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from sklearn.datasets import make_regression
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error, r2_score
import matplotlib.pyplot as plt

# Generate synthetic regression dataset
X, y = make_regression(n_samples=100, n_features=1, noise=10,
random_state=42)

# Split into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)

# Create and train the Linear Regression model
model = LinearRegression()
model.fit(X_train, y_train)

# Predict on test data
y_pred = model.predict(X_test)

# Evaluate the model
print("Mean Squared Error (MSE):", mean_squared_error(y_test, y_pred))
print("R^2 Score (Coefficient of Determination):", r2_score(y_test,
y_pred))

# Plotting the regression line
plt.scatter(X_test, y_test, color='blue', label='Actual')
plt.plot(X_test, y_pred, color='red', linewidth=2, label='Predicted')
plt.title("Linear Regression - Actual vs Predicted")
plt.xlabel("Feature")
plt.ylabel("Target")
plt.legend()
plt.show()
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