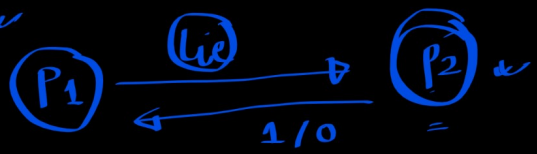
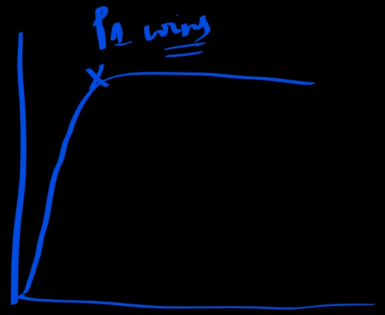
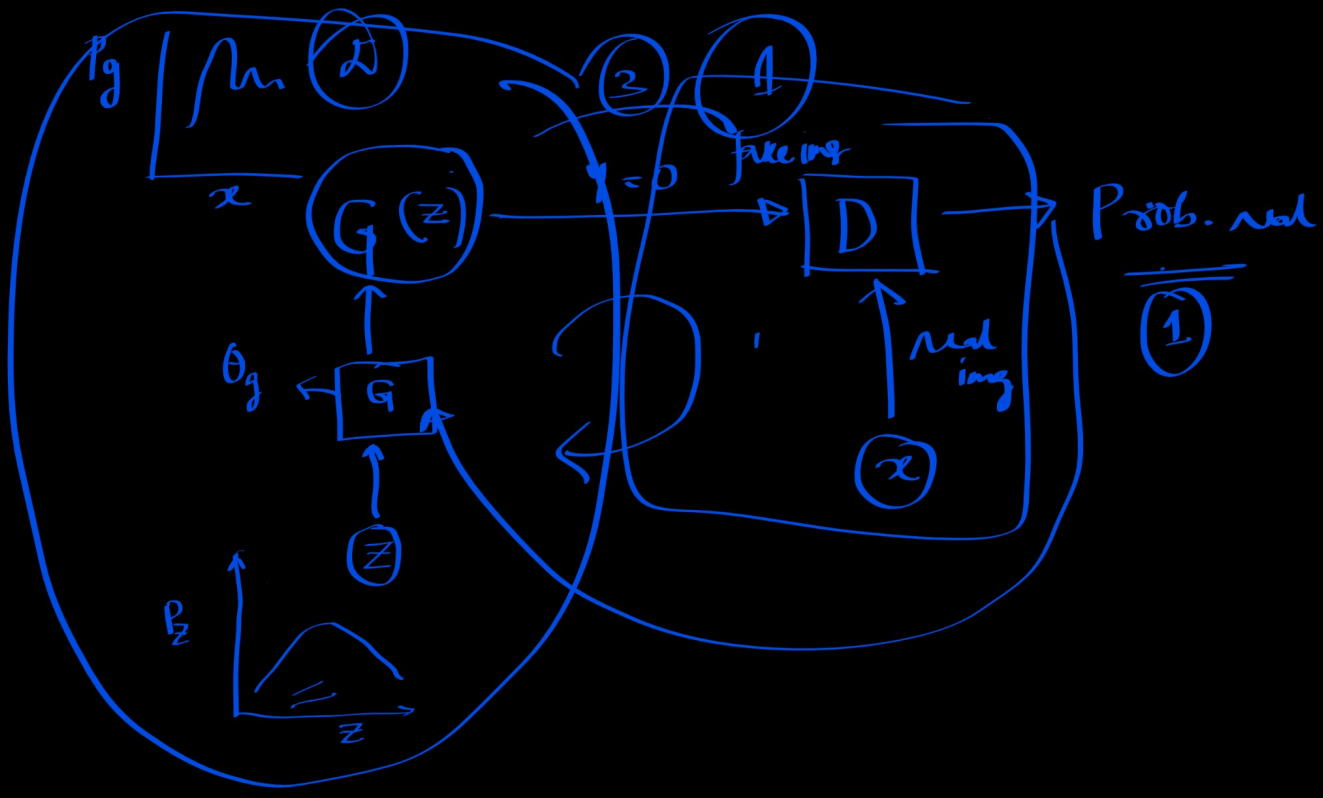
GAN

- Unsupervised learning
- Game Theory - Minimax game







Generative models Vs Discriminative model

$P(x,y)$

Probability when x and y simultaneously happen

x is independent of y and vice versa.

