

NLP In Deep Learning

① ANN → ARTIFICIAL NEURAL N/W → Tabular Data.

House size No. of Rooms Price



Sequential Data
vs
Non Sequential Data

↑ Order is Important

② CNN → Images → Image classification, Object Detection

Sequence of Data IS Important

③ i) RNN

ii) LSTM RNN

iii) GRU RNN

iv) Encoder Decoder

v) Attention is all you need

⇒ Sequential Data. [NLP] [Time Series]

Eg: Chat bot App → Q & A

Language Translation → Eng → French

Text Generation → A sentence → Completion of sentences

Auto Suggestion → LinkedIn, Gmail

Time Series → Sales Data Future Prediction.

① Can we solve with ANN?

Eg:

<u>Text</u>	<u>o/p</u>
The <u>food</u> is good	1
The food is <u>bad</u>	0
The food is <u>not</u> good	0

① Words → Vectors ↓ Sequential Info.
Bow, TF-IDF [Context Is Missing].

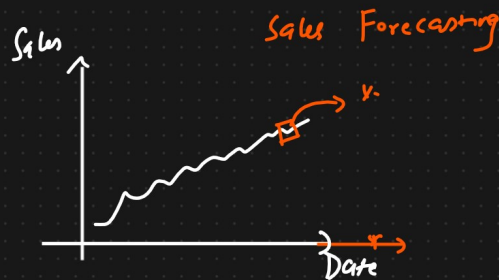
	Word 1	Word 2	Word 3	-	-
Sent 1	0	1	0	0	0
Sent 2	1	1	0	0	0
Sent 3	0	0	1	0	0

{ good The food is } → Meaning may change

③ Language Translation → English French
→ - - - - - → - - - - -

④ Auto Suggestion → LinkedIn, GMAIL → Auto suggestion

⑤ Sales Data → DateTime



Can we use ANN to solve this problem? → Sequential Data

↓
NLP In Deep Learning [Generative AI → LLM, MultiModel]

① Simple RNN → LSTM / GRU RNN → Bidirectional RNN → Encoder Decoder
↓
← Transformers ← Self Attention

Can we solve with ANN → Sequential Data

Dataset { Sentiment Analysis }

ANN

Text Preprocessing → Text → Vectors

<u>Text</u>	<u>O/p</u>
The <u>food</u> is <u>good</u>	1
The food is <u>bad</u>	0
The food is <u>not</u> good	0

