**Polynomial Regression**

Polynomial Regression is a form of linear regression in which the relationship between the independent variable x and dependent variable y is modelled as an *nth-degree* polynomial. Polynomial regression fits a nonlinear relationship between the value of x and the corresponding conditional mean of y, denoted E(y | x).

## **How does a Polynomial Regression work?**

If we observe closely then we will realize that to evolve from linear regression to polynomial regression. We are just supposed to add the higher-order terms of the dependent features in the feature space.

## **Application of Polynomial Regression**

The reason behind the vast use cases of the polynomial regression is that approximately all of the real-world data is non-linear in nature and hence when we fit a non-linear model on the data or a curvilinear regression line then the results that we obtain are far better than what we can achieve with the standard linear regression. Some of the use cases of the Polynomial regression are as stated below:

* The growth rate of tissues.
* Progression of disease epidemics
* Distribution of carbon isotopes in lake sediments

### **Advantages of using Polynomial Regression**

* A broad range of functions can be fit under it.
* Polynomial basically fits a wide range of curvatures.
* Polynomial provides the best approximation of the relationship between dependent and independent variables.

### **Disadvantages of using Polynomial Regression**

* These are too sensitive to 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.

# **K Nearest Neighbors**

The K-Nearest Neighbors (KNN) algorithm is a simple, easy-to-implement supervised machine learning algorithm that can be used to solve both classification and regression problems. The KNN algorithm assumes that similar things exist in close proximity. KNN captures the idea of similarity (sometimes called distance, proximity, or closeness) with some mathematics like calculating the distance between points on a graph.

### **Advantages of KNN:**

* It is easy to understand and implement.
* It can also handle multiclass classification problems.
* Useful when data does not have a clear distribution.
* It works on a non-parametric approach.

### **Disadvantages of KNN:**

* Sensitive to the noisy features in the dataset.
* Computationally expensive for the large dataset.
* It can be biased in the imbalanced dataset.
* Requires the choice of the appropriate value of K.
* Sometimes normalization may be required.