

R

PROGRAMMING

Tutorial 6

Aniruddh Kulkarni

Roll No: I081

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> #Lab 6
> #Question 1
> x<-c(1,2,3,4,5,6,7,8,9);
> y<-c(9,8,10,12,11,13,14,16,15);
> xy=x*y
> xbar=mean(x)
> ybar=mean(y)
> xybar=mean(xy)
> x2bar=mean(x*x)
> y2bar=mean(y*y)
> cov=xybar-xbar*ybar
> sigmax=(x2bar-xbar^2)^(1/2)
> print(sigmax)
[1] 2.581989

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> sigmay=(y2bar-ybar^2)^(1/2)
> r=cov/(sigmax*sigmay)
> print(r)
[1] 0.95
> #Y-12=0.95(X-5)
> ypred=(r*(6.2-xbar))+ybar
> print(ypred)
[1] 13.14

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> #Question 2
> x<-c(56,42,72,36,63,47,55,49,38,42,68,60);
> y<-c(147,125,160,118,149,128,150,145,115,140,152,155);
> xy=x*y
> xbar=mean(x)
> ybar=mean(y)
> xybar=mean(xy)
> x2bar=mean(x*x)
> y2bar=mean(y*y)
> cov=xybar-xbar*ybar
> sigmax=(x2bar-xbar^2)^(1/2)
> sigmay=(y2bar-ybar^2)^(1/2)
> r=cov/(sigmax*sigmay)
> print(r)
[1] 0.8961394

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> #Y-140.33=1.138(X-52.33)
> #X-52.33=0.7056(Y-140.33)
> ypred=((r*sigmay/sigmax)*(45-xbar))+ybar
> print(ypred)
[1] 131.988

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> #Question 3
> x<-c(59,65,45,52,60,62,70,55,45,49);
> y<-c(75,70,55,65,60,69,80,65,59,61);
> xy=x*y
> xbar=mean(x)
> ybar=mean(y)
> xybar=mean(xy)
> x2bar=mean(x*x)
> y2bar=mean(y*y)
> cov=xybar-xbar*ybar
> sigmax=(x2bar-xbar^2)^(1/2)
> sigmay=(y2bar-ybar^2)^(1/2)
> r=cov/(sigmax*sigmay)
> print(r)
[1] 0.835873

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> #Y-140.33=1.138(X-52.33)
> #X-52.33=0.7056(Y-140.33)
> ypred=((r*sigmay/sigmax)*(61-xbar))+ybar
> print(ypred)
[1] 69.55204

