# ml-practical-5-piyusha

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LP3_ML_Practical_5

Implement K-Nearest Neighbors algorithm on diabetes.csv dataset. Compute confusion matrix, accuracy, error rate, precision and recall on the given dataset. Dataset link : https://www.kaggle.com/datasets/abdallamahgoub/diabetes

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

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import confusion_matrix, accuracy_score, precision_score,␣
 ↪recall_score, f1_score
```

[2]:
```python
# Step 1: Upload diabetes.csv manually
from google.colab import files
uploaded = files.upload()

# Step 2: Load dataset
df = pd.read_csv("/content/diabetes.csv")
df.head()
```

```
<IPython.core.display.HTML object>

Saving diabetes.csv to diabetes.csv
```

[2]:
```
   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

   Pedigree  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
```

[3]:

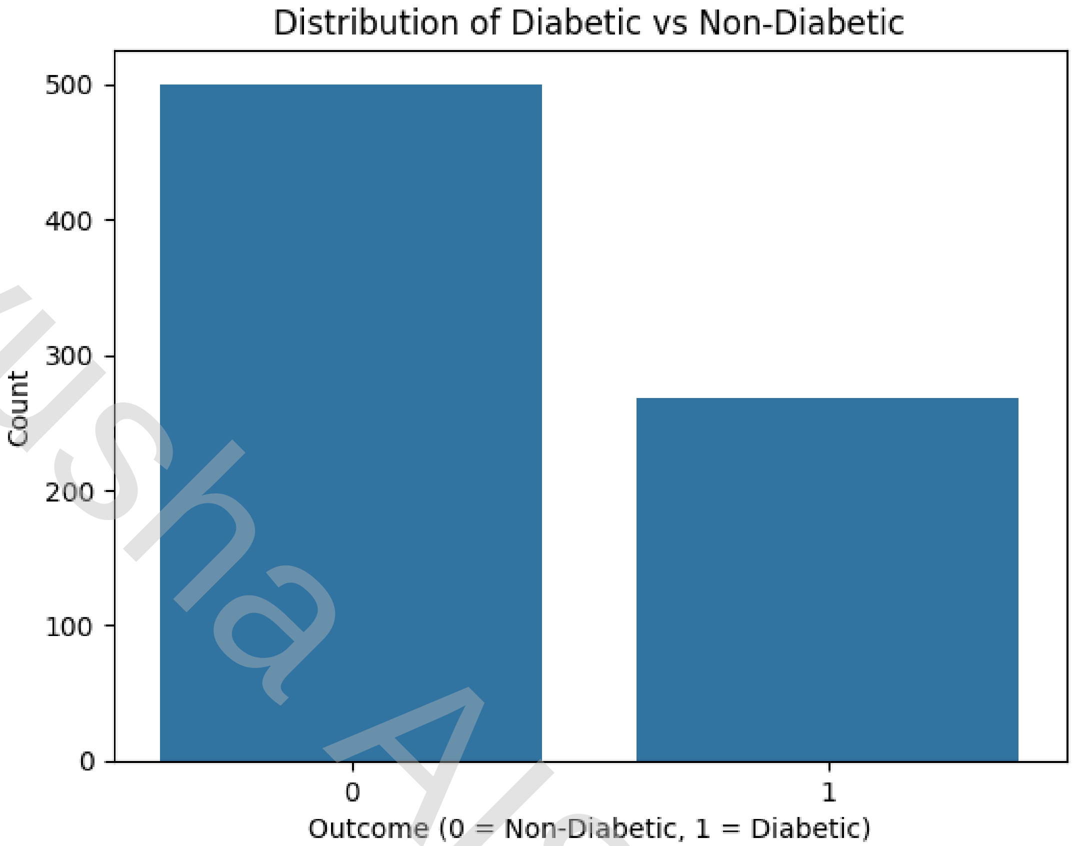
```
# Display basic info
print(df.info())
print(df.describe())

# Check for missing values
print(df.isnull().sum())

# Separate features (X) and target (y)
X = df.drop('Outcome', axis=1)
y = df['Outcome']

# Scale features
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

# Split dataset (80% training, 20% testing)
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2,␣
 ↪random_state=42)
```