Probability that it will rain if I carry an umbrella.

$P(x,y)$ = Joint probability.

SVM Classify
RF Regression
DT
LR
LR

$y = f(x)$

$P(y|x)$ = Conditional

dependent var

no dep. var

Naive Bayes Model

Transformer model → modified neural network that can predict next token in a context

GPT

2017

Ashish Vaswani

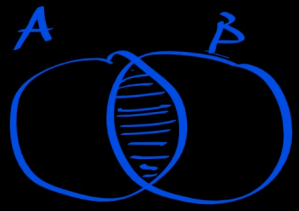
Attention is what you need.

NLP

NLP

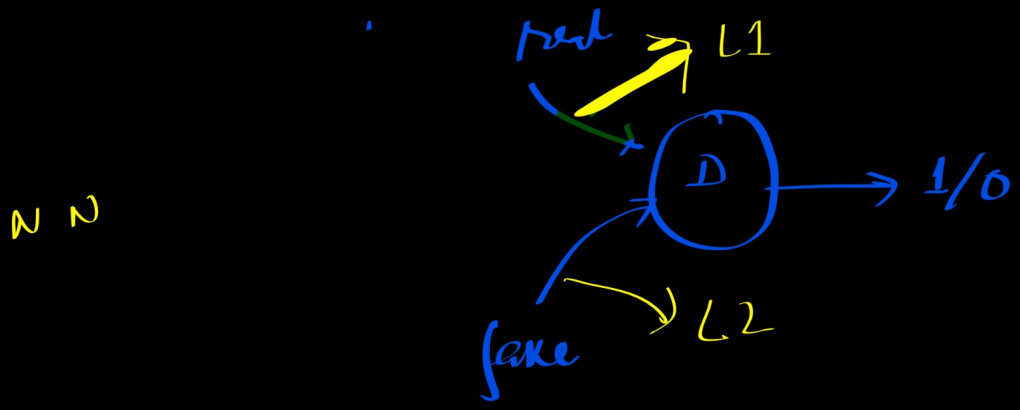
Where is the sky ?

$$P(A|B) = \frac{P(A,B)}{P(B)}$$

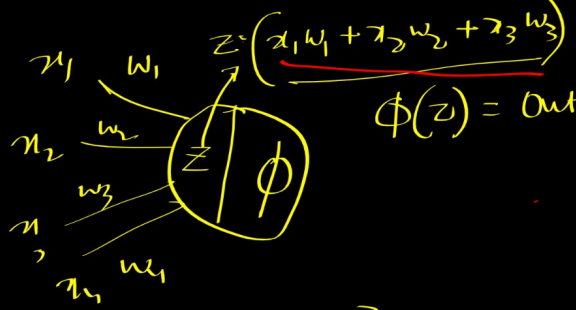


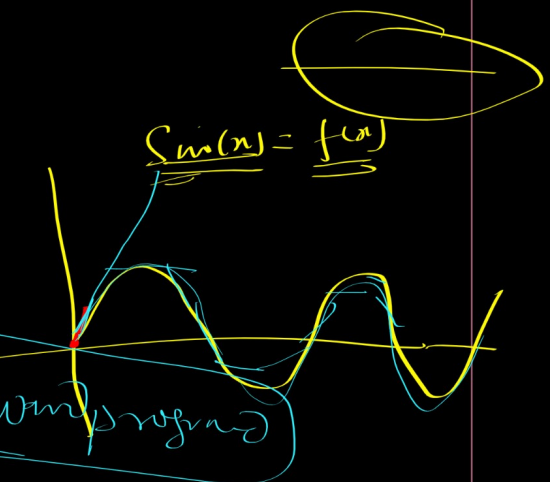
$$P(A,B) = P(A|B) \times P(B)$$

Generate → Generated
Images.

