**MLA0201-Fundamentals of Machine Learning**

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Experiment 9:

Compare Linear and Polynomial Regression using Python

**Code:**

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

from sklearn.linear\_model import LinearRegression

from sklearn.preprocessing import PolynomialFeatures

from sklearn.model\_selection import train\_test\_split

from sklearn.metrics import r2\_score

data = pd.read\_csv("car\_data.csv")

X = data[['EngineCC']]

y = data['Mileage']

X\_train, X\_test, y\_train, y\_test = train\_test\_split(

X, y, test\_size=0.3, random\_state=1

)

linear\_model = LinearRegression()

linear\_model.fit(X\_train, y\_train)

y\_pred\_linear = linear\_model.predict(X\_test)

r2\_linear = r2\_score(y\_test, y\_pred\_linear)

poly = PolynomialFeatures(degree=2)

X\_poly\_train = poly.fit\_transform(X\_train)

X\_poly\_test = poly.transform(X\_test)

poly\_model = LinearRegression()

poly\_model.fit(X\_poly\_train, y\_train)

y\_pred\_poly = poly\_model.predict(X\_poly\_test)

r2\_poly = r2\_score(y\_test, y\_pred\_poly)

print("Linear Regression R² Score:", r2\_linear)

print("Polynomial Regression R² Score:", r2\_poly)

X\_range = pd.DataFrame(

np.linspace(X.min().values[0], X.max().values[0], 100),

columns=['EngineCC']

)

y\_linear\_line = linear\_model.predict(X\_range)

y\_poly\_curve = poly\_model.predict(poly.transform(X\_range))

plt.figure(figsize=(8, 6))

plt.scatter(X, y, color='blue', label='Actual Data')

plt.plot(X\_range, y\_linear\_line, color='red', label='Linear Regression')

plt.plot(X\_range, y\_poly\_curve, color='green', label='Polynomial Regression')

plt.xlabel("EngineCC")

