Introduction to Neural Network

⇒ Machine Learning

⇒ Deep Learning

- Basic
- CNN (Open CV)
- NLP → text ← Transformer

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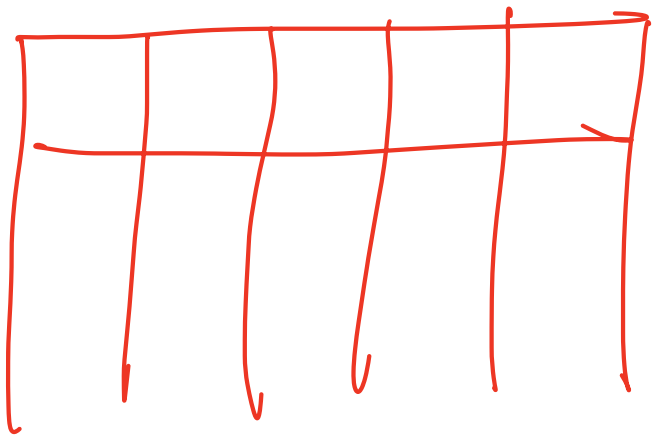
ChatGPT

Jobs ⇒ LLM

⇒ ML ⇒

RF

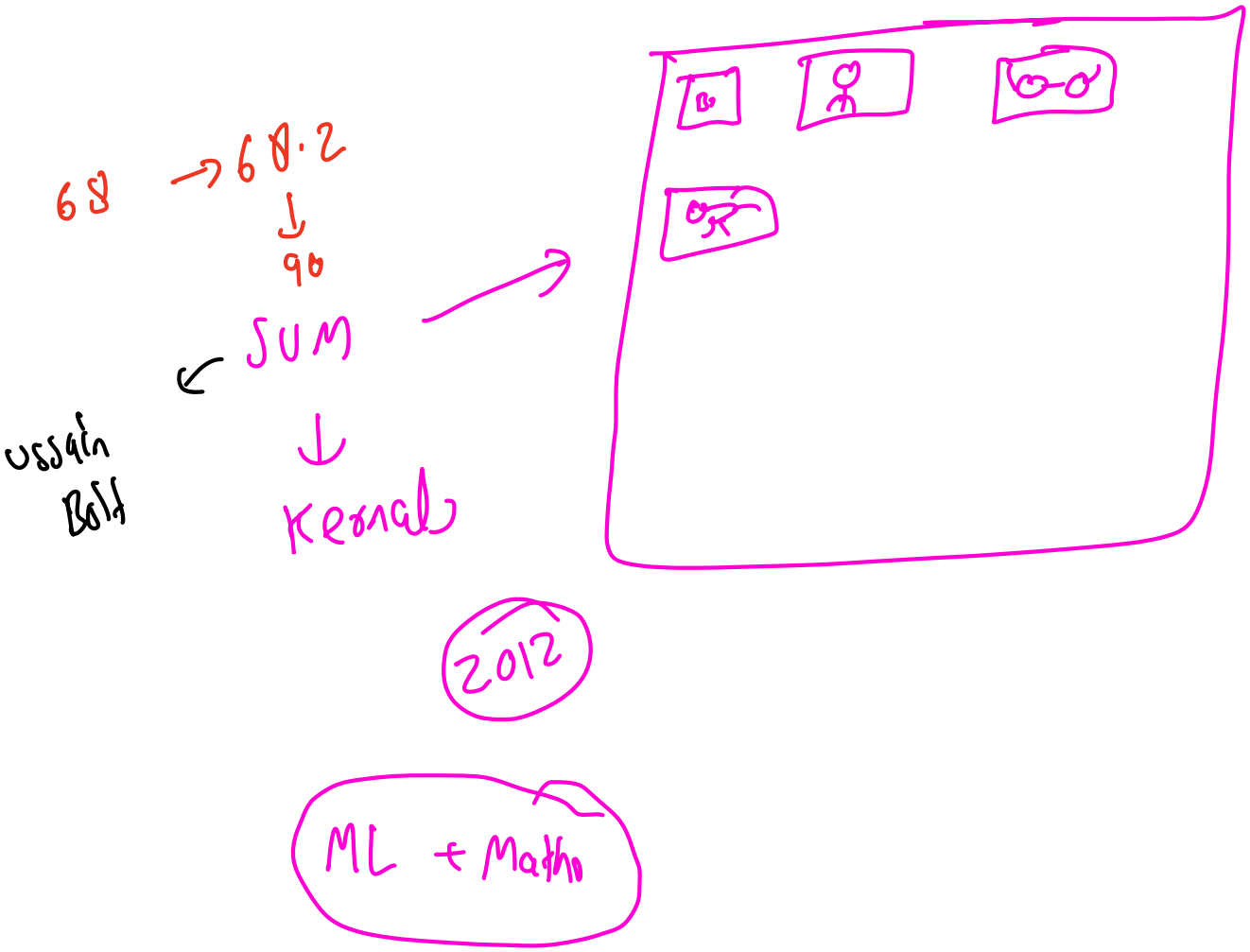
SUM



Speech / Images / Videos / Time series

Complex

