IFT 512 ADVANCED BIG DATA ANALYTICS/AI (2023 Fall)

INFORMATION TECHNOLOGY

Asg3.1GeoLinReg

Instructor: Dr. Robert Rucker

Aishwarya Devi Akkim

ASU ID: 1226589665

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**Code:**

// Given test vectors

val X = Array(3.0, 4.0, 5.0)

val Y = Array(6.0, 9.0, 15.0)

// Step 1: Compute w using centered variables

val X\_mean = X.sum / X.length

val Y\_mean = Y.sum / Y.length

val X\_c = X.map(x => x - X\_mean)

val Y\_c = Y.map(y => y - Y\_mean)

val numerator = X\_c.zip(Y\_c).map { case (xi, yi) => xi \* yi }.sum

val denominator = X\_c.map(xi => xi \* xi).sum

val w = numerator / denominator

// Step 2: Compute b using w and the raw means of X and Y

val b = Y\_mean - (w \* X\_mean)

// Step 3: Calculate SST, SSR, SSE, MSE, RMSE, r, and r^2

val SST = Y.map(y => (y - Y\_mean) \* (y - Y\_mean)).sum

val SSR = X\_c.map(xi => xi \* xi).sum \* w \* w

val SSE = SST - SSR

val MSE = SSE / (X.length - 2)

val RMSE = math.sqrt(MSE)

val r = SSR / SST

val r2 = r \* r

// Print the results

println(s"Regression Weight (w): $w")

println(s"Bias (b): $b")

println(s"SST: $SST")

println(s"SSR: $SSR")

println(s"SSE: $SSE")

println(s"MSE: $MSE")

println(s"RMSE: $RMSE")

println(s"Correlation Coefficient (r): $r")

println(s"Coefficient of Determination (r^2): $r2")

**Output:**

Regression Weight (w): 4.5

Bias (b): -8.0

SST: 42.0

SSR: 40.5

SSE: 1.5

MSE: 1.5

RMSE: 1.224744871391589

Correlation Coefficient (r): 0.9642857142857143

Coefficient of Determination (r^2): 0.9298469387755103

X: Array[Double] = Array(3.0, 4.0, 5.0)

Y: Array[Double] = Array(6.0, 9.0, 15.0)

X\_mean: Double = 4.0

Y\_mean: Double = 10.0

X\_c: Array[Double] = Array(-1.0, 0.0, 1.0)

Y\_c: Array[Double] = Array(-4.0, -1.0, 5.0)

numerator: Double = 9.0

denominator: Double = 2.0

w: Double = 4.5

b: Double = -8.0

SST: Double = 42.0

SSR: Double = 40.5

SSE: Double = 1.5

MSE: Double = 1.5

RMSE: Double = 1.224744871391589

r: Double = 0.9642857142857143

r2: Double = 0.9298469387755103

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