기계인공지능 HW#05 Sol

1 (3)

For same data set, the result of linear regression and PCA are different

we do linear regression to find expression of tendancy of output y for each input x

Hence, we define error as difference between data point and projected (parallel to y axis) data point.

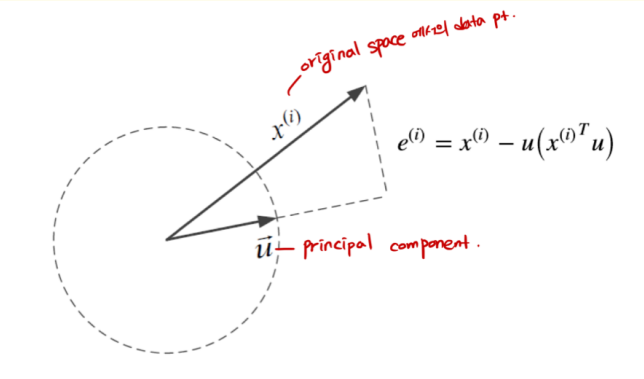
And minimize it.

On the other hands, PCA is a dimension reduction method.

So, we want to reduce dimension with minimum information loss.

Thus, data have to projected on the principal direction. (max variance)

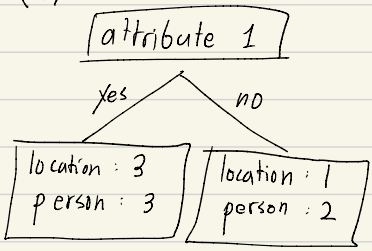
So, define the error as follows.



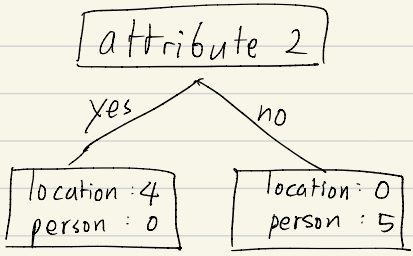
we can see the definition of error (want to minimize) for two methods are different.

Since objects to minimize are different, results also different, ovbious.

4(1)



$D_1 = 1 \quad D_2 = 0.9183$



$D_1 = 0 \quad D_2 = 0$

attribute 1:

$$D_1 = -\frac{1}{2}\log_2\frac{1}{2} - \frac{1}{2}\log_2\frac{1}{2} = 1$$

$$D_2 = -\frac{1}{3}\log_2\frac{1}{3} - \frac{2}{3}\log_2\frac{2}{3} = 0.9183$$

$$Q(\text{test}) = \frac{6}{9}\cdot 1 + \frac{3}{9}\cdot 0.9183 = 0.973$$

attribute 2:

$$D_1 = -\frac{4}{4}\log_2\frac{4}{4} - 0\cdot\log_2 0 = 0$$

$$D_2 = -0\cdot\log_2 0 - \frac{5}{5}\log_2\frac{5}{5} = 0$$

$$Q(\text{test}) = \frac{4}{9}\cdot 0 + \frac{5}{9}\cdot 0 = 0$$

∴ Since $Q_2 < Q_1$, attribute 2 is more useful