

Why RNN?

- 1) Sequence → Any Sentence → $\boxed{\text{ANN}}$ → $\left\{ \begin{array}{l} \text{fixed input} \\ \text{size} \end{array} \right\} \left\{ \begin{array}{l} \text{Padding} \\ \uparrow \\ \text{length very huge} \end{array} \right\}$
- 2) RNN ⇒ Recurrent Neural Network
(qgram and ngram)
- Computational expensive

Sequence ⇒ Contain Some meaning

Data for RNN

Reviews	Sentiment	
movie was good	1	good → 1 bad → 0
movie was bad	0	
movie was not good	0	

Review 1 $\left[[1, 0, 0, 0, 0], [0, 1, 0, 0, 0], [0, 0, 1, 0, 0] \right]$ = $\left[\begin{array}{c} \text{movie} \\ \text{was} \\ \text{good} \end{array} \right]$

for every corpus ↓

OHE
Vocab

NLP Project

term → Num
= Encoding

Review-2 $\left[[1, 0, 0, 0, 0], [0, 1, 0, 0, 0], [0, 0, 0, 1, 0] \right]$

{
① Doc2vec
② TF-IDF
③ OHE
④ word2vec
⑤ glove
⑥ elmo } INN

Review3 $\left[[1, 0, 0, 0, 0], [0, 1, 0, 0, 0], [0, 0, 0, 0, 1], [0, 0, 1, 0, 0] \right]$

Keras for encoding

Keras → RNN → Batch Size, Input feature

$(3, 3, 5)$

How RNN works

RNN \Rightarrow ANN

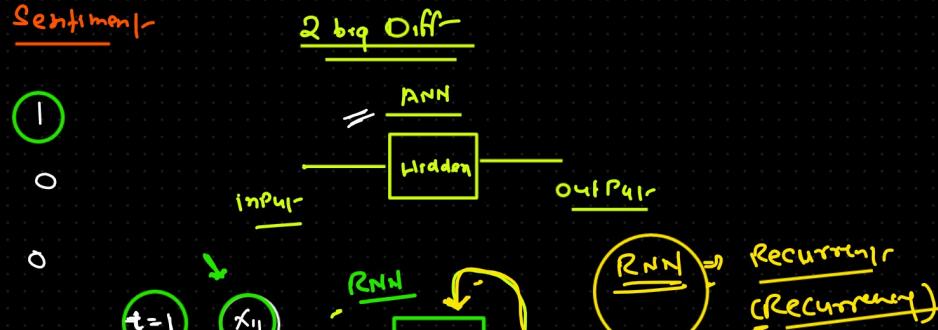
Review

x_{11}	x_{12}	x_{13}
movie	was	good

x_{21}	x_{22}	x_{23}
movie	was	bad

x_{31}	x_{32}	x_{33}
movie	was not	good

Sentiment



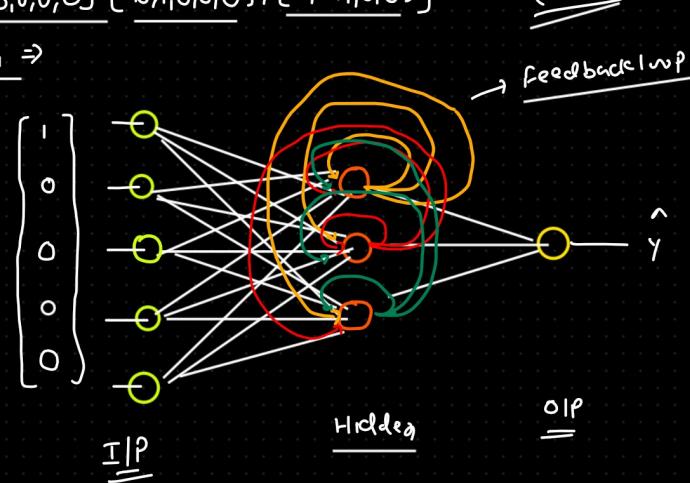
$$= \left[\begin{array}{c} [1, 0, 0, 0, 0] \\ [0, 1, 0, 0, 0] \\ [0, 0, 1, 0, 0] \end{array} \right] = \left[\begin{array}{c} [1, 0, 0, 0, 0] \\ [0, 1, 0, 0, 0] \\ [0, 0, 1, 0, 0] \end{array} \right]$$