size
Vocabulary → 4

RNN

Text

The food is good

The food is bad

The food is not good

o/p

1

0

0

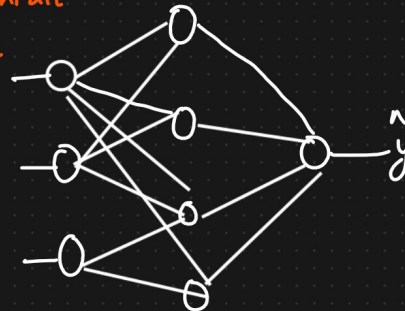
① Timestamps

② Inp Text

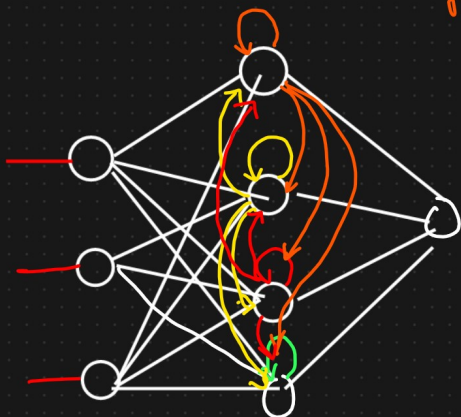
RNN Architecture



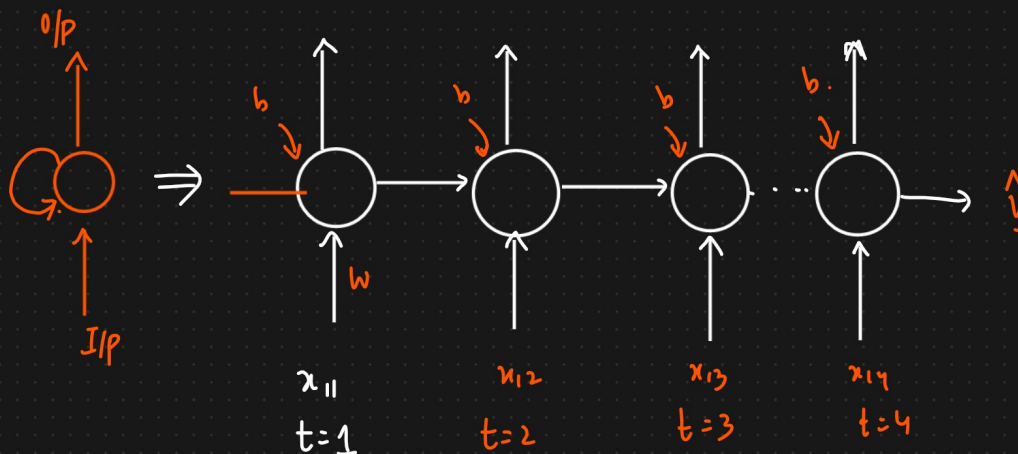
I/p is sent all at once



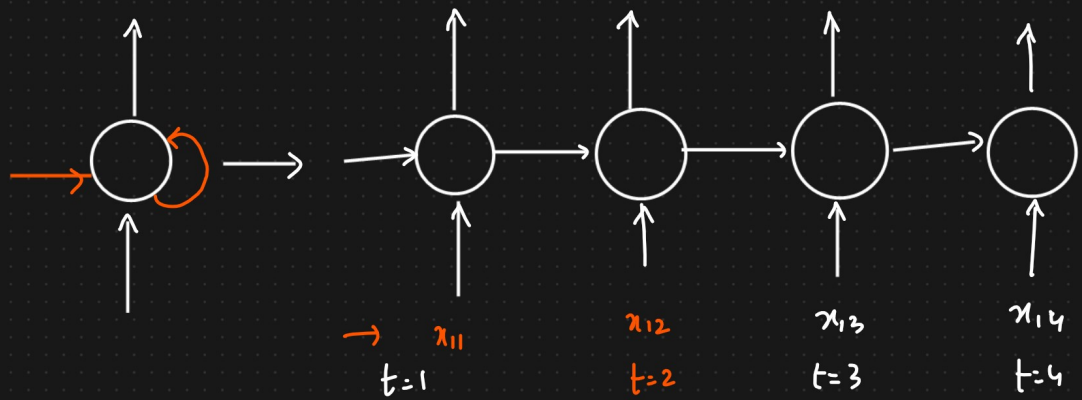
RNN



x_{11} x_{12} x_{13} x_{14}
→ The food is good



Sentence words



Working of Simple RNN With Forward Propagation

Dataset

Text
 $x_{1,1}$ $x_{1,2}$ $x_{1,3}$
 The food is good
 The food is bad
 The food is not good

O/P

1
0
0

Words \rightarrow Vectors

OHE \rightarrow One hot Encoding

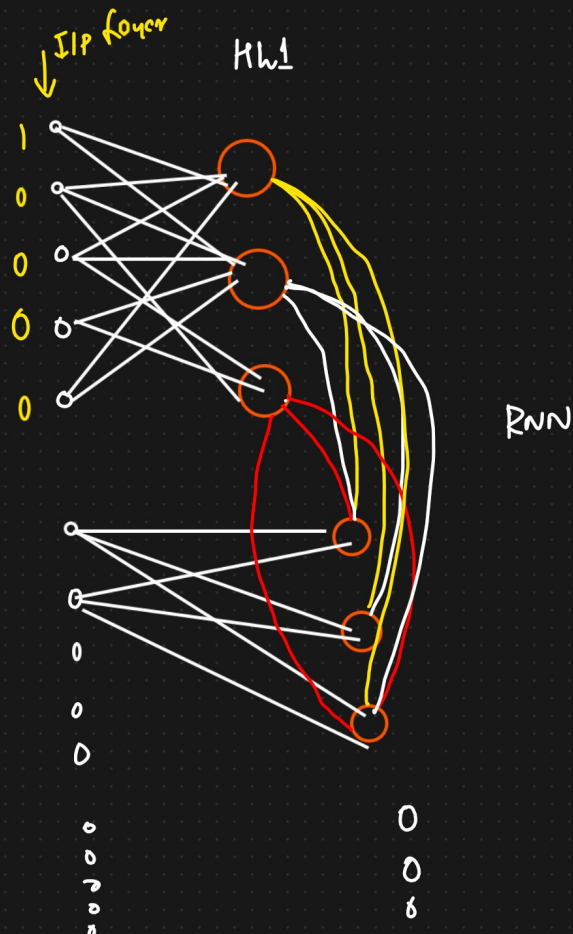
$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

