

EXPERIMENT-34

34. Scenario: Suppose you are working as a data scientist for a medical research organization. Your team has collected data on patients with a certain medical condition and their treatment outcomes. The dataset includes various features such as age, gender, blood pressure, cholesterol levels, and whether the patient responded positively ("Good") or negatively ("Bad") to the treatment. The organization wants to use this model to identify potential candidates who are likely to respond positively to the treatment and improve their medical approach.

Question: Your task is to build a classification model using the KNN algorithm to predict the treatment outcome ("Good" or "Bad") for new patients based on their features. Evaluate the model's performance using accuracy, precision, recall, and F1-score. Make predictions on the test set and display the results.

Code:

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score
data = pd.read_csv("patients_treatment.csv")
data["gender"] = data["gender"].map({"Male": 0, "Female": 1})
data["outcome"] = data["outcome"].map({"Good": 1, "Bad": 0})
X = data.drop("outcome", axis=1)
y = data["outcome"]
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
X_train, X_test, y_train, y_test = train_test_split(
    X_scaled, y, test_size=0.2, random_state=0
)
knn = KNeighborsClassifier(n_neighbors=5)
knn.fit(X_train, y_train)
y_pred = knn.predict(X_test)
print("\nModel Performance:")
print("Accuracy:", round(accuracy_score(y_test, y_pred), 4))
print("Precision:", round(precision_score(y_test, y_pred), 4))
print("Recall:", round(recall_score(y_test, y_pred), 4))
print("F1 Score:", round(f1_score(y_test, y_pred), 4))
age = float(input("\nEnter patient age: "))
gender = input("Enter gender (Male/Female): ")
bp = float(input("Enter blood pressure: "))
```

```
chol = float(input("Enter cholesterol level: "))
gender_val = 0 if gender == "Male" else 1
new_patient = pd.DataFrame({
    "age": age,
    "gender": gender_val,
    "bp": bp,
    "cholesterol": chol
})
new_scaled = scaler.transform(new_patient)
pred = knn.predict(new_scaled)[0]
print("\nPredicted Treatment Outcome:", "Good" if pred == 1 else "Bad")
```

Output:

```
Model Performance:
```

```
Accuracy: 0.95
```

```
Precision: 0.875
```

```
Recall: 0.875
```

```
F1 Score: 0.875
```

```
Enter patient age: 18
```

```
Enter gender (Male/Female): male
```

```
Enter blood pressure: 125
```

```
Enter cholesterol level: 210
```