Altogether (Mismatch)

(Sequence)

t=1
t=2
t=3

RNN



Neuron \Rightarrow $I \cdot \text{PR weight} + b$

activation \Rightarrow \tanh

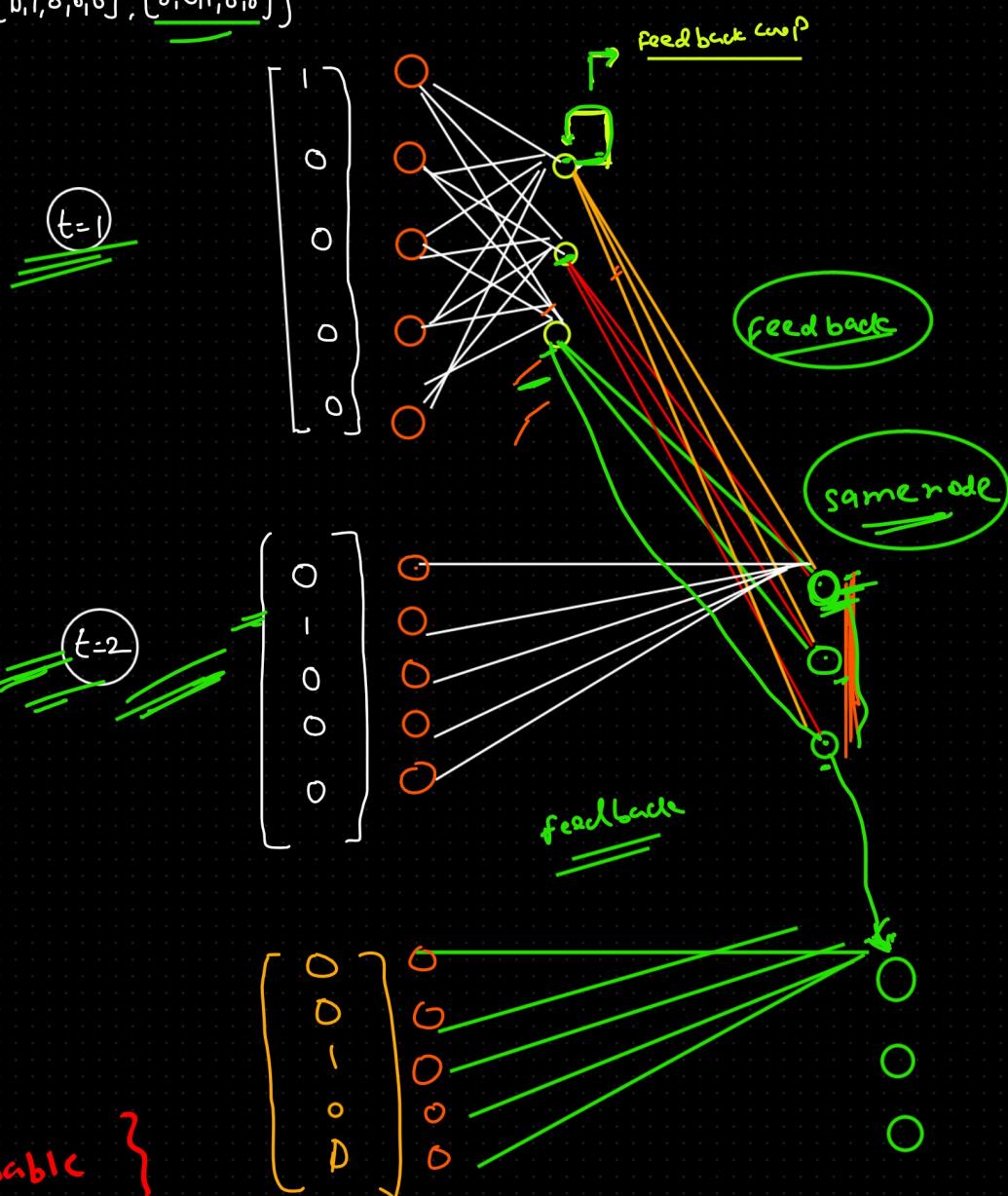
wordvec \Rightarrow PyTorch, lstm, aff

Review

Review-1 \Rightarrow movie was cool $\left\{ \text{every token} = \tanh((Wx + b)) \right\}$

