AI BASED DIABETES PREDICTION SYSTEM

Development Part-1

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Introduction:

To Building a complete AI-based diabetes prediction system involves multiple steps, including obtaining the dataset, preprocessing the data, and building a predictive model. Below, I'll provide a step-by-step guide with code examples for each stage of the project.

I will setup the project environment, here are the steps I will be follow:-

- Download Anaconda,we use this to ease the process of installing necessary libraries for our project.
- Then I will create a repository and create a conda environment along with the necessary dependencies – Pandas, NumPy, Matplotlib and Scikit
- Activate the environment and install Jupyter notebook – an IDE to run our project.
- In Jupyter notebook, I will create a new python file and began the coding process.

Load the Dataset:

Load your dataset into a Pandas DataFrame. You can typically find kaggle Diabetes datasets in CSV format, but you can adapt this code to other formats as needed

To predict Diabetes using Diabetes dataset

```
[1]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
```

```
[2]: dataset = pd.read_csv('Documents/PS/diabetes.csv')
```

```
[4]: dataset.head()
```

```
[4]:    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
```

```
[5]: dataset.shape
```

```
[5]: (768, 9)
```

```
[6]: 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
```

[7]:
```
dataset.describe().T
```

[7]:
```
                          count        mean         std     min       25%  \
Pregnancies               768.0    3.845052    3.369578   0.000   1.00000
Glucose                   768.0  120.894531   31.972618   0.000  99.00000
BloodPressure             768.0   69.105469   19.355807   0.000  62.00000
SkinThickness             768.0   20.536458   15.952218   0.000   0.00000
Insulin                   768.0   79.799479  115.244002   0.000   0.00000
BMI                       768.0   31.992578    7.884160   0.000  27.30000
DiabetesPedigreeFunction  768.0    0.471876    0.331329   0.078   0.24375
Age                       768.0   33.240885   11.760232  21.000  24.00000
Outcome                   768.0    0.348958    0.476951   0.000   0.00000

                               50%        75%     max
Pregnancies                 3.0000    6.00000   17.00
Glucose                   117.0000  140.25000  199.00
BloodPressure              72.0000   80.00000  122.00
SkinThickness              23.0000   32.00000   99.00
Insulin                    30.5000  127.25000  846.00
BMI                        32.0000   36.60000   67.10
DiabetesPedigreeFunction    0.3725    0.62625    2.42
Age                        29.0000   41.00000   81.00
Outcome                     0.0000    1.00000    1.00
```