Deep Learning



1957 → Perceptron

⋮

1980 → Backpropagation (Hilton)

⋮

2006 → Modern DL

⋮

2012 → Alex Net

Tensorflow 2 & Keras

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Google

Pytorch

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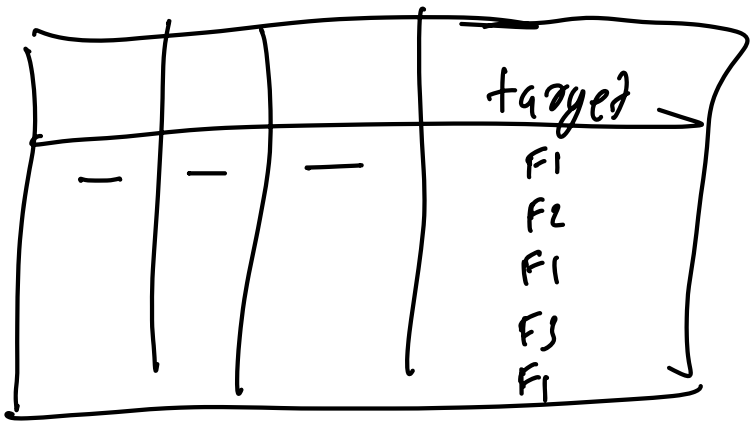
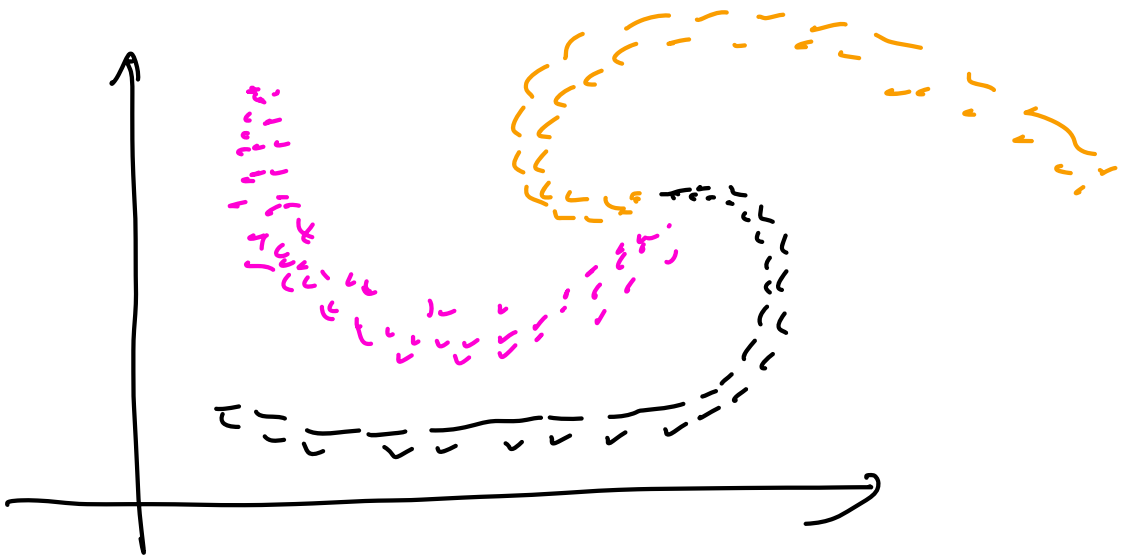
FB





