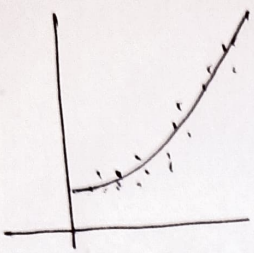
Polynomial Linear Regression.

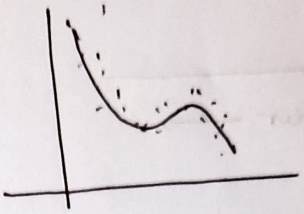
→ Linear : $y = \theta_0 + \theta_1 x$.

→ Polynomial linear : $y = \theta_0 + \theta_1 x + \theta_2 x^2 \cdots \theta_n x^n$

→ This can fit a broader range of functions.

Ex





→ This is still linear because all coefficients are of degree one, (hence linear). powers of features make curve non-linear.

[Here equation is shown for only 1 feature]

→ Outliers affect this model and ineffective choosing of order can cause overfitting / underfitting.

To determine this,

▶ Bayes Information Criterion (BIC$_K$) $= n \log(SS_E) + K \log(n)$

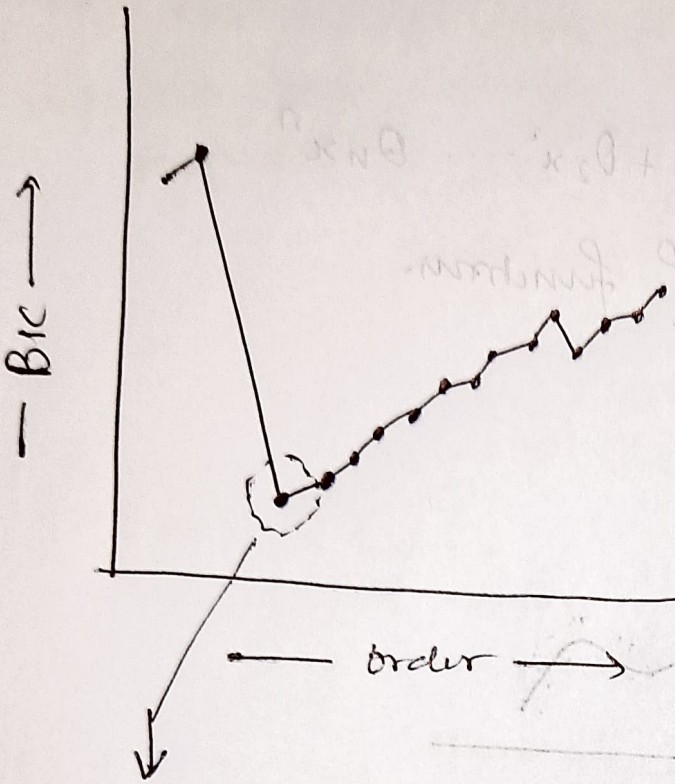
K

K = model order ie number of parameter

n = Number of data point

SS_E = Sum of square of residuals (Squared summed error)

Find BIC for a lot of parameter number.
Then plot it vs K (polynomial order)



Look for minimum point

This is the BIC corresponding to which we get the optimal order.