15 Oct 2024

RECURRENT NEURAL NETWORKS

ANN → work of tabular data.
CNN → work on images data
RNN → work on text data/time series data.

RNN:
- RNN is a type of sequential model that work on sequential data.
example. Hi my name is Rohan
Here the sequence of the each word matters. to understand the whole sentense
- other example is speech and DNA sequences
- it is highly used in NLP field.

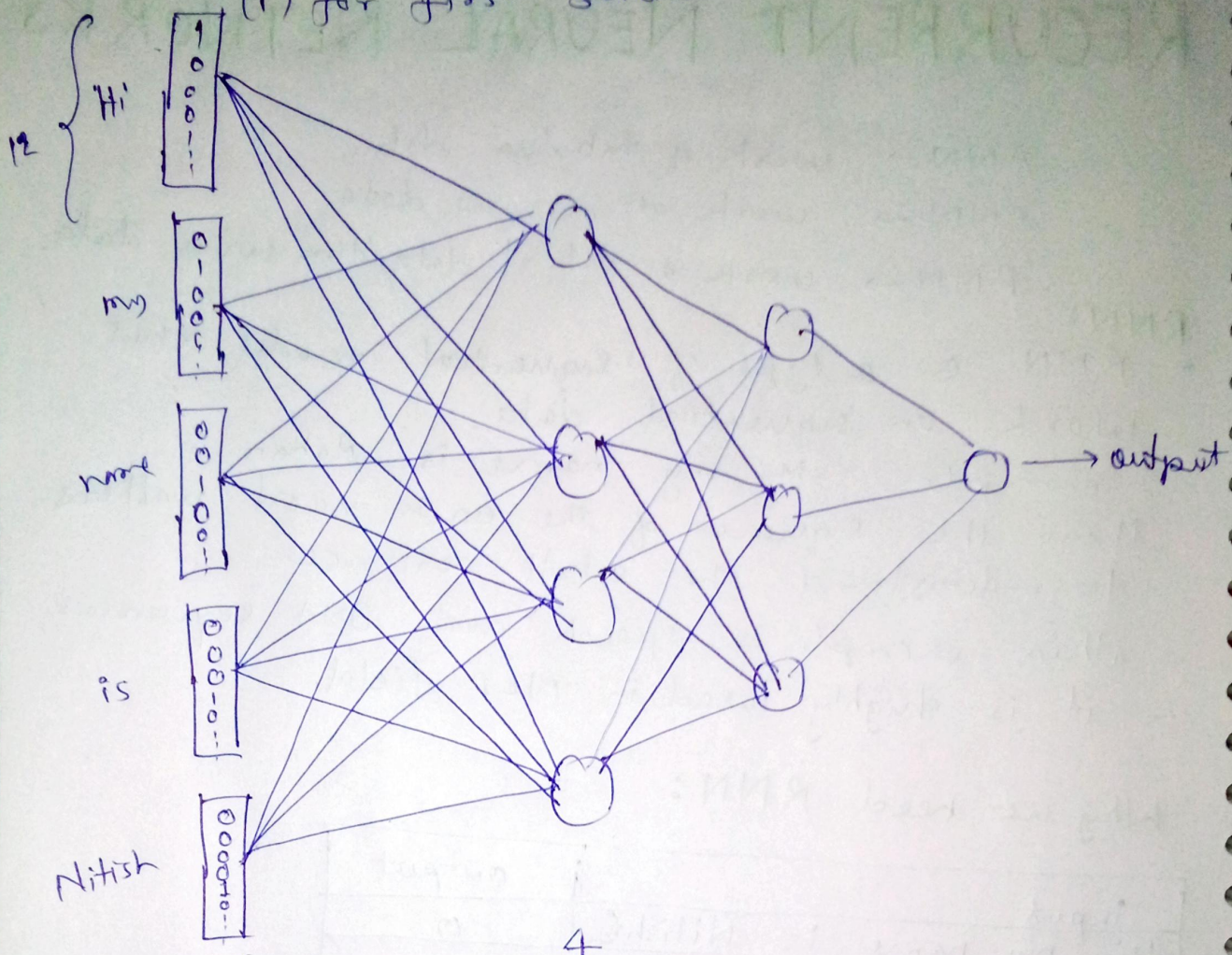
Why we need RNN:

input	output
Hi my name is Nitish	0
I Love. Campus X	0
India wan the match.	1

vectorize (OHE)
1,0,0,0,0,0,0,0,0,0,0 → Hi
0,1,0,0,0,0,0,0,0,0,0 → my
0,0,1,0,0,0,0,0,0,0,0 → name
similarly for other.

ANN → Text classification

(i) for first sentence

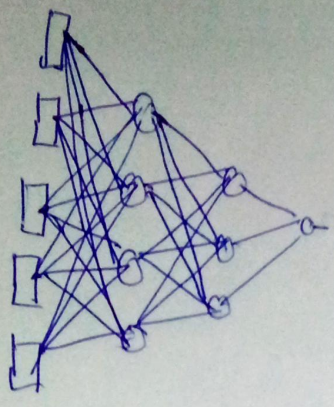


input text (sentence)

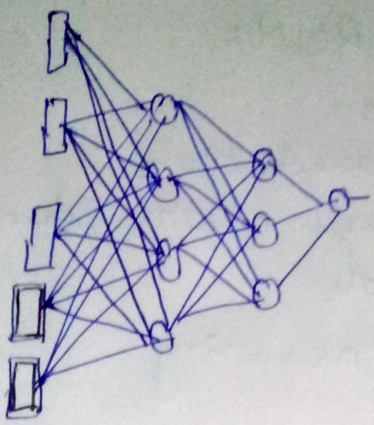
(ii) for secard sentence the input size is $12 \times 3 = 36$

(iii) for third sentence the input size is $12 \times 4 = 48$

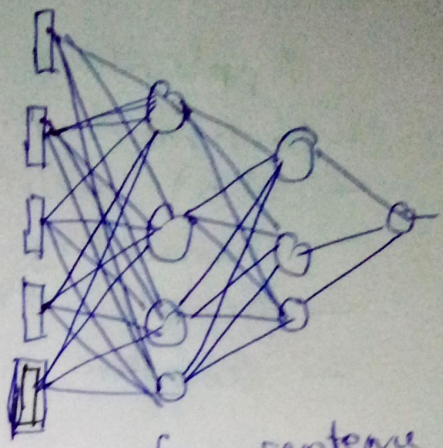
- Here we see that the input size is vary for each sentence that is not possible in neural network
- But this problem can be resolve using the zero padding make input size same for all sentence according to the bigger one.



for sentence (i)



for sentence (ii)



for sentence (iii)

- But after apply above apply we com face another problem when the number of words is very large like 10000 then vectorisation of each words occupy the large amount of storage. and also input size increase.
- and also if largest one have 100 word and smallest one have only 5 words then irrelevant ⇒ zero-padding take the large amount of storage.
- one more draw back of using ANN for text classification is that if some one input the sentence with 200 words but our model is trained only on 100 words sentence.

in summary (ANN is sequencial data) drawback:

- text input → varying size
- zero padding → unnecessary computation
- Prediction problem
- totally disregarding the sequence info

Applications of RNN:

- Sentiment Analysis
- Next word prediction
- Generating image caption demo
- google translate
- Question and Answering