① Multi-class classification

② Non-linear

Logistic Regr

//

One vs rest

Polynomial regression

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Feature eng

$\frac{1}{1+e^{-z}}$

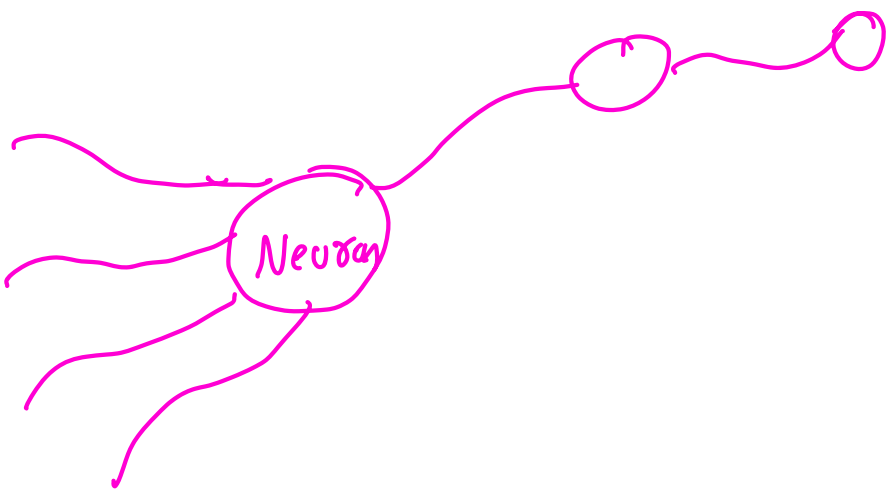
KNN

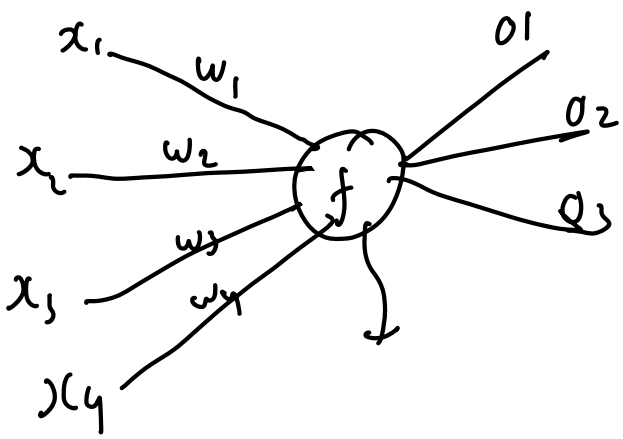
Multiclass ✓

Non-linear ✓

Trees

SVM





$$f(w_1 x_1 + w_2 x_2 + \cdots + w_n x_n) = 0$$

activation function

