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RNNs

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# RNNs

In ANNs , there is no need for sequence even , sequence doesn’t matter in output calculation . e.g if there are 3 features given “iq”,”marks”,”gender” , it doesn’t affect the results if “marks” placed above “iq”.Thus ANN is Non Sequential.

But what if we have to read a sentence “Hi I am Vaishnavi from Delhi” ,here the sequence matters . For Sequential data we need RNNs.

RNNS used in Time series graphs , Speech recognition , DNA sequence etc.

# Why use RNN instead of ANN ?

We are taking an example of movie reviews based on the outcome whether it is positive or negative.

| Review | Sentiment |
| --- | --- |
| Movie was Good not bad | 1 |
| Movie was bad | 0 |
| Movie was not good. | 0 |

# 

For processing , vectorize it by OHE (One Hot Encoding).

As shown there are 5 different categories (movie , was , good , bad , not).

[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]

1. See first time the sentence with 5 words will go , parameters are (25 x 4).
2. Next time a sentence with 3 words goes , parameters are (15 X 4).
3. Similarly for the 3rd sentence , parameters are (20 X 4).

If you see the parameters : 

(5\*5) X 4 = 100 weights

4 X 3 = 12 weights

3 X 1 = 3 weights

And (4+3+1)=8 biases

In total we have 123 parameters to train just for 3 sentences having only 5 varieties of words .

It is seeing that input size changes every time and it doesn’t happen in ANN.

An alternative to it is that you will find the sentence with maximum words and fix input size according to it . e.g 100 words

And the one with minimum is 5 words and you add a padding of 95 words just like [0,0,0,0 \_ \_ \_ \_ \_ \_ \_ \_,0] ,assuming there are 10,000 unique words.

Shockingly we have excessive unnecessary computation ,

(10000 x 95 X no of nodes in hidden layer) , This is the extra computation if you use ANN.

## Text input is of varying size.

## Zero padding , unnecessary computation

## If a new word of much bigger length is given in prediction, the model fails.

## Totally disregarding the concept of sequence information , by design ANN can’t remember sequences.

# Applications of RNN:

1. Sentiment / Feedback Analysis
2. Suggestions in collab / captions
3. Generating Image caption
4. Google translation (language detection , translation)
5. BERT, NLP answering questions by reading the paragraph