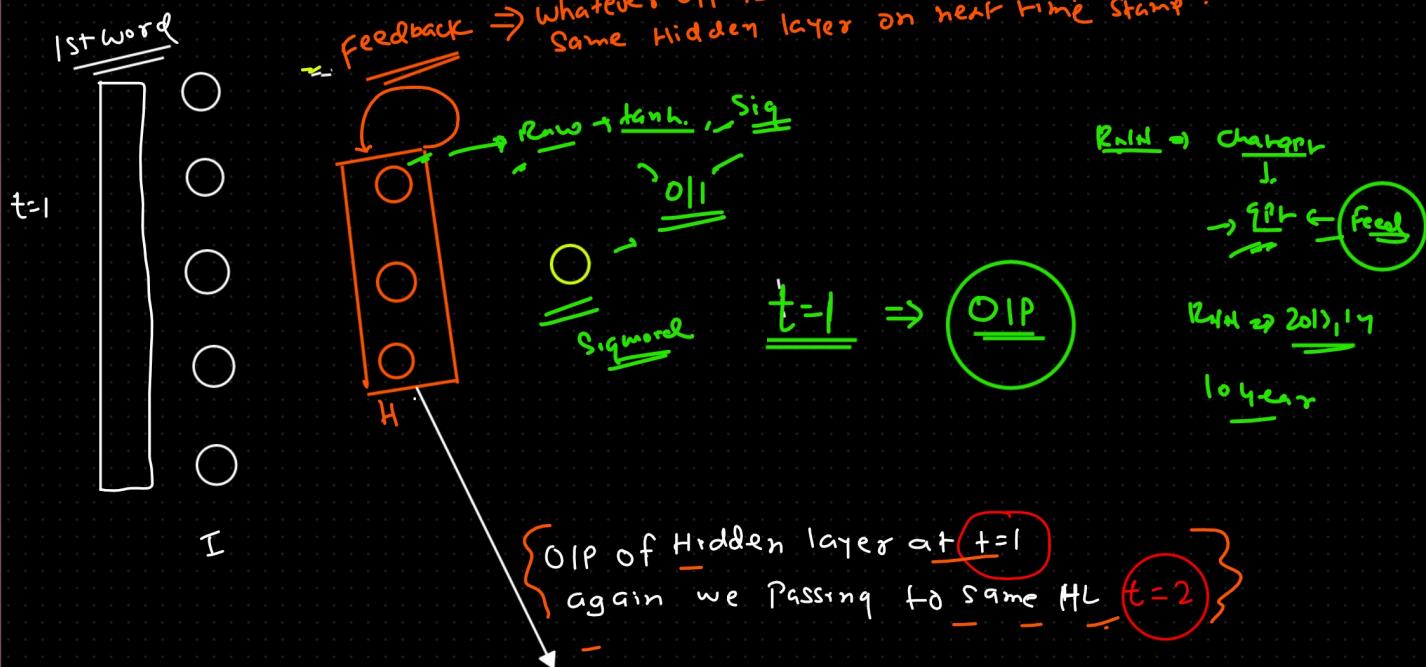
Review1 $\rightarrow \left[[1, 0, 0, 0, 0], [0, 1, 0, 0, 0], [0, 0, 1, 0, 0] \right]$