$$o_i = f\left(\sum_{j=1}^{d} x_{ij}\, w_j\right) \qquad x \in R^d$$

activation fn

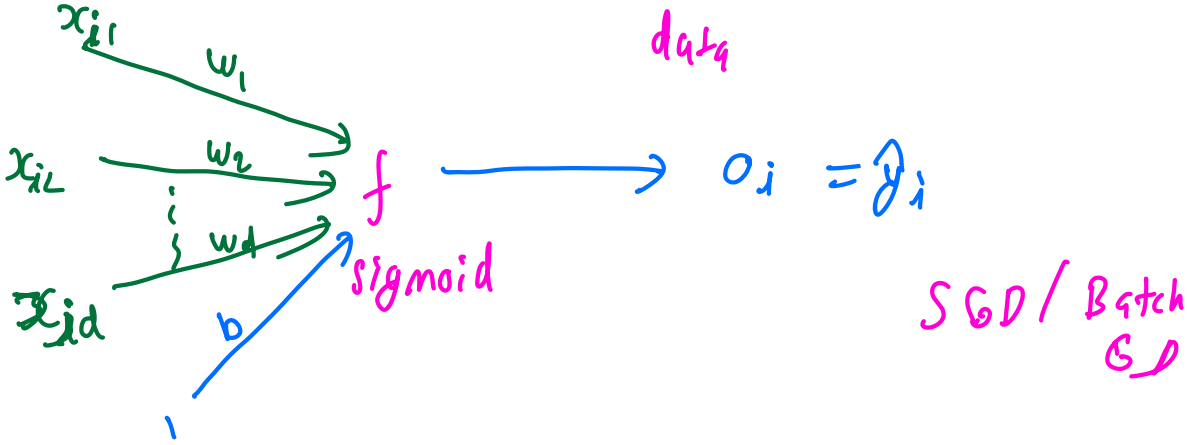
Logistic Regression

$$D_{Tr} = (x \in R^d, y_i)$$

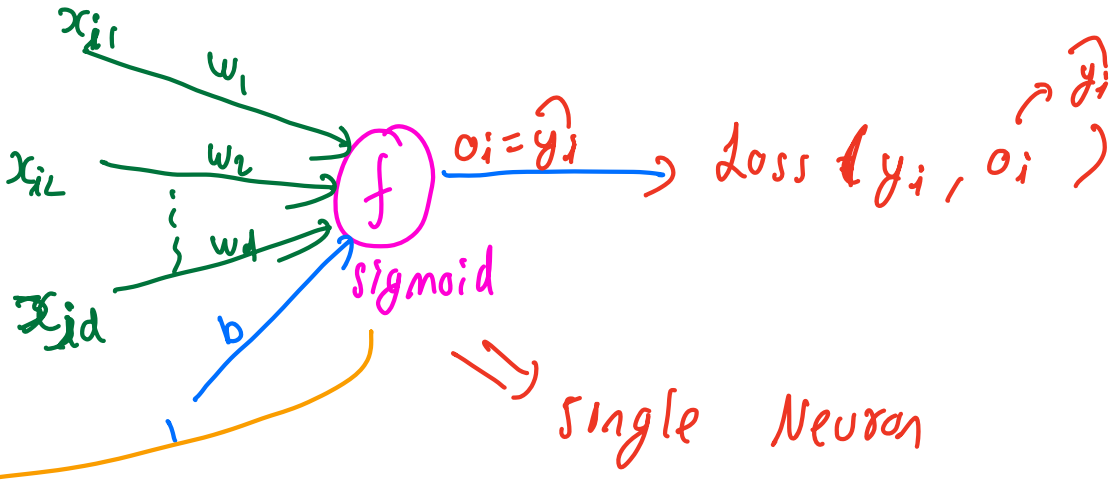
$$\hat{y}_i = \text{sigmoid}\,(w^T x_i + b)$$

d-dim data

scaler



SGD / Batch GD



⇒ single Neuron

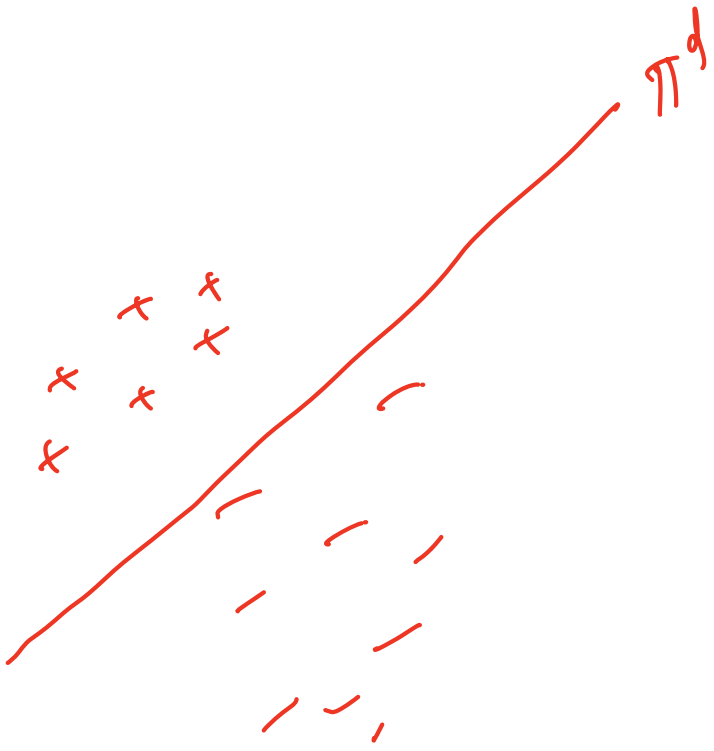
Forward Propogation ⇒ $f_\sigma(w^T x + b)$