```
<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   Pedigree       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
None
       Pregnancies     Glucose  BloodPressure  SkinThickness     Insulin  \
count   768.000000  768.000000     768.000000     768.000000  768.000000
mean      3.845052  120.894531      69.105469      20.536458   79.799479
std       3.369578   31.972618      19.355807      15.952218  115.244002
min       0.000000    0.000000       0.000000       0.000000    0.000000
25%       1.000000   99.000000      62.000000       0.000000    0.000000
```

```
50%         3.000000  117.000000      72.000000      23.000000   30.500000
75%         6.000000  140.250000      80.000000      32.000000  127.250000
max        17.000000  199.000000     122.000000      99.000000  846.000000

              BMI    Pedigree         Age     Outcome
count  768.000000  768.000000  768.000000  768.000000
mean    31.992578    0.471876   33.240885    0.348958
std      7.884160    0.331329   11.760232    0.476951
min      0.000000    0.078000   21.000000    0.000000
25%     27.300000    0.243750   24.000000    0.000000
50%     32.000000    0.372500   29.000000    0.000000
75%     36.600000    0.626250   41.000000    1.000000
max     67.100000    2.420000   81.000000    1.000000
Pregnancies      0
Glucose          0
BloodPressure    0
SkinThickness    0
Insulin          0
BMI              0
Pedigree         0
Age              0
Outcome          0
dtype: int64
```

[4]:

```
sns.countplot(x='Outcome', data=df)
plt.title("Distribution of Diabetic vs Non-Diabetic")
plt.xlabel("Outcome (0 = Non-Diabetic, 1 = Diabetic)")
plt.ylabel("Count")
plt.show()
```



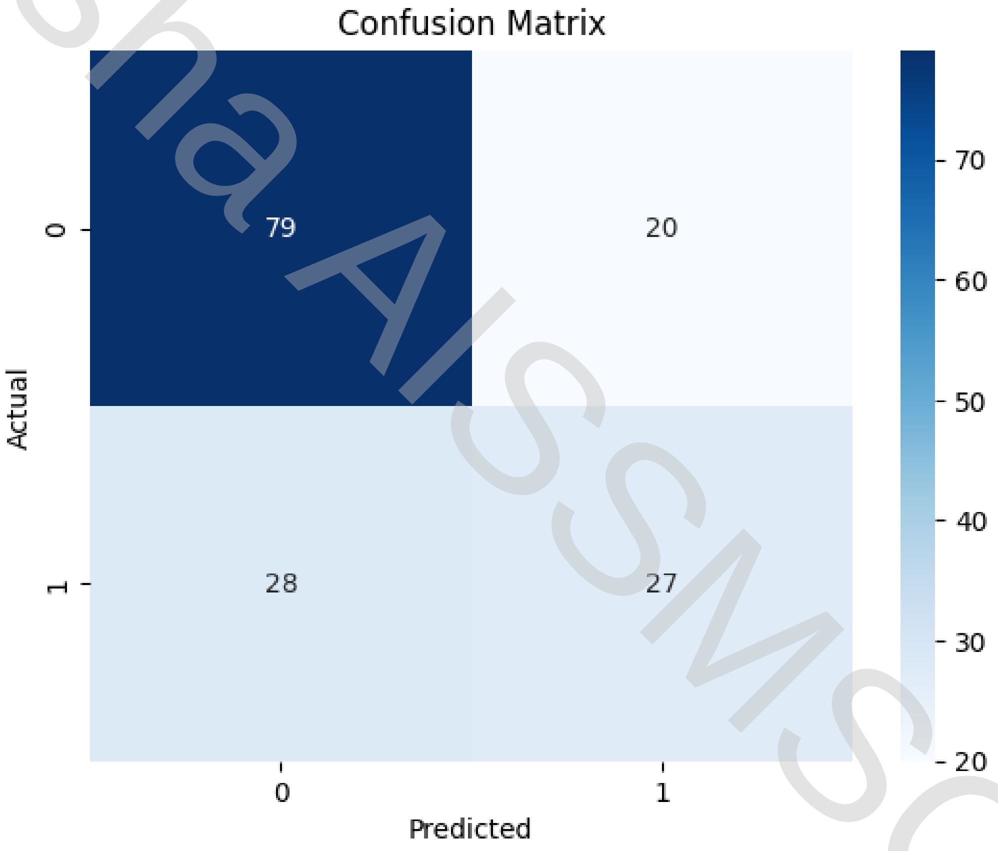
[5]:

```
# Choose number of neighbors
k = 5

# Initialize model
knn = KNeighborsClassifier(n_neighbors=k)

# Train model
knn.fit(X_train, y_train)

# Predict
y_pred = knn.predict(X_test)
```

[6]:

```
# Confusion Matrix
cm = confusion_matrix(y_test, y_pred)
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues')
plt.title("Confusion Matrix")
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```

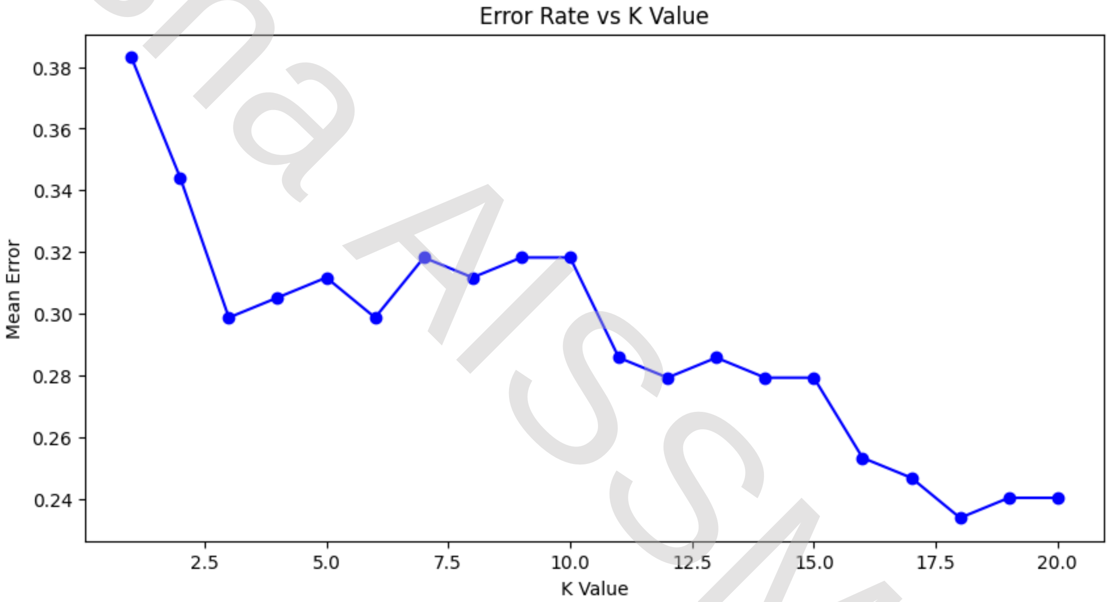
```
# Compute metrics
accuracy = accuracy_score(y_test, y_pred)
error_rate = 1 - accuracy
precision = precision_score(y_test, y_pred)
recall = recall_score(y_test, y_pred)
f1 = f1_score(y_test, y_pred)

print("Accuracy:", round(accuracy, 4))
print("Error Rate:", round(error_rate, 4))
print("Precision:", round(precision, 4))
print("Recall:", round(recall, 4))
print("F1-Score:", round(f1, 4))
```



```
Accuracy: 0.6883
Error Rate: 0.3117
Precision: 0.5745
Recall: 0.4909
F1-Score: 0.5294
```

[7]:

```
error = []
for i in range(1, 21):
    knn = KNeighborsClassifier(n_neighbors=i)
    knn.fit(X_train, y_train)
    pred_i = knn.predict(X_test)
    error.append(np.mean(pred_i != y_test))

plt.figure(figsize=(10,5))
plt.plot(range(1, 21), error, marker='o', color='blue')
plt.title('Error Rate vs K Value')
plt.xlabel('K Value')
plt.ylabel('Mean Error')
plt.show()
```



[ ]:

```
```