

University Admission Prediction with Logistic Regression

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import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, classification_report

# Generate synthetic data
np.random.seed(0)
exam1_scores = np.random.uniform(40, 100, 100)
exam2_scores = np.random.uniform(40, 100, 100)
admission_status = (exam1_scores + exam2_scores) > 140 # A simple admission decision based on scores

# Create a DataFrame
data = pd.DataFrame({'Exam1_Score': exam1_scores, 'Exam2_Score': exam2_scores, 'Admitted': admission_status})

# Split the data into training and testing sets
X = data[['Exam1_Score', 'Exam2_Score']]
y = data['Admitted']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Create a Logistic Regression model
model = LogisticRegression(solver='lbfgs')

# Train the model on the training data
model.fit(X_train, y_train)

# Make predictions on the test data
y_pred = model.predict(X_test)

# Calculate and print the model's accuracy
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy:.2f}')

# Generate and print a classification report
class_report = classification_report(y_test, y_pred, target_names=['Not Admitted', 'Admitted'])
print(f'Classification Report:\n{class_report}')

# Plot the decision boundary
x_min, x_max = X['Exam1_Score'].min() - 10, X['Exam1_Score'].max() + 10
y_min, y_max = X['Exam2_Score'].min() - 10, X['Exam2_Score'].max() + 10
xx, yy = np.meshgrid(np.arange(x_min, x_max, 0.1), np.arange(y_min, y_max, 0.1))
Z = model.predict(np.c_[xx.ravel(), yy.ravel()])
Z = Z.reshape(xx.shape)

plt.contourf(xx, yy, Z, alpha=0.4)
plt.scatter(X['Exam1_Score'], X['Exam2_Score'], c=y, marker='o', edgecolor='k')
plt.title('Logistic Regression: Admission Prediction')
plt.xlabel('Exam 1 Score')
plt.ylabel('Exam 2 Score')
plt.show()
```



Accuracy: 1.00

Classification Report:

	precision	recall	f1-score	support
Not Admitted	1.00	1.00	1.00	9
Admitted	1.00	1.00	1.00	11
accuracy			1.00	20
macro avg	1.00	1.00	1.00	20
weighted avg	1.00	1.00	1.00	20

/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid feature names, but LogisticRegression was using them. Please provide a valid feature names to avoid this warning.