$o_i = f_{\text{Perceptron}}(x, w, b)$

$= \begin{cases} 1 & \text{if } w^T x_i + b > 0 \\ 0 & \text{otherwise} \end{cases}$

⇓

Perceptron

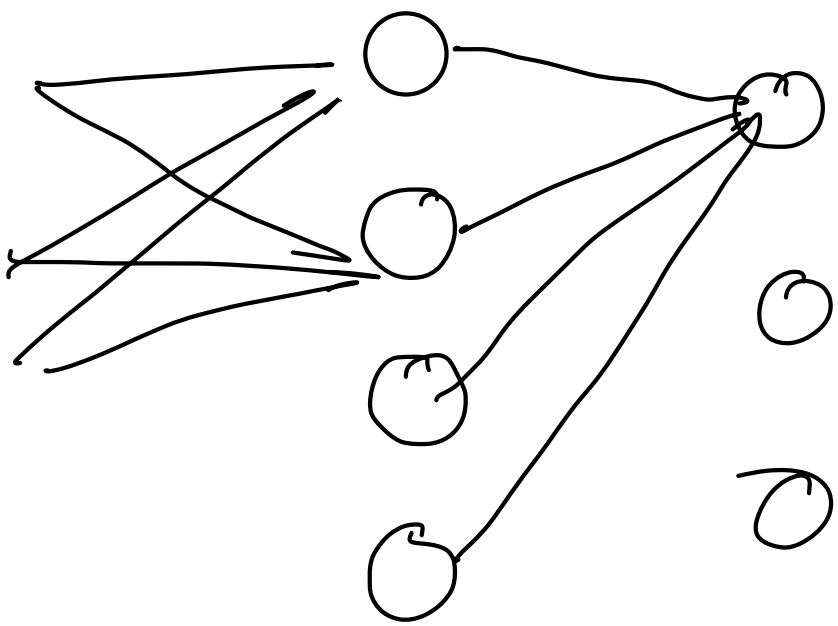


1957

outliers

Linear model

No probabilistic



$f_1 \rightarrow$ add()

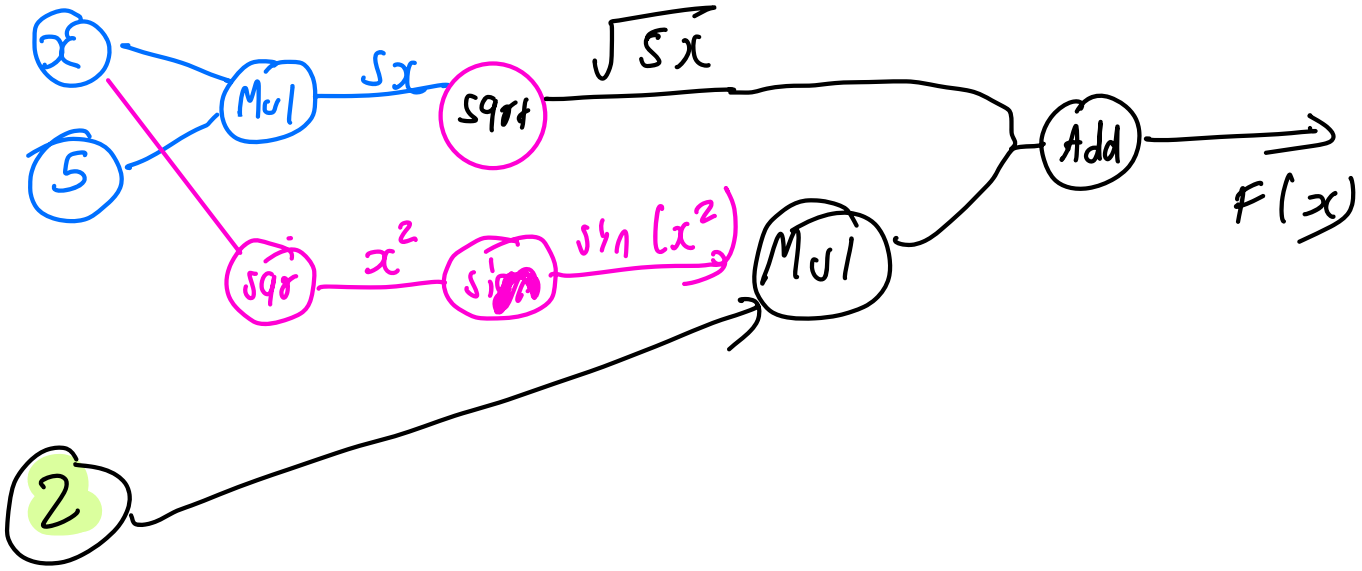
$f_2 \rightarrow$ square()