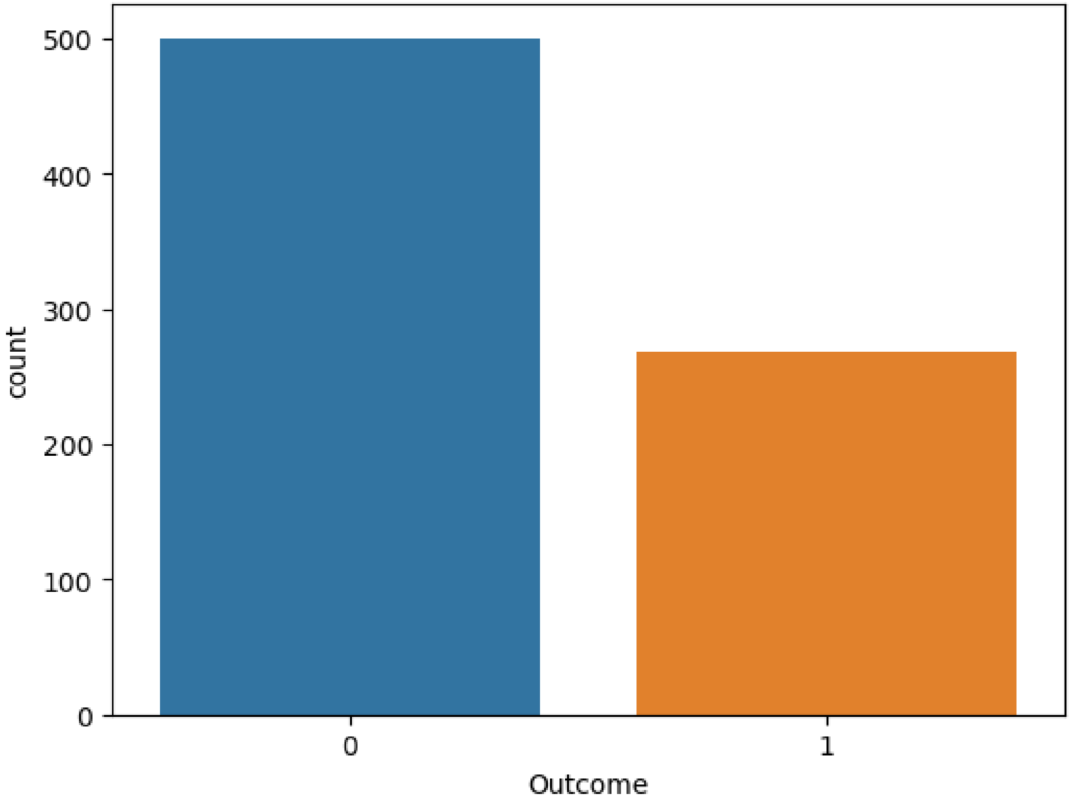
[8]:
```
dataset.isnull().sum()
```

[8]:
```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

[9]:
```
sns.countplot(x = 'Outcome',data = dataset)
```

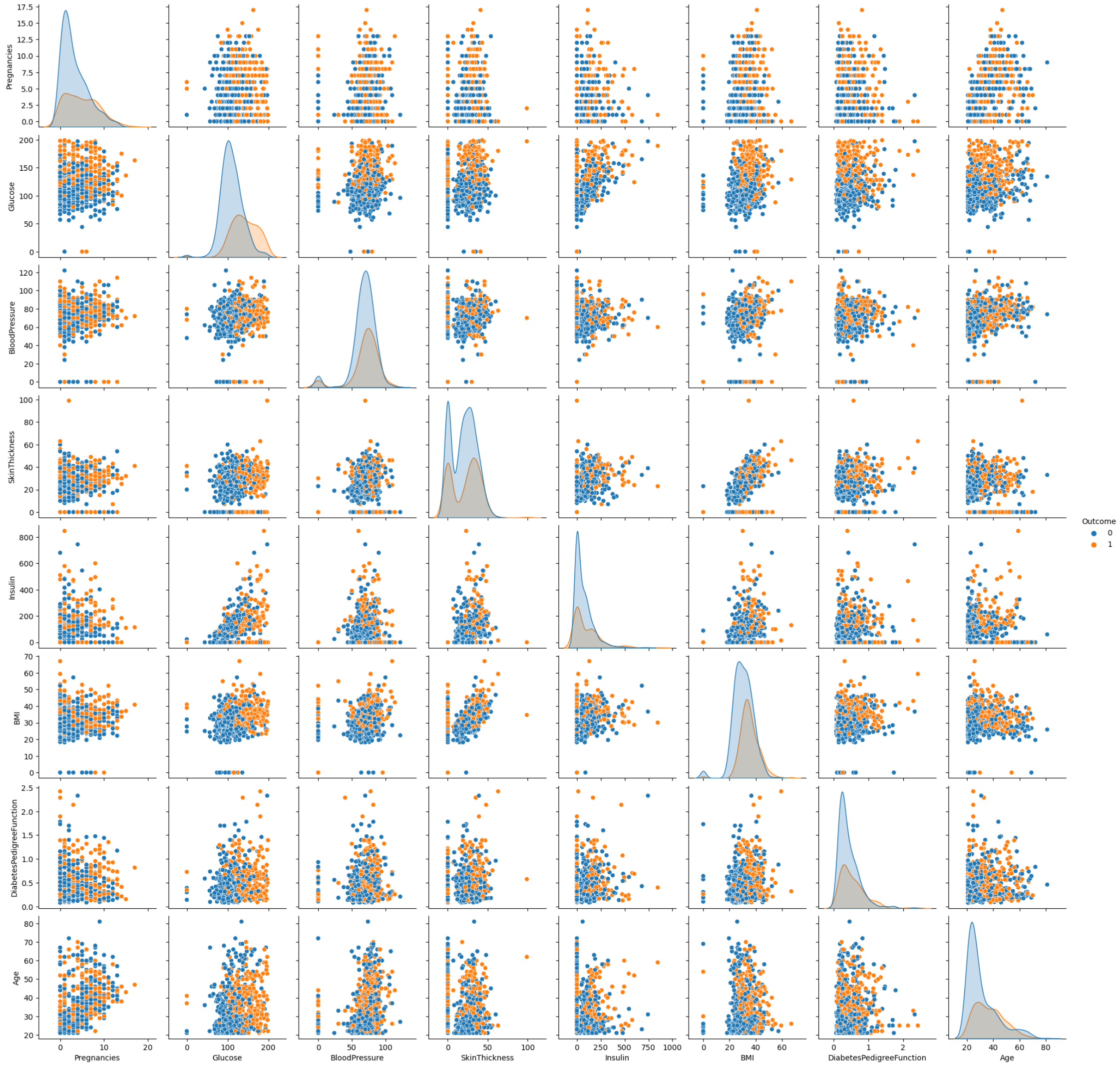
[9]:

```
<Axes: xlabel='Outcome', ylabel='count'>
```



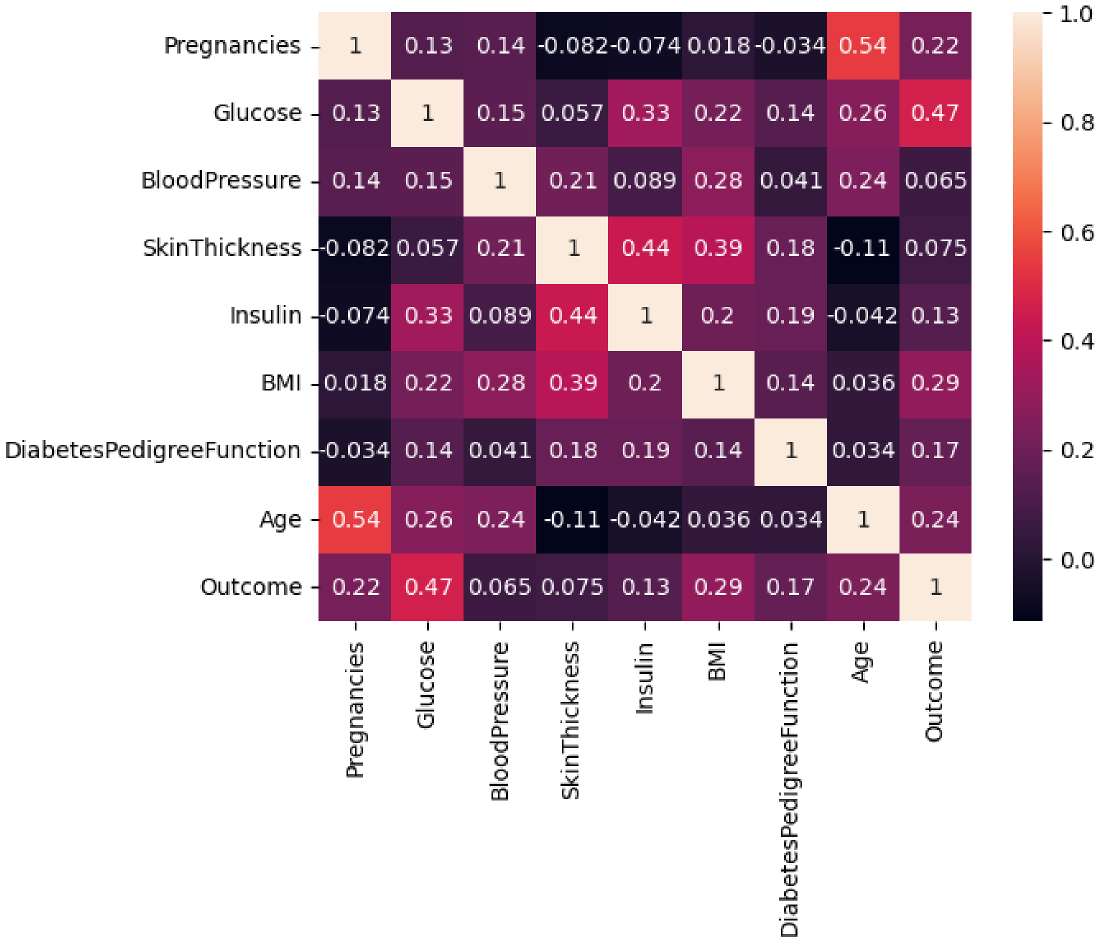
[12]:

```
# Pairplot
sns.pairplot(data = dataset, hue = 'Outcome')
plt.show()
```



[13]:

```
# Heatmap
sns.heatmap(dataset.corr(), annot = True)
plt.show()
```



[14]:

```
# Replacing zero values with NaN
dataset_new = dataset
dataset_new[["Glucose", "BloodPressure", "SkinThickness", "Insulin", "BMI"]] =␣
 ↪dataset_new[["Glucose", "BloodPressure", "SkinThickness", "Insulin", "BMI"]].
 ↪replace(0, np.NaN)
```

[15]:

```
# Count of NaN
dataset_new.isnull().sum()
```

[15]:

```
Pregnancies                   0
Glucose                       5
BloodPressure                35
SkinThickness               227
Insulin                     374
BMI                          11
DiabetesPedigreeFunction      0
Age                           0
```

```
Outcome                     0
dtype: int64
```

[16]:

```
# Replacing NaN with mean values
dataset_new["Glucose"].fillna(dataset_new["Glucose"].mean(), inplace = True)
dataset_new["BloodPressure"].fillna(dataset_new["BloodPressure"].mean(),␣
 ↪inplace = True)
dataset_new["SkinThickness"].fillna(dataset_new["SkinThickness"].mean(),␣
 ↪inplace = True)
dataset_new["Insulin"].fillna(dataset_new["Insulin"].mean(), inplace = True)
dataset_new["BMI"].fillna(dataset_new["BMI"].mean(), inplace = True)
```

[17]:

```
dataset_new.isnull().sum()
```

[17]:

```
Pregnancies                 0
Glucose                     0
BloodPressure               0
SkinThickness               0
Insulin                     0
BMI                         0
DiabetesPedigreeFunction    0
Age                         0
Outcome                     0
dtype: int64
```

[18]:

```
y = dataset_new['Outcome']
X = dataset_new.drop('Outcome', axis=1)
```

[19]:

```
# Splitting X and Y
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, y, test_size = 0.20,␣
 ↪random_state = 42, stratify = dataset_new['Outcome'] )
```

[20]:

```
from sklearn.linear_model import LogisticRegression
model = LogisticRegression()
model.fit(X_train, Y_train)
y_predict = model.predict(X_test)
```

```
C:\Users\CSE_BAY4\anaconda3\Lib\site-
packages\sklearn\linear_model\_logistic.py:460: ConvergenceWarning: lbfgs failed
to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-
```

```
regression
  n_iter_i = _check_optimize_result(
```

[21]:

```
y_predict
```

[21]:

```
array([1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1,
       0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0,
       0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 0,
       1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 1,
       0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0,
       0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0],
      dtype=int64)
```

[22]:

```
# Confusion matrix
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(Y_test, y_predict)
cm
```

[22]:

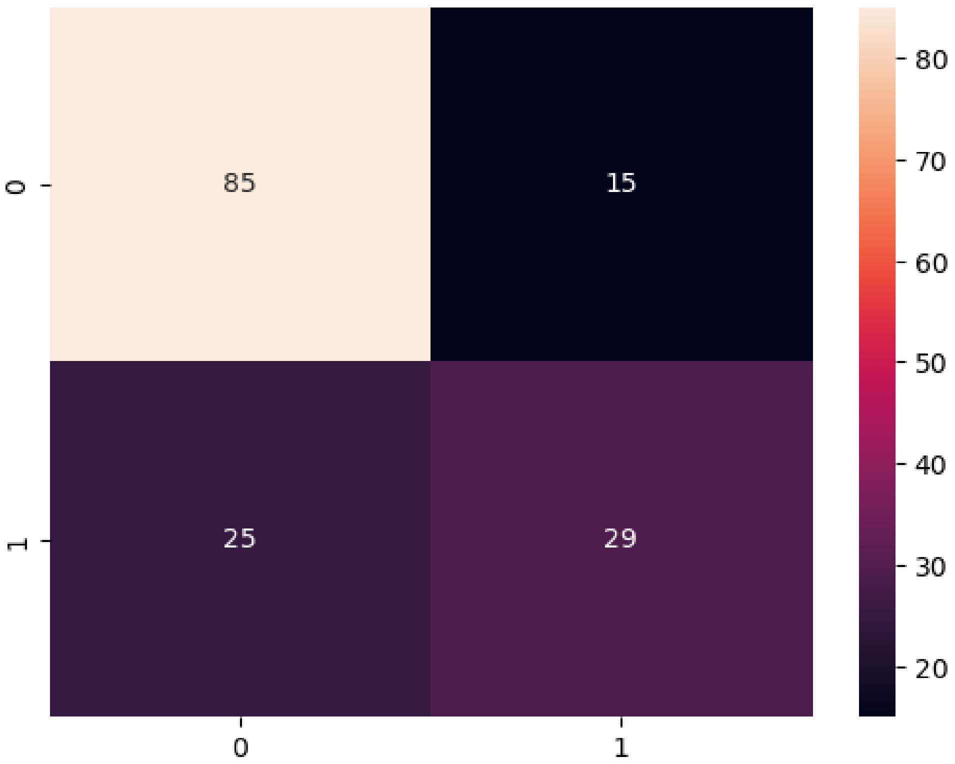
```
array([[85, 15],
       [25, 29]], dtype=int64)
```

[23]:

```
# Heatmap of Confusion matrix
sns.heatmap(pd.DataFrame(cm), annot=True)
```

[23]:

```
<Axes: >
```



[24]:
```
from sklearn.metrics import accuracy_score
```

[25]:
```
accuracy =accuracy_score(Y_test, y_predict)
accuracy
```

[25]:
```
0.7402597402597403
```

[26]:
```
y_predict = model.predict([[1,148,72,35,79.799,33.6,0.627,50]])
print(y_predict)
if y_predict==1:
    print("Diabetic")
else:
    print("Non Diabetic")
```

```
[1]
Diabetic
```

```
C:\Users\CSE_BAY4\anaconda3\Lib\site-packages\sklearn\base.py:464: UserWarning:
X does not have valid feature names, but LogisticRegression was fitted with
feature names
  warnings.warn(
```