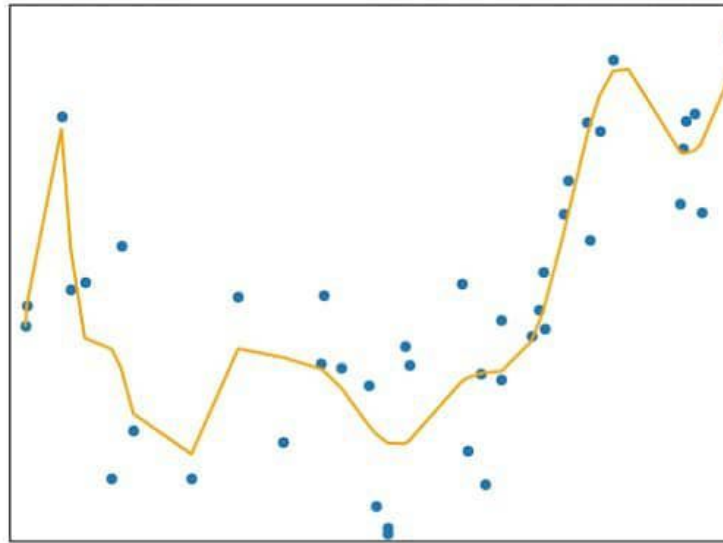# Polynomial regression

- **What if the distribution of the data was more complex like the above picture**
- **We can't use linear models to get good accuracy. which also leads the model to underfit.**
- **We need to generate the curve to fit the data which w we can't do with linear models.**
- **Most of the time the equations look like**
  $$Y = \theta_0 + \theta_1 X + \theta_2 X^2 + \ldots + \theta_m X^m + \text{residual error}$$

Polynomial regression

- **We use the same methods to find the weight vector of how we do in linear regression.**
- **While there might be a temptation to fit a higher degree polynomial to get a lower error, this can result in over-fitting.**
- **We also use L1 and L2 regularizers to maintain the balance between bias(underfit) and variance(overfit)**

Polynomial regression

Advantages of using Polynomial Regression:

- Polynomial basically fits a wide range of curvature.
- Polynomial provides the best approximation of the relationship between the dependent and independent variable.
- A Broad range of function can be fit under it.

DisAdvantages of using Polynomial Regression:

- These are too sensitive to the outliers.
- The presence of one or two outliers in the data can seriously affect the results of nonlinear analysis.
- In addition, there are unfortunately fewer model validation tools for the detection of outliers in nonlinear regression than there are for linear regression.