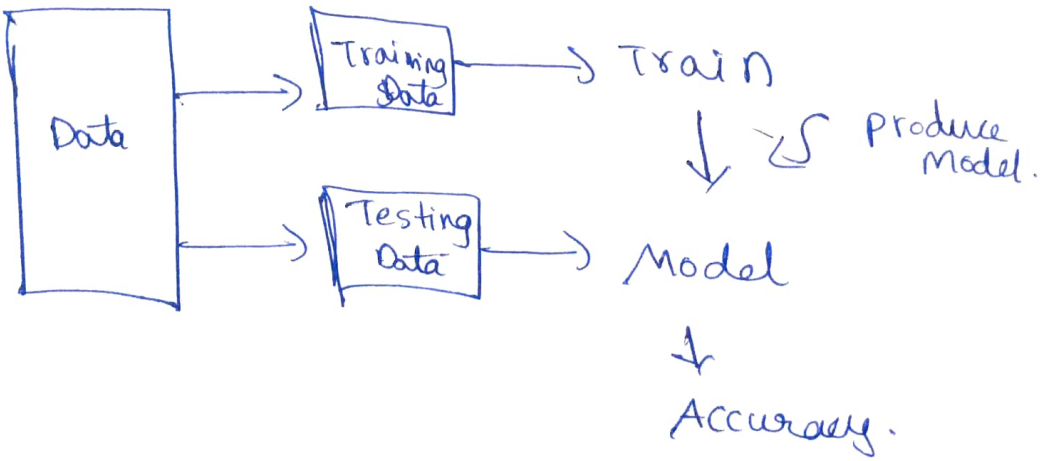
Supervised learning :-

1. In this, A model is getting trained on a labelled dataset.
2. It is a process of providing sample input data as well as correct output data.
3. This learning is to find a mapping function to map the input to the output.
4. In Supervised learning, the main data set is divided into 2 data sets.
   a. Training Data set.
   b. Testing Data Set.



Learning a class from Examples:

1. Set of Cars

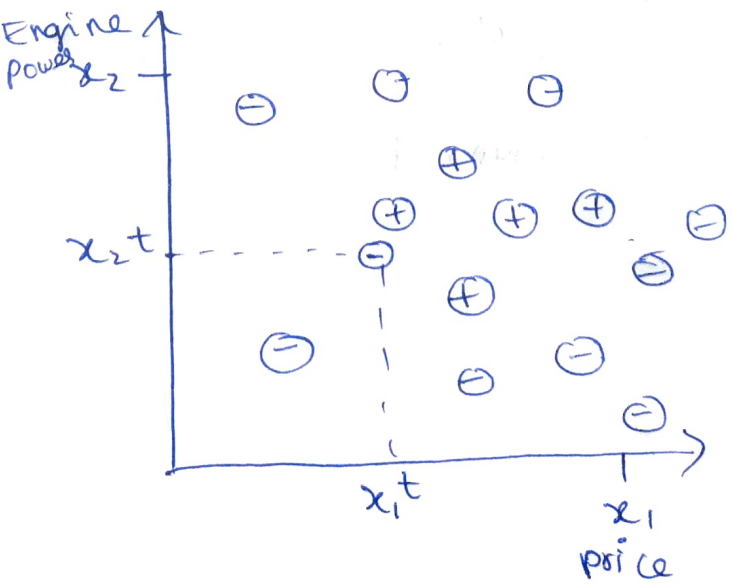
   "Class - C : Family Cars"

2. A group of people look at the cars and label them as family Car(⊕) not by using main 2 attributes
   price
   Enginepower.

3. The Cars that they believe are family cars are (+) positive examples and other cars are (-ve) negative examples.

4. We can ignore other attributes such as seating Capacity and colour and Consider those of irrevelant.

Training Set-Family Car



* The data point corresponds to one sample car.
* Co-ordinates : price and engine power.
* (+) ; positive examples of class (a family car).
* (-) ; negative examples (not a family car).

Variables 'x' and 'r'

1. Price is the 1st attribute x_1 (eg. ; in Rupees)
2. engine power as the second attribute x_2.
3. It can be denote as $\text{Car}\left\{x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right\}$.

