagnosis dengan diabetes.

Matriks Evaluasi Model

- *KNN*: Akurasi dan recall 78.05%, precision 84.35%.
- *Decision Tree*: Kinerja terbaik dengan akurasi 99.39%, recall 99.39%, dan precision 99.71%.
- *Naive Bayes*: Kinerja rendah dengan akurasi 19.31%, recall rendah, meski precision-nya 80.24%.

Kesimpulan dan Rekomendasi

- **Decision Tree** Berdasarkan hasil evaluasi, Decision Tree adalah model yang paling baik dengan akurasi 99.39%, recall 99.39%, dan precision 99.71%. Ini menunjukkan bahwa model ini sangat efektif dalam mengklasifikasikan individu sebagai diabetes atau tidak diabetes, dengan tingkat kesalahan yang sangat rendah.