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# Linear Regression - House Price Prediction

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.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score

# Load dataset
df = pd.read_csv("housing.csv")
df.dropna(inplace=True)

# Simple Linear Regression: area -> price
X = df[['area']]
y = df['price']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
model = LinearRegression()
model.fit(X_train, y_train)
y_pred = model.predict(X_test)

print("MAE:", mean_absolute_error(y_test, y_pred))
print("MSE:", mean_squared_error(y_test, y_pred))
print("R²:", r2_score(y_test, y_pred))
print("Intercept:", model.intercept_)
print("Slope:", model.coef_[0])
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# Plot
plt.figure(figsize=(8,6))
sns.scatterplot(x=X_test['area'], y=y_test, label='Actual')
sns.lineplot(x=X_test['area'], y=y_pred, color='red', label='Predicted')
plt.title("Linear Regression - Area vs Price")
plt.xlabel("Area (sq ft)")
plt.ylabel("Price")
plt.legend()
plt.tight_layout()
plt.savefig("regression_plot.png")
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