

11/20/22

* fit transformed (df[i]) changing data object to numeric

* statistics part in ~~EDA~~

→ data collection

→ preparing sample

→ null and alternate hypo

→ applying the op test

→ if $P\text{-value} > 0.05$ --- fail to reject the null hypothesis

Question Q11

It was observed that average purchase made by the men of age 18-25 was 10000. is it still the same. check through hypothesis

Note :-

① what ever question says it directly goes for null hypothesis.

Null : mean will be equal to 10000 (same question)

Alt : Mean \neq 10K (opposite to question)

Question

* Can we use t-test if we have two sample

⇒ T-test is only to solve the test problem solving.

which practically not possible and sample size is less than ≤ 30 we will prefer t-test.

Linear Algebra For Machine Learning

matrixes are nothing but combination of rows & columns.

10	4	18
8	12	14
2	6	16

Matrix Multiplication

5	2	9
4	6	7
1	3	8

$$\times \begin{matrix} 1 \\ 2 \\ 4 \end{matrix}$$

=

45
44
39

$$X = 5 \times 1 + 2 \times 2 + 9 \times 4 = 45$$

$$Y = 4 \times 1 + 6 \times 2 + 7 \times 2 = 44$$

$$Z = 1 \times 1 + 3 \times 2 + 8 \times 4 = 39$$

5	2	9
4	6	7
1	3	8

\times

1	2
2	1
1	2

=

18	30
23	28
15	21

$$X_1 = 5 \times 1 + 2 \times 2 + 9 \times 1 = 18$$

$$Y_1 = 4 \times 1 + 6 \times 2 + 7 \times 1 = 23$$

$$Z_1 = 1 \times 1 + 3 \times 2 + 8 \times 1 = 15$$

$$X_2 = 5 \times 2 + 2 \times 1 + 9 \times 2 = 30$$

$$Y_2 = 4 \times 2 + 6 \times 1 + 7 \times 2 = 28$$

$$Z_2 = 1 \times 2 + 3 \times 1 + 8 \times 2 = 21$$

5	2	9
4	6	7
1	3	8

\times

1	2	1
3	1	2
4	2	1

$=$

47	30	18
50	28	23
42	21	15

$$x_1 = 5 \times 1 + 2 \times 3 + 9 \times 4 = 47$$

$$x_2 = 4 \times 1 + 6 \times 3 + 7 \times 4 = 50$$

$$x_3 = 1 \times 1 + 3 \times 3 + 8 \times 4 = 42$$

$$x_2 = 5 \times 2 + 2 \times 1 + 9 \times 2 = 30$$

$$x_2 = 4 \times 2 + 6 \times 1 + 7 \times 2 = 28$$

$$x_2 = 1 \times 2 + 3 \times 1 + 8 \times 2 = 21$$

$$x_3 = 5 \times 1 + 2 \times 2 + 9 \times 1 = 18$$

$$x_3 = 4 \times 1 + 6 \times 2 + 7 \times 1 = 23$$

$$x_3 = 1 \times 1 + 3 \times 2 + 8 \times 1 = 15$$

$$\begin{array}{r} 4 \\ 18 \\ 23 \\ \hline 50 \end{array}$$

Transpose

1	1	0
2	1	2

$=$

1	2
1	1
0	2

Note: transpose is simply changing the rows into column.

OR

changing all the rows into column.

Inverse

$$\begin{bmatrix} 5 & 2 & 9 \\ 4 & 6 & 7 \\ 1 & 3 & 8 \end{bmatrix}^{-1} =$$

Inverse — Determinant of a 2×2 matrix

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \text{matrix} = ad - bc$$

$$\begin{bmatrix} 1 & 4 \\ 6 & 9 \end{bmatrix} = \text{matrix} = 1 \times 9 - 4 \times 6 \\ = 9 - 24 = -15$$

Inverse — Determinant of 3×3 matrix

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = \text{matrix} = a(ei - fxg) + b(dxi - fxg) + c(dxh - exg)$$

Calc for this

+ - + (Rule)

2	2	-3
1	2	2
1	1	2

Matrix

$$= 2(2 \times 2 - 2 \times 1) + (-2)(1 \times 2 - 2 \times 1) +$$

$$-3(1 \times 1 - 2 \times 1)$$

$$= 2(2) + 2(0) + (-3)(-1)$$

$$= 4 + 0 + 3$$

$$= \underline{7}$$

Inverse = Adjoint of a matrix

5	2	9
4	6	7
1	3	8

=

m_{11}	m_{12}	m_{13}
m_{21}	m_{22}	m_{23}
m_{31}	m_{32}	m_{33}

SIGN

+	-	+
-	+	-
+	-	+



27	25	6
-11	31	13
-40	-1	22

27	11	40
-25	31	1
6	-13	22

$$m_{11} = 48 - 21 = 27$$

$$m_{12} = 32 - 7 = 25$$

$$m_{13} = 12 - 6 = 6$$

$$m_{21} = 16 - 27 = -11$$

$$m_{22} = 40 - 9 = 31$$

$$m_{23} = 15 - 2 = 13$$

$$m_{31} = 14 - 38 = -24$$

$$m_{32} = 35 - 36 = -1$$

$$m_{33} = 30 - 8 = 22$$

Rank of Q Matrix

$P(A) =$

0	0	0
0	1	0
0	0	1

Ranking of Matrix how to find.

Let's Suppose

↓ First check do you have completely zero row

1	2	3	→ ①
0	1	0	
2	4	6	

→ NO

× 2 ↓ Relation find out, direct relation.

→ here is relation

2	4	6
2	4	6
<hr/>		
0		

↓ if we will multiply with 2, it will become. 2 4 6

0	0	0
0	1	0
2	4	6

Here the rank of the

matrix is 2 because two non zero column are here.

Second Example

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Here no dependent row and
no non zero row rows so
the rank of this matrix
is 3

Notes Ranking work on elimination
of rows actually.

Matrix Factorization.

Eigen values And Eigen
Vectors

Ticket
Date of matrix

Notes:-

Highest eigen value means highest important.
PCA:- Principal Component Analysis it focus
on only important part.

⑥ + - determinant find out

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\begin{aligned} &= 1(45-48) - 2(36-42) + 3(32-35) \\ &= -3 - 2(-6) + 3(-3) \\ &= -3 + 12 - 2 \\ &= -1 + 12 \\ &= 0 \end{aligned}$$

Notes: There is no any build in command for
adjoint in python.

$$\text{Inverse} = \frac{1}{|A|} (\text{adjoint } a)$$

$$\text{Adjoint} = (\text{inverse})^T \times |A|$$

Notes :- When you get det of any matrix zero mean it is a singular matrix.

And We cannot calculate inverse the matrix which is singular matrix or det of matrix is zero(0).