Meher Shrishti Nigam
20BRS1193

EDA LAB – 4
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EDA Lab 4

```
options(prompt="MEHERSHRISHTI>", continue =" ")

# options(prompt=">", continue =" ")
```

EDA-LAB-EXPERIMENT-4 (Date-20/1/2023)

A group of twelve children participated in a psychological study designed to assess the relationship, if any, between age, x years and average total sleep time (ATST), y minutes. To obtain a measure for ATST, recordings were taken on each child on five consecitive nights and then averaged. The results obtained are shown in the table.

Calculate the value of the product moment correlation coefficient between x and y. Assess the statistical significance of your value and interpret your results.

```
df <- data.frame(age = c(4.4, 6.7, 10.5, 9.6, 12.4, 5.5, 11.1, 8.6, 14.0, 10.1, 7.2, 7.9), atst = c(586, 565, 515, 532, 478, 560, 493, 533, 575, 490, 530, 515))
```

Using library functions

```
cor(df$age, df$atst)
```

Using user defined functions

```
pmcc <- function(x, y, n){
 x_mean <- mean(x)
 y_mean <- mean(y)
 #print(x_mean)
 #print(y_mean)
 sum_x_sqr <- sum(x*x)
 sum_y_sqr <- sum(y*y)
 #print(sum_x_sqr)
 #print(sum_y_sqr)
 xy <- x*y
 #print(xy)
 sum_xy <- sum(xy)
 #print(sum_xy)
```

```
sxy <- (sum_xy / n) - (x_mean * y_mean)

#print(sxy)

sx <- sqrt(((sum_x_sqr/n) - (x_mean*x_mean)))

sy <- sqrt(((sum_y_sqr/n) - (y_mean*y_mean)))

#print(sx)

#print(sy)

return (sxy / (sx*sy))

}

pmcc(df$age, df$atst, 12)
```

Interpretation:

Weak negative correlation is shown by the data of Age vs ATST.

Applying significance test,

Null hypothesis -> H0: r = 0

Significance level : 5% (two tailed).

For n = 12 , rcrit = ± 0.576

Thus, H0 is rejected if r < − 0.576 or r > 0.576 .

As r = −0.481, there is not enough data to rule out the null hypothesis.

Output:

```
MEHERSHRISHTI>df <- data.frame(age = c(4.4, 6.7, 10.5, 9.6, 12.4, 5.5, 11.
1, 8.6, 14.0, 10.1, 7.2, 7.9), atst = c(586, 565, 515, 532, 478, 560, 493,
 533, 575, 490, 530, 515))
MEHERSHRISHTI># Using library functions
MEHERSHRISHTI>cor(df$age, df$atst)
[1] -0.4808029
MEHERSHRISHTI># Using user defined functions
MEHERSHRISHTI>pmcc <- function(x, y, n){
   x_mean <- mean(x)
   y_mean <- mean(y)
   #print(x_mean)
   #print(y_mean)
   sum_x_sqr <- sum(x*x)
   sum_y_sqr <- sum(y*y)
   #print(sum_x_sqr)
   #print(sum_y_sqr)
   xy <- x*y
   #print(xy)
   sum_xy <- sum(xy)
   #print(sum_xy)
   sxy <- (sum_xy / n) - (x_mean * y_mean)
   #print(sxy)
   sx <- sqrt(((sum_x_sqr/n) - (x_mean*x_mean)))
   sy <- sqrt(((sum_y_sqr/n) - (y_mean*y_mean)))
   #print(sx)
   #print(sy)
   return (sxy / (sx*sy))
 }
MEHERSHRISHTI>pmcc(df$age, df$atst, 12)
[1] -0.4808029
MEHERSHRISHTI>
```