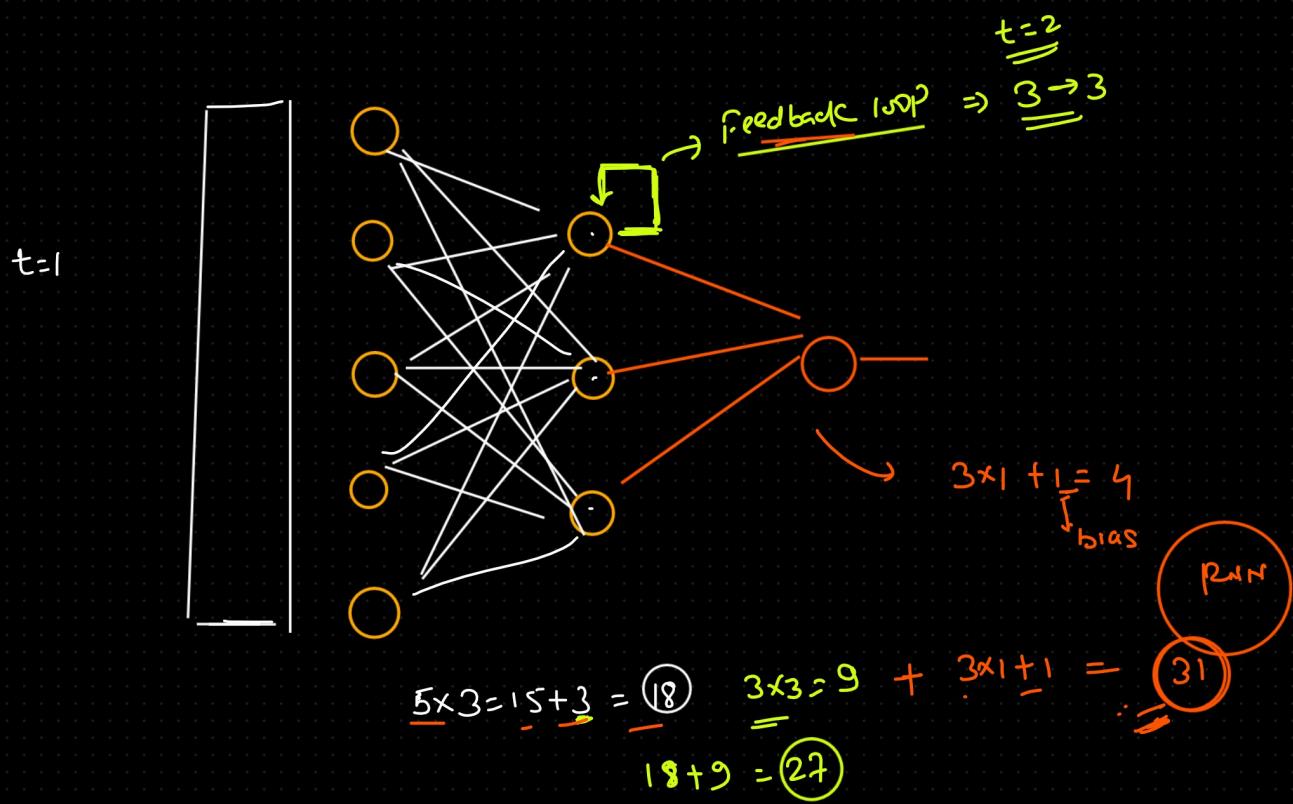
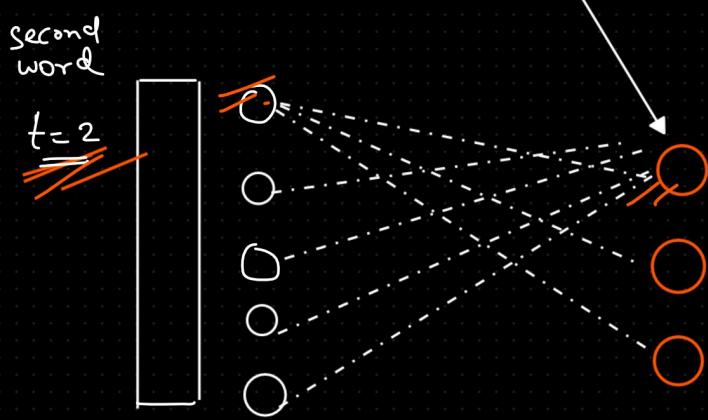
OHE