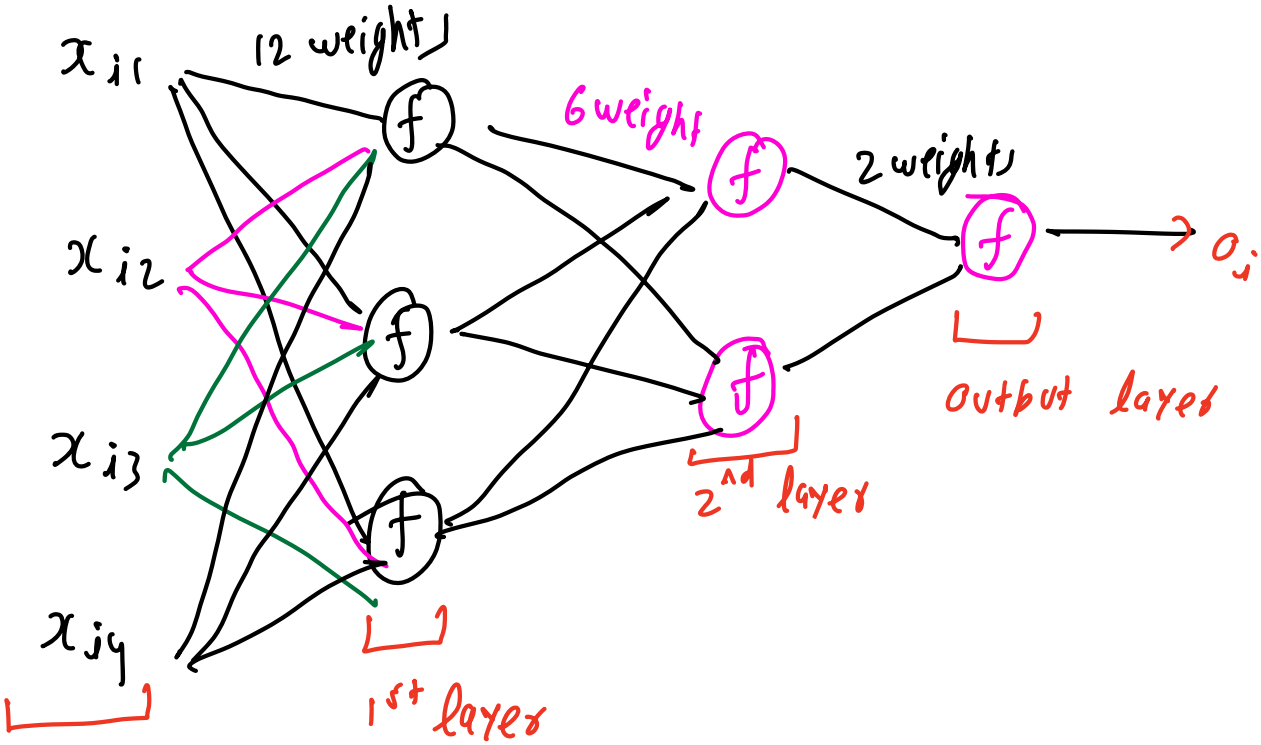
$f_3 \rightarrow$ sqrt()

$f_4 \rightarrow$ sin()

$f_5 \rightarrow$ mul()

$F(x) = 2\sin(x^2) + \text{sqrt}(5x)$



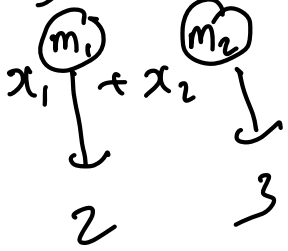


i/p

Break: 10 - 15 PM

$$f(g(x))$$
$$\Downarrow$$
$$fog$$

1



$\Rightarrow \quad x_1^2 + x_2^3 + \dots$

$x_1 + x_2$

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