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QUESTION 8

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> x_sum <- 130
> y_sum <- 220
> x2_sum <- 2288
> y2_sum <- 5506
> xy_sum <- 3467
> n <- 10
>
> x_mean <- x_sum / n
> y_mean <- y_sum / n
>
> x_std <- sqrt((x2_sum / n) - (x_mean^2))
> y_std <- sqrt((y2_sum / n) - (y_mean^2))
>
> r <- ((xy_sum / n) - (x_mean * y_mean)) / (x_std * y_std)
>
> byx <- r * (y_std / x_std)
> bxy <- r * (x_std / y_std)
>
> sprintf("r = %f", r)
[1] "r = 0.961836"
> sprintf("Standard Deviation of x = %f", x_std)
[1] "Standard Deviation of x = 7.733046"
> sprintf("Standard Deviation of y = %f", y_std)
[1] "Standard Deviation of y = 8.160882"
> sprintf("byx = %f", byx)
[1] "byx = 1.015050"
> sprintf("bxy = %f", bxy)
[1] "bxy = 0.911411"
> sprintf("When X = 16, Y = %f", (byx * (16 - x_mean)) + y_mean)
[1] "When X = 16, Y = 25.045151"
> cat("\n")
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> #QUESTION 5  
> x5 <- c(20,30,40,50,60)  
> fx5 <- c(50,70,67,38,25)  
> u5 <- c(2, 3, 4, 5, 6)  
> fu5 <- fx5 * u5  
> fu25 <- fx5 * u5 * u5  
> y5 <- c(22.5,37.5,52.5,67.5)  
> fy5 <- c(39,85,95,31)  
> v5 <- c(2.25, 3.75, 5.25, 6.75)  
> fv5 <- fy5 * v5  
> fv25 <- fy5 * v5 * v5  
> fuv5 <- c( 291, 922.5, 1335, 982.5, 787.5)  
> n5 <- sum(fy5)  
> ubar5 <- sum(fu5)/n5  
> vbar5 <- sum(fv5)/n5  
> fusquare5 <- sum(fu25)/n5  
> fvsquare5 <- sum(fv25)/n5  
> fuvbar5 <- sum(fuv5)/n5  
> sigmau5 <- sqrt(fusquare5 - (ubar5)^2)  
> sigmav5 <- sqrt(fvsquare5 - (vbar5)^2)  
> rxy5 <- (fuvbar5 - (ubar5 * vbar5))/(sigmau5 * sigmav5)  
> cat('Coefficient of correlation: ', rxy5)  
Coefficient of correlation: 0.5427512>  
> byx5 = (rxy5 * sigmav5)/sigmau5  
> cat('Slope: ', byx5)  
Slope: 0.5931609> cat('Line of regression Y on X: ', 'Y = ', byx5, 'X +', (-byx5*36.72) +  
+                                     44.58 ))  
Line of regression Y on X: Y = 0.5931609 X + 22.79913> X5 <- 31  
> Y5 <- (byx5 * X5) + (-byx5*36.72) + 44.58 )  
> cat('When X = 31, Y = ', Y5)  
When X = 31, Y = 41.18712> bxy5 = (rxy5 * sigmau5)/sigmav5 #X on Y  
> cat('Slope: ', bxy5)  
Slope: 0.4966255> cat('Line of regression X on Y: ', 'X = ', bxy5, 'Y +', (-bxy5*44.58) +
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+
Line of regression X on Y:  $X = 0.4966255 Y + 14.58043$ > Y15 <- 40
> X15 <- (bxy5 * Y15) + (-(bxy5*44.58) + 36.72 )
> cat('When Y = 40, X = ', X15)
When Y = 40, X = 34.44546> #QUESTION 6
> x6 <- c(250, 750, 1250, 1750, 2250)
> fx6 <- c(14, 29, 12, 9, 5)
> u6 <- c(2.5, 7.5, 12.5, 17.5, 22.5)
> fu6 <- fx6 * u6
> fu26 <- fx6 * u6 * u6
> y6 <- c(100, 300, 500, 700, 900)
> fy6 <- c(18, 27, 14, 4, 6)
> v6 <- c(1, 3, 5, 7, 9)
> fv6 <- fy6 * v6
> fv26 <- fy6 * v6 * v6
> fuv6 <- c(45, 652.5, 700, 927.5, 832.5)
> n6 <- sum(fy6)
> ubar6 <- sum(fu6)/n6
> vbar6 <- sum(fv6)/n6
> fusquare6 <- sum(fu26)/n6
> fvsquare6 <- sum(fv26)/n6
> fuvbar6 <- sum(fuv6)/n6
> sigmau6 <- sqrt(fusquare6 - (ubar6)^2)
> sigmav6 <- sqrt(fvsquare6 - (vbar6)^2)
> rxy6 <- (fuvbar6 - (ubar6 * vbar6))/(sigmau6 * sigmav6)
> cat('Coefficient of correlation: ', rxy6)
Coefficient of correlation: 0.7563585>
> byx6 = (rxy6 * sigmav6)/sigmau6
> cat('Slope: ', byx6)
Slope: 0.3056369> cat('Line of regression Y on X: ', 'Y = ', byx6, 'X +', (-(byx6*974.
637) +
+
Line of regression Y on X:  $Y = 0.3056369 X + 65.88299$ > X6 <- 1000
> Y6 <- (byx6 * X6) + (-(byx6*974.637) + 363.768 )
> cat('When X = 1000, Y = ', Y6)
When X = 1000, Y = 371.5199

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