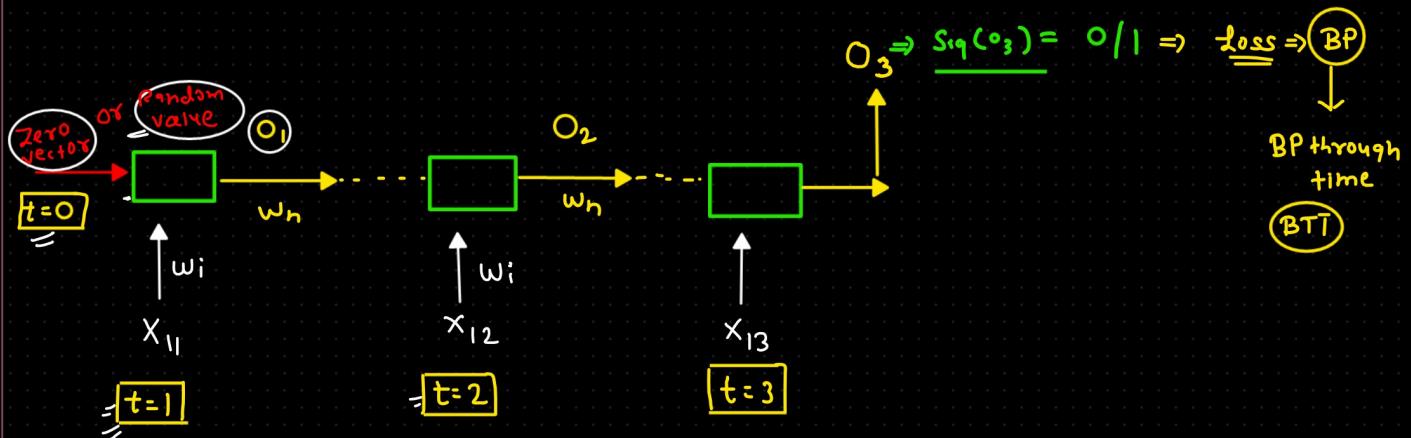
{ calculate trainable param }

1st word \Rightarrow whatever OIP is there again passing the OIP to the same Hidden layer on next time stamp.

