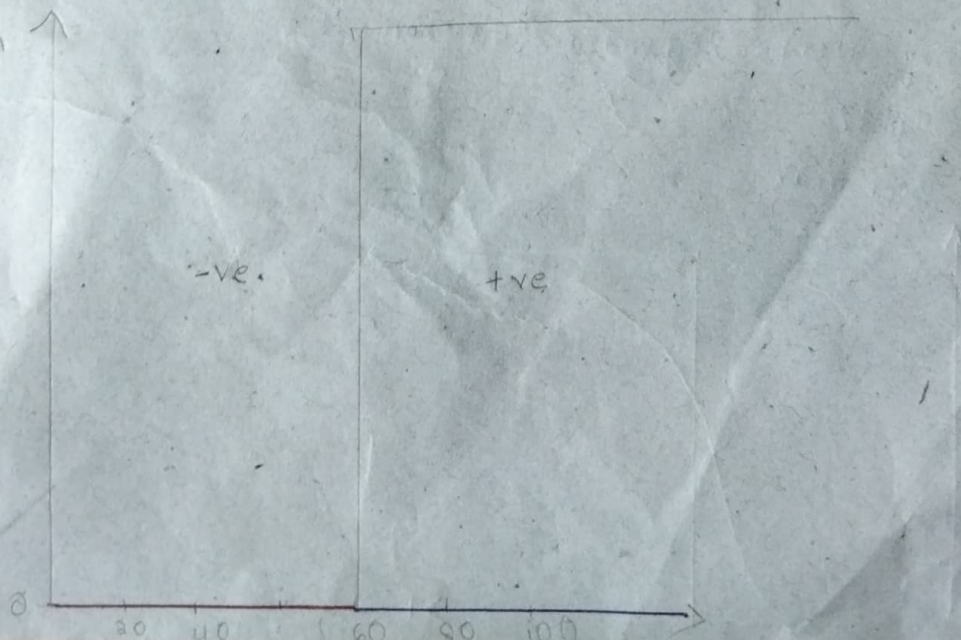
Theorem :

Any Boolean function of 'n' input can be represented exactly by a network of perceptron containing one hidden layer with 2^n perceptrons & one output layer containing one perceptron

n i/p → (2^n P) → (P)

Eg: A person would like to buy a car or not with single input x → Salary.

Sal in $\frac{K}{1000}$	y (buy or not)
80	1
20	0
65	1
15	0
30	0
~~49~~ 49	0
51	1
87	1



a line that separates y=0 & y=1

Left side → Person who donot buy a car
Right side → Person who buy a car

- In Perceptron model, a small change in the i/p will completely flip the o/p in different way. Flip is from 0 to 1. This change is completely depend on weight and threshold.
- Used to handle linearly separable data or binary classification.
- This is because of the characteristic of neuron which is itself act ~~step~~ as a step function (Reason for flip)

↓

which increase or decrease abruptly from one constant value to another constant value.

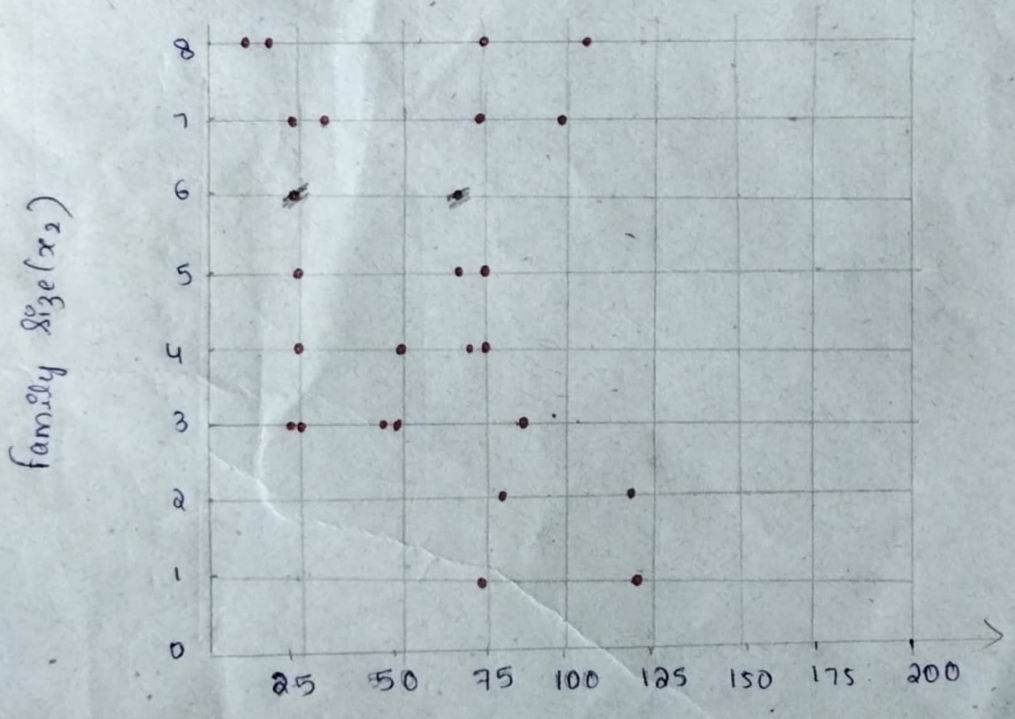
- To avoid this problem, another artificial neuron called SIGMOID NEURON
- In this model, output is smooth that perceptron model
- Here small change in i/p will cause small (minor) change in o/p.
- Used to handle non-linearly separable data.
- It is like a S-like shape.
- Commonly used sigmoid function is
  - logistic
  - soft max

$$y = \frac{1}{1 + e^{-(wx+b)}}$$

- y is not either 0 or 1 (between 0 & 1)

Eg: A person would like to buy a car or not based on two inputs:

Salary lpa(x_1)	Size of family (x_2)	buy or not
11	8	1
20	7	1
4	8	0
8	7	0
11	5	1



> Here number of iterations are performed to minimize error.

> A single ~~neuron~~ sigmoid neuron cannot handle non-linear data.

> we need many Sigmoid neuron for non-linear data

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MLP → multiple layers of neurons.

→ also called as Feed Forward Neural network or deep Feed Forward Neural Network.

→ Hidden layer in MLP will handle non-linear data.

convergence Assignment 10/01/2022