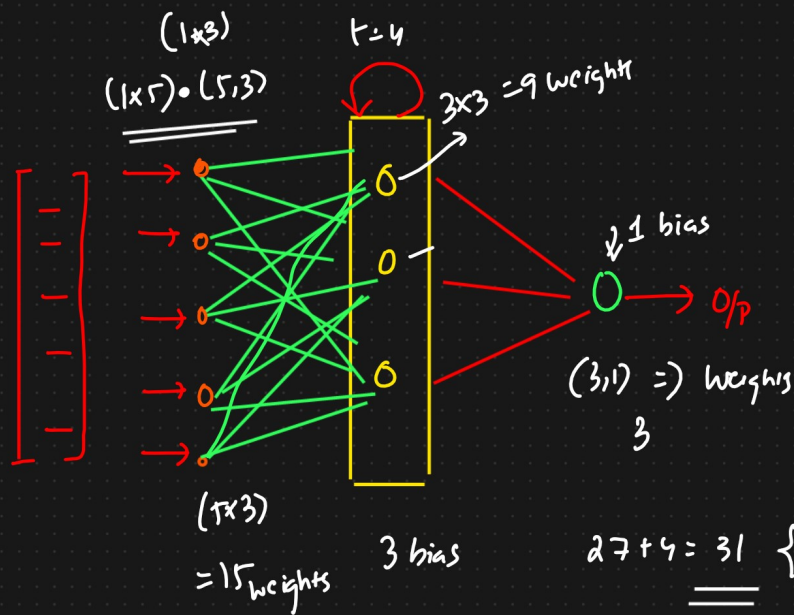


$t=1$ $x_{1,1}$
 =
 The

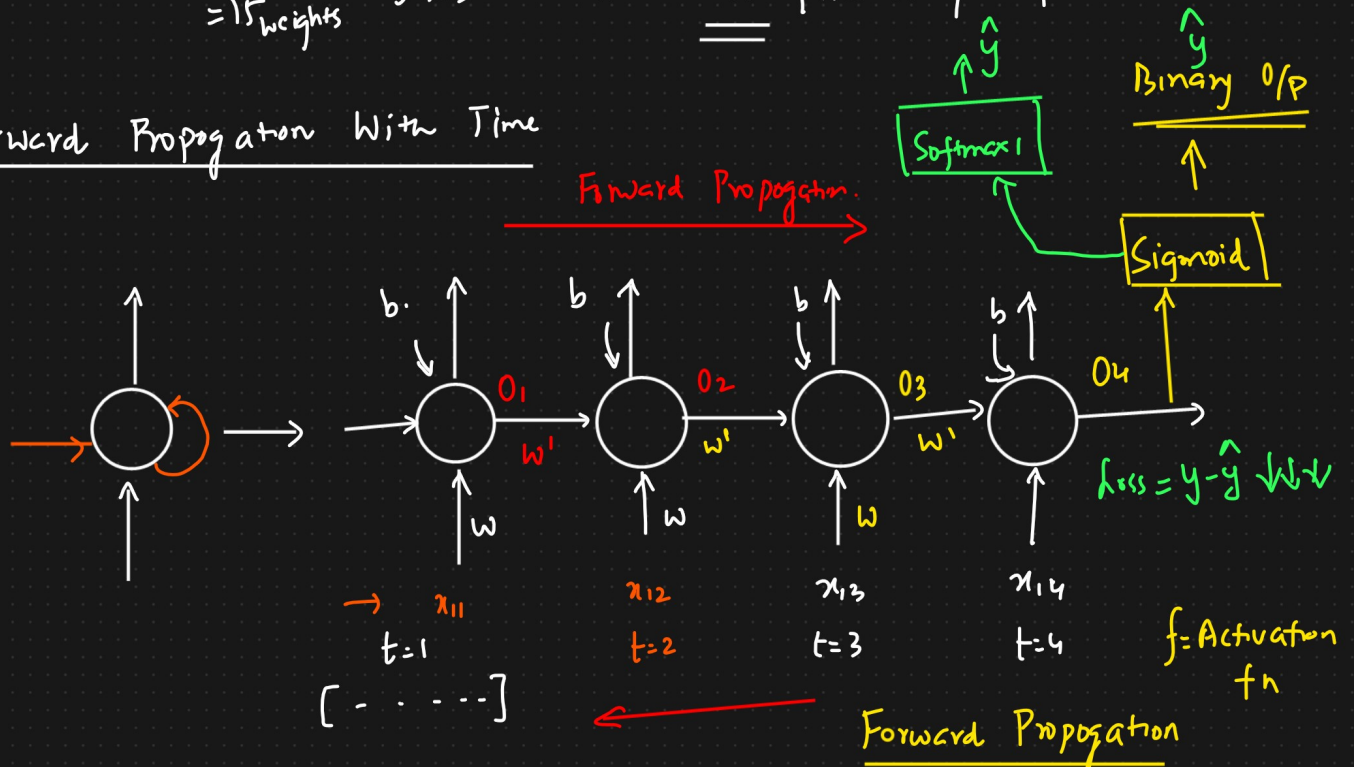
$t=2$ $x_{1,2}$
 =
 food

$t=3$





Forward Propagation With Time



Data at

The food is good

$x_{11} \quad x_{12} \quad x_{13} \quad x_{14}$

O/P

1

$$O_1 = f(x_{11} \cdot w + b_1)$$

$$O_2 = f(x_{12} \cdot w + O_1 \cdot w' + b_1)$$

$$O_3 = f(x_{13} \cdot w + O_2 \cdot w' + b_1)$$