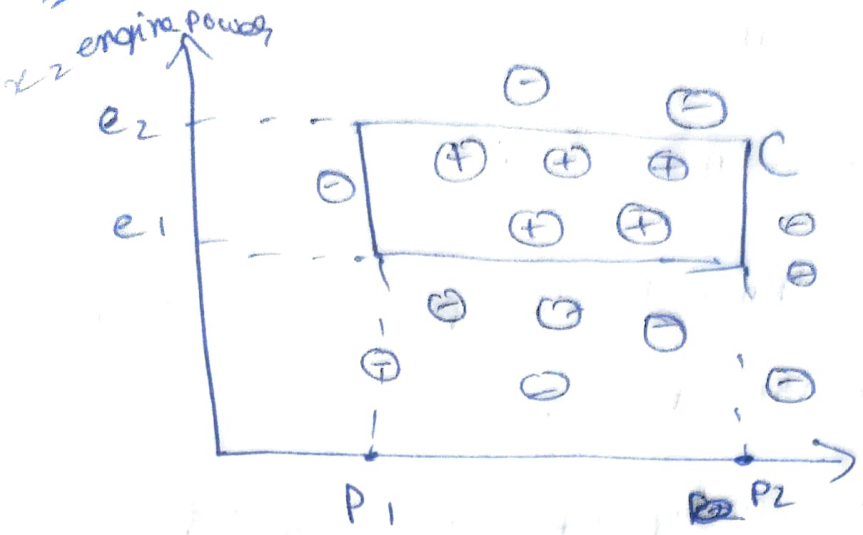
$$r = \begin{cases} 1 & \text{if } x \text{ is a positive example.} \\ 0 & \text{if } x \text{ is a negative example.} \end{cases}$$

4. Each car is represented by such an ordered pair (x, r) and the training set contains N such example.

$$X = \{x^t, r^t\}_{t=1}^{N}$$

5. where t is training set.

Hypothesis class:-



1. If a car to be a family car, its price and engine power should be in certain range.
2. $(p_1 \leq \text{price} \leq p_2)$ and $(e_1 \leq \text{engine power} \leq e_2)$.
3. The class of family car is a rectangle in the price-engine power space.
4. hypothesis, $h \in H$, specified by a particular quadruple of $(p_1^h, p_2^h, e_1^h, e_2^h)$ to approximate C.

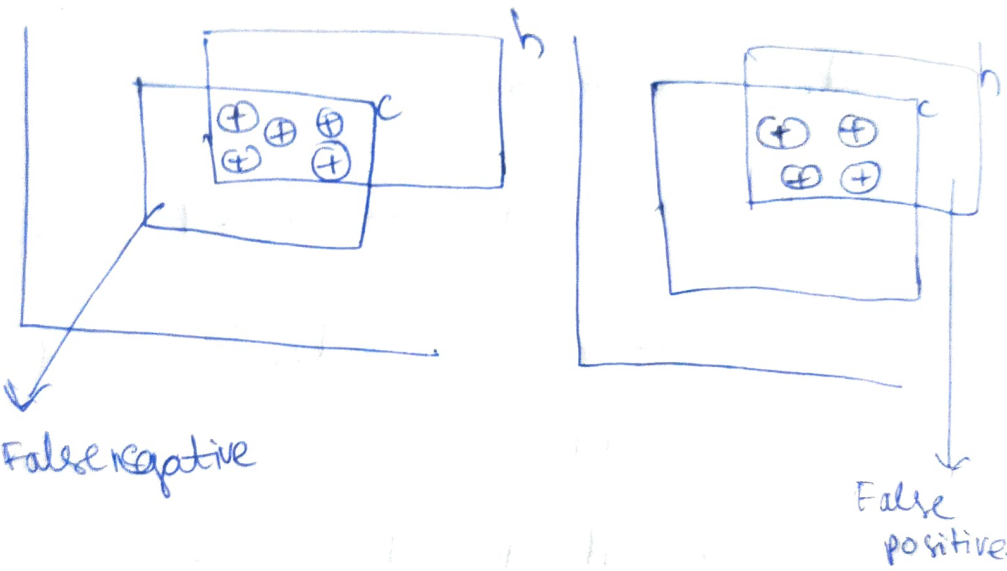
$$h(x) = \begin{cases} 1 & \text{if } h \text{ classifies } x \text{ as a positive example.} \\ 0 & \text{if } h \text{ classifies } x \text{ as a negative example.} \end{cases}$$

1. In real life, we do not know $c(x)$, so we cannot evaluate how well $h(x)$ matches $c(x)$.

2. c - Target function

3. Instances within rectangle represents family cars and outside are not family cars.

4. Hypothesis h - closely approximate C, and there may be error region.



5. The point where c is 1 but h is 0 is False negative.

6. The point where c is 0 and h is 1 is called false positive.

7. True positives and True negatives are correctly classified.