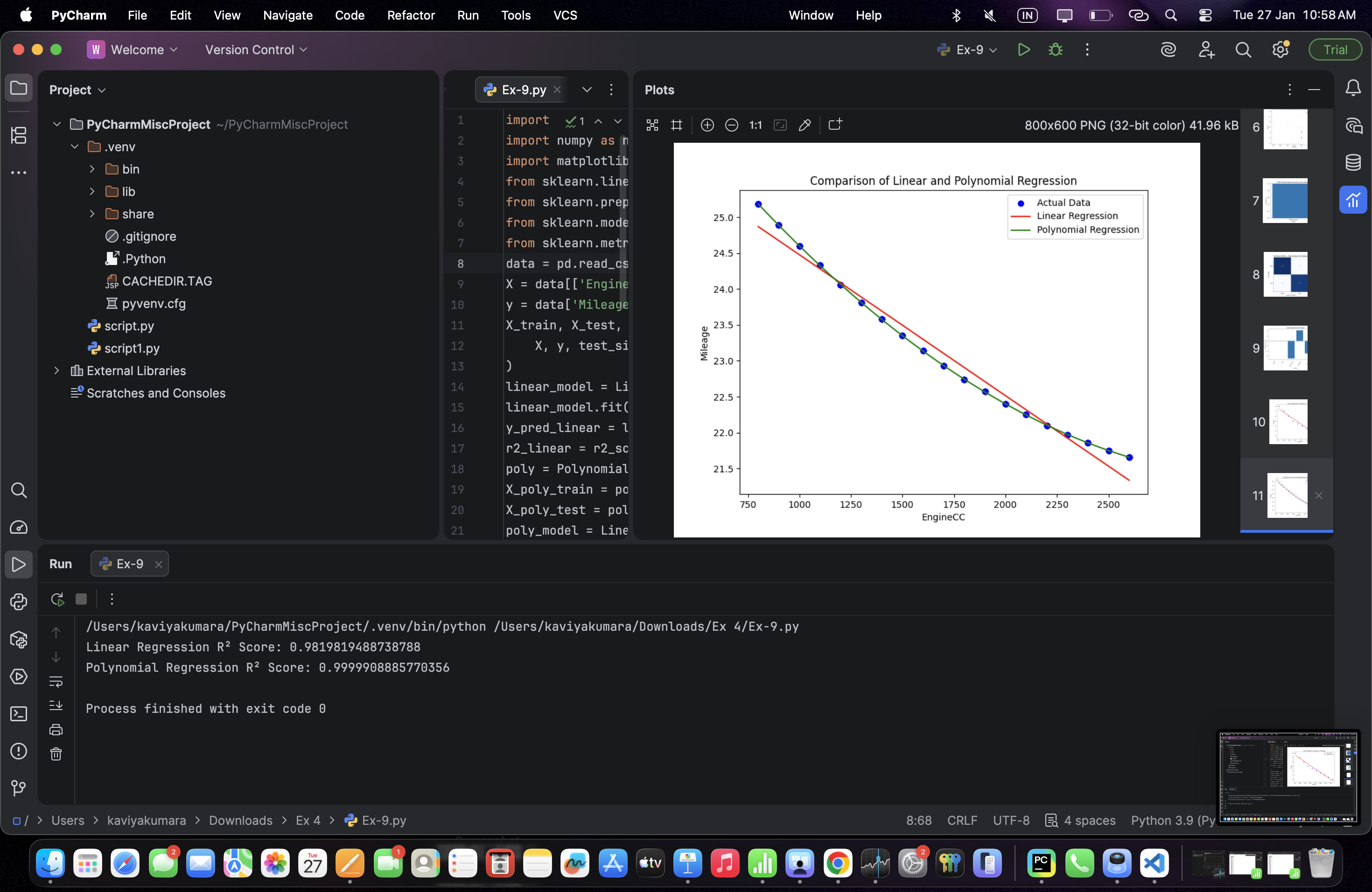
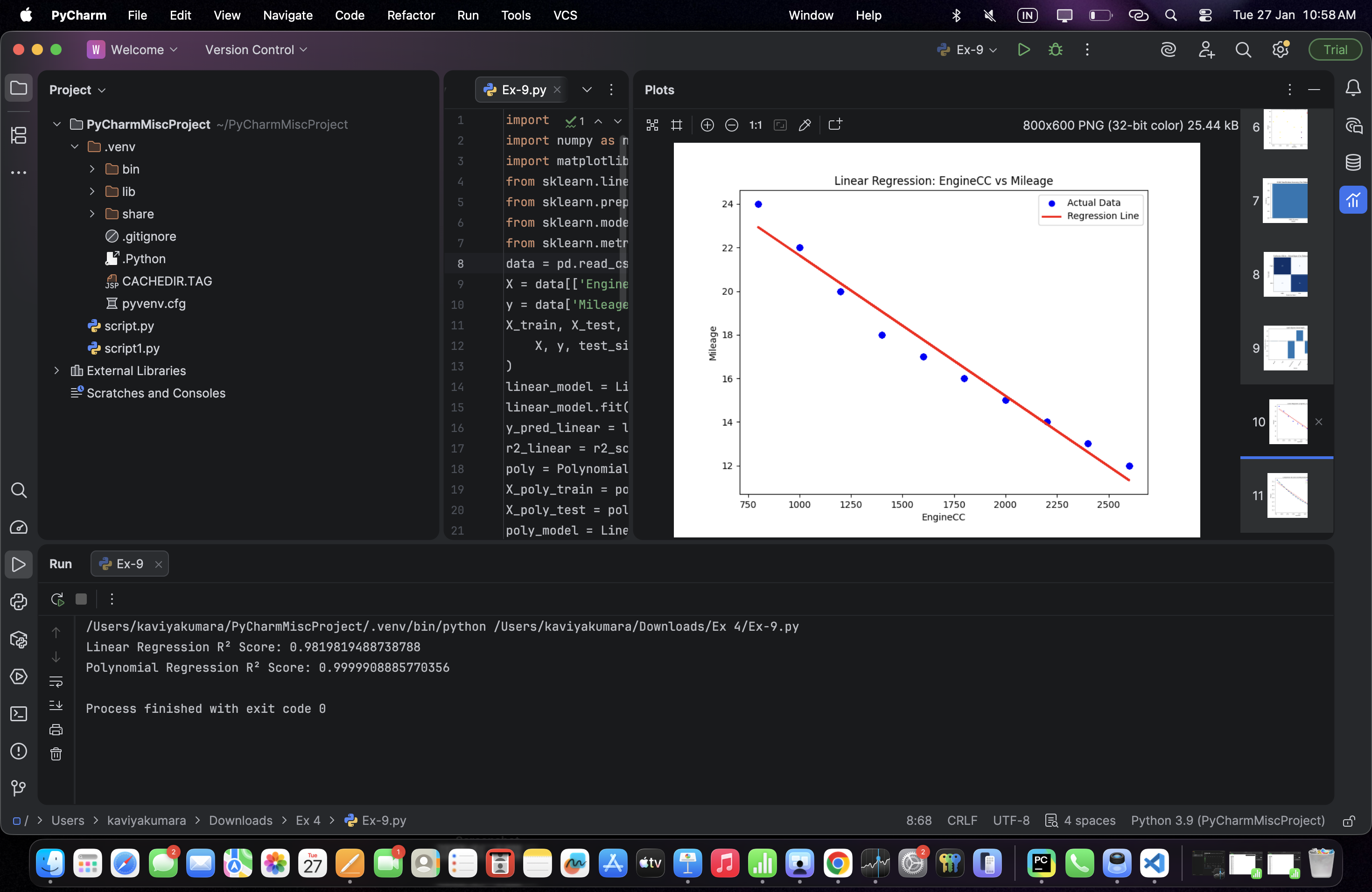
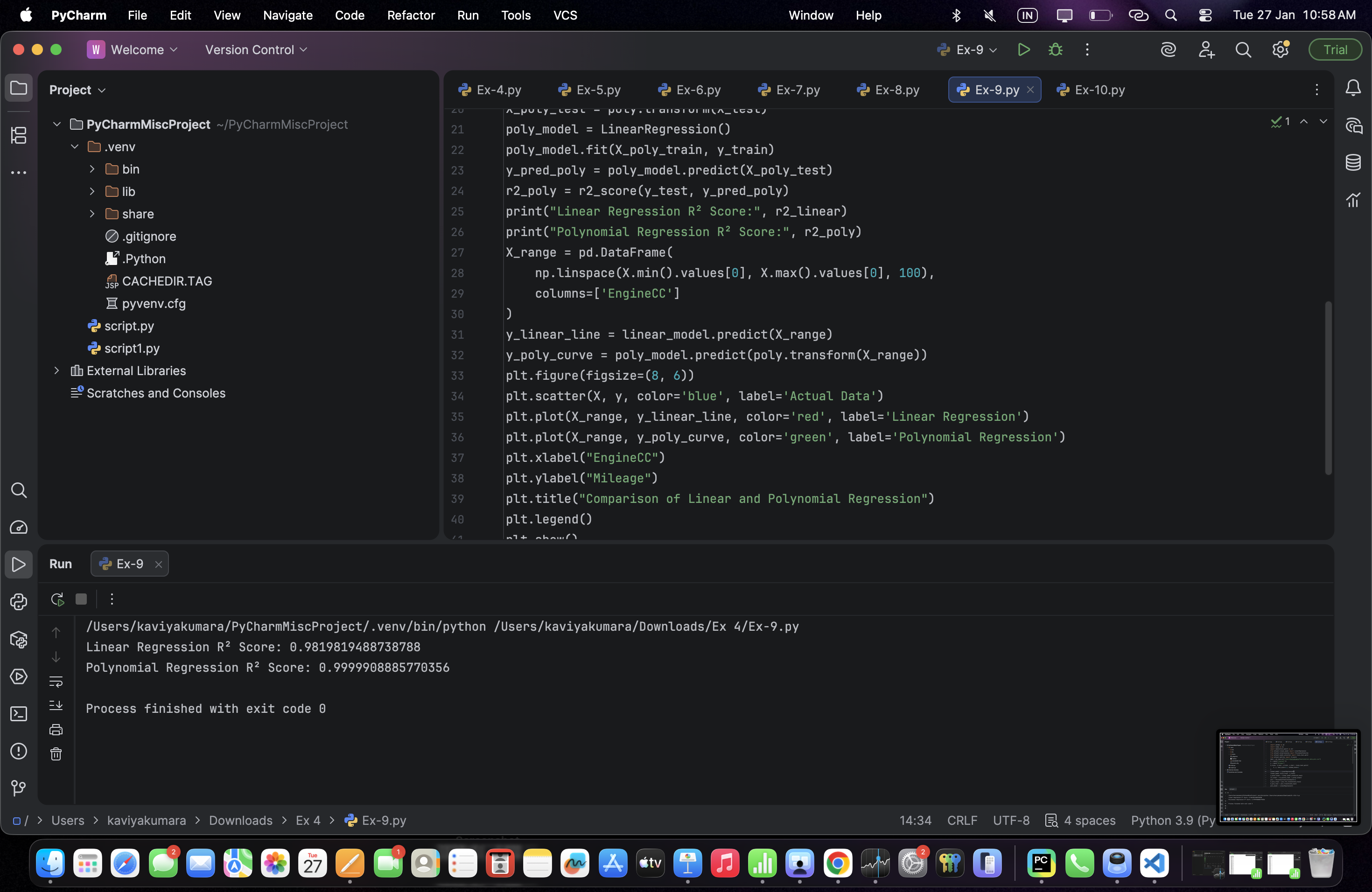
plt.ylabel("Mileage")

plt.title("Comparison of Linear and Polynomial Regression")

plt.legend()

plt.show()

**Output:**

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