

multiple_linear_regression

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[1]: # Step 0: User Input
n = int(input("Enter number of data points: "))

x1 = list(map(float, input("Enter x1 values (space separated): ").split()))
x2 = list(map(float, input("Enter x2 values (space separated): ").split()))
y = list(map(float, input("Enter y values (space separated): ").split()))

# Validation
if len(x1) != n or len(x2) != n or len(y) != n:
    print("Error: Number of values must match n")
    exit()

# Step 1: Summations
Sx1 = sum(x1)
Sx2 = sum(x2)
Sy = sum(y)

Sx1x1 = sum(i*i for i in x1)
Sx2x2 = sum(i*i for i in x2)

Sx1x2 = sum(x1[i] * x2[i] for i in range(n))
Sx1y = sum(x1[i] * y[i] for i in range(n))
Sx2y = sum(x2[i] * y[i] for i in range(n))

# Step 2: Determinants
D = (n*(Sx1x1*Sx2x2 - Sx1x2**2)
     - Sx1*(Sx1*Sx2x2 - Sx2*Sx1x2)
     + Sx2*(Sx1*Sx1x2 - Sx1x1*Sx2))

D0 = (Sy*(Sx1x1*Sx2x2 - Sx1x2**2)
       - Sx1*(Sx1y*Sx2x2 - Sx2y*Sx1x2)
       + Sx2*(Sx1y*Sx1x2 - Sx1x1*Sx2y))

D1 = (n*(Sx1y*Sx2x2 - Sx2y*Sx1x2)
       - Sy*(Sx1*Sx2x2 - Sx2*Sx1x2)
       + Sx2*(Sx1*Sx2y - Sx1y*Sx2))
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D2 = (n*(Sx1x1*Sx2y - Sx1y*Sx1x2)
      - Sx1*(Sx1*Sx2y - Sx1y*Sx2)
      + Sy*(Sx1*Sx1x2 - Sx1x1*Sx2))

# Step 3: Coefficients
b0 = D0 / D
b1 = D1 / D
b2 = D2 / D

print("\nRegression Equation:")
print(f"y = {b0:.4f} + {b1:.4f}*x1 + {b2:.4f}*x2")

# Prediction
new_x1 = float(input("\nEnter x1 for prediction: "))
new_x2 = float(input("Enter x2 for prediction: "))
y_pred = b0 + b1*new_x1 + b2*new_x2

print(f"Predicted y = {y_pred:.4f}")

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Enter number of data points: 5
 Enter x1 values (space separated): 1 2 3 4 5
 Enter x2 values (space separated): 2 1 3 5 4
 Enter y values (space separated): 5 6 7 10 11

Regression Equation:
 $y = 2.8000 + 1.3333*x1 + 0.3333*x2$

Enter x1 for prediction: 6
 Enter x2 for prediction: 5

Predicted y = 12.4667

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