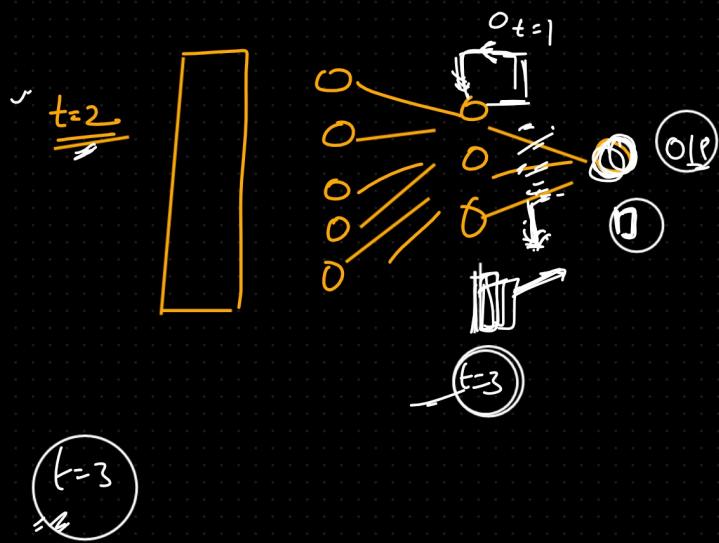
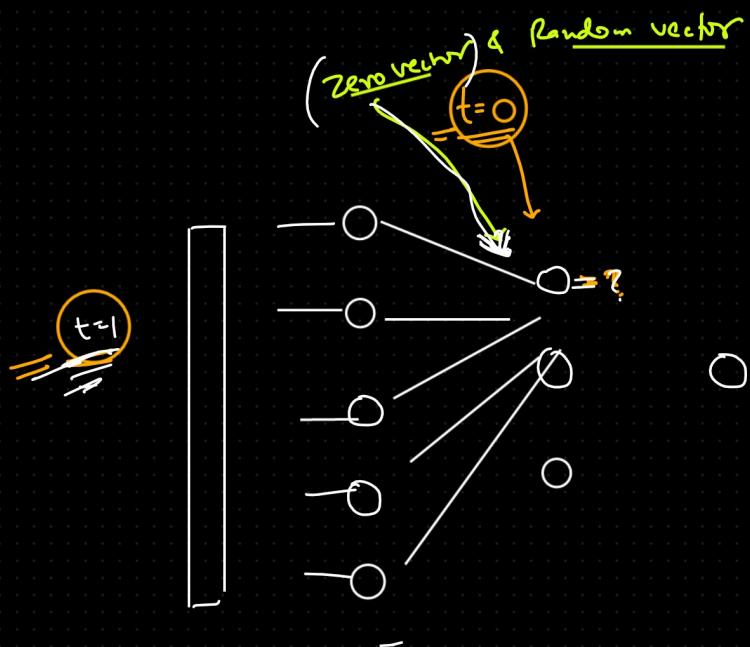
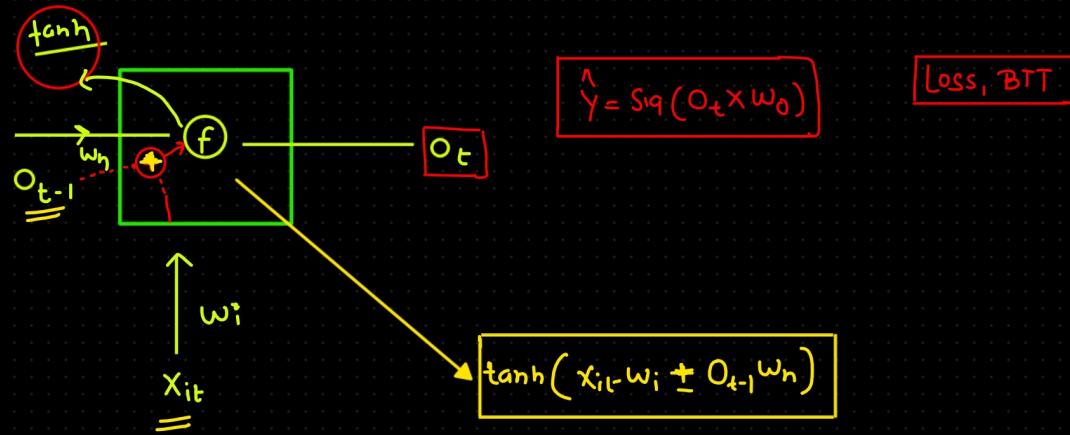


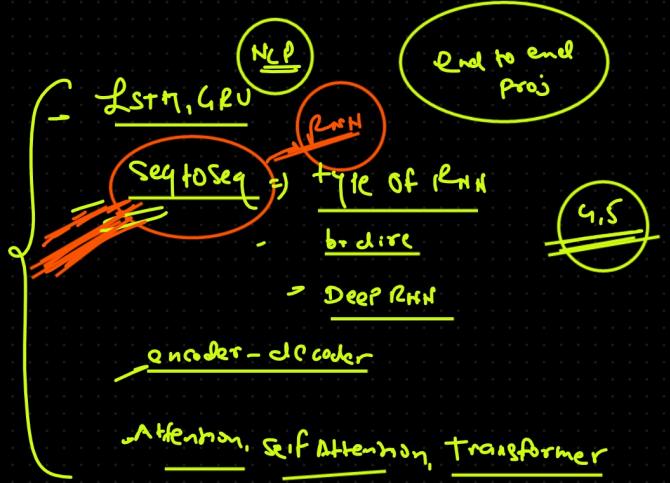


thus Box it is a same Hidden Layer



Forward Propagation in RNN





Data Eng, Data Eng

Sentiment analysis

$$\left\{ \begin{array}{l} m \text{ to } m \\ 0 \text{ to } m \\ m \text{ to } 0 \end{array} \right\}$$

↳ entire sent \rightarrow single o/p