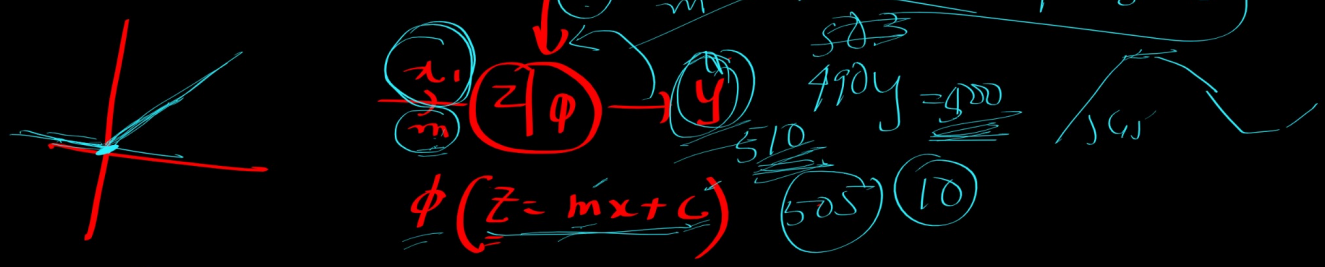


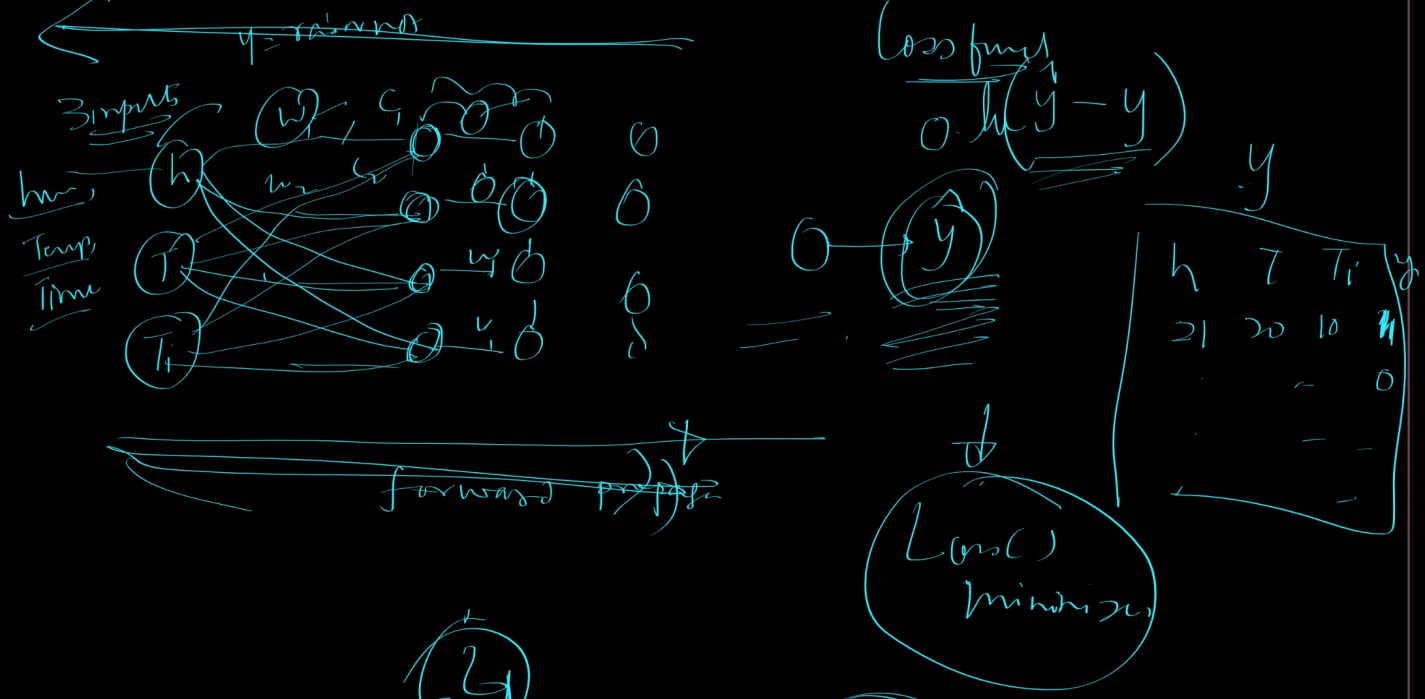
NN

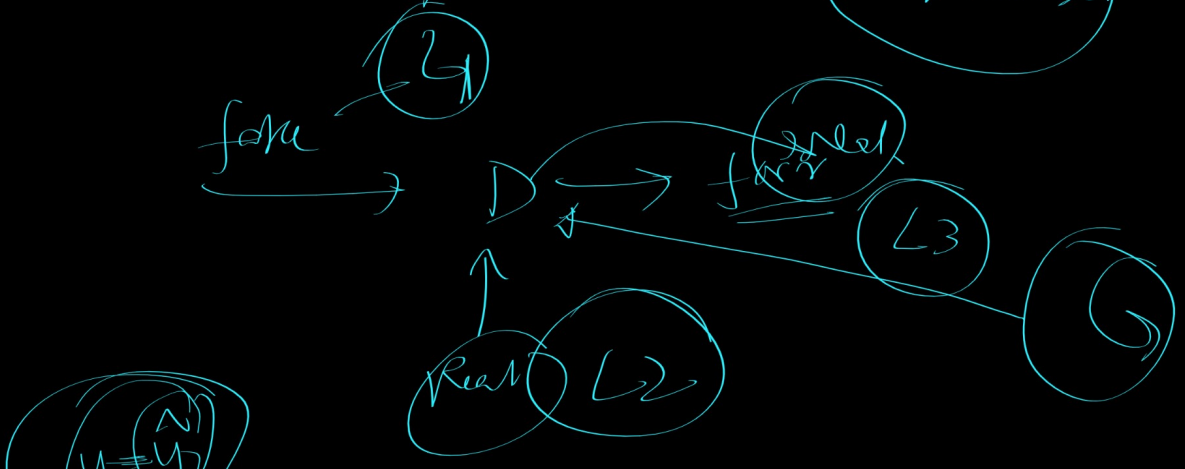


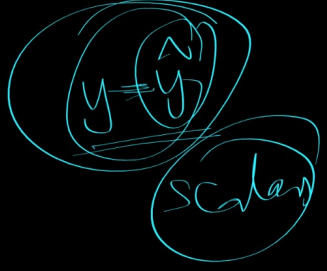


$y = f(x)$









Binary Cross Entropy function

$$L = -\left[y \ln \hat{y} + (1-y) \ln (1-\hat{y}) \right]$$

$$\frac{\partial (L)}{\partial x} = 0$$

Gradient Descent = to

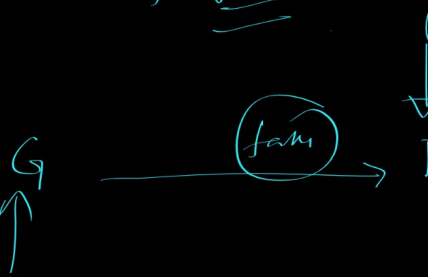
for real imgs when $y = 1$, $\hat{y} = D(x) \Rightarrow L = \ln D(x)$

for fake img when $y = 0$, $\hat{y} = D(G(z)) \Rightarrow L =$

$\ln(D(G(z)))$

$-\ln(1-0)$

$\ln(1 - D(G(z)))$



(2)

$$V(G,D) = x \ln[D(x)] + z \ln(1 - D(G(z)))$$

$E(x)$

$$\frac{P(x) \cdot x}{n}$$

$$V(G,D) = \sum p_{data}(x) \ln[D(x)] + \sum p_z(z) \ln(1 - D(G(z)))$$