

RNN (Recurrent NN)

↳ why RNNs are needed

↳ RNNs vs ANNs

ANN : \Rightarrow Tabular Data

CNN : \Rightarrow Images / videos

RNN : \Rightarrow Type of Sequential model, Specially designed to work on Sequential data.

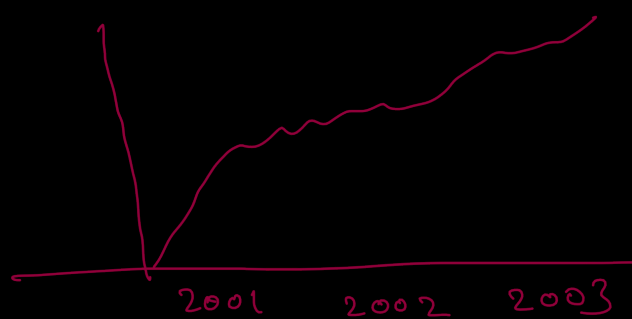
	iq	marks	gender	placement
iq	0	0	0	0
marks	0	0	0	0
gender	0	0	0	0

↳ Non-sequential data : order does not matter

Sequential data : Eg \rightarrow text

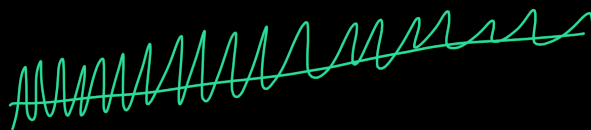
Sequence
Hi my name is upendra

Time Series



Sequential data

Speech



DNA Sequence

RNN \Rightarrow NLP

Why use RNN?

Input	Output
1 Hi my name is upend	0
2 I love Campusx	0
3 India won the match	1

↓
vectorize (one hot encoding)

12 → unique words (vocabulary)

$[1, 0, 0, 0, \dots]$ $[0, 1, 0, \dots]$
Hi my
12 items

$[0, 0, 1, 0, 0, \dots]$
name

ANN → text classification

12 $\begin{bmatrix} 1 \\ 0 \\ 0 \\ \vdots \end{bmatrix}$

0

12 $\begin{bmatrix} 0 \\ 1 \\ 0 \\ \vdots \end{bmatrix}$

0

0

0

0

12 $\begin{bmatrix} 0 \\ 0 \\ 1 \\ \vdots \end{bmatrix}$

0

0

12 $\begin{bmatrix} 0 \\ 0 \\ 0 \\ \vdots \end{bmatrix}$

0

$60 \times 4 = 240$
weights

12 $\begin{bmatrix} \vdots \end{bmatrix}$



what are the problems when we use ANN for text data?

for first record (input)
weight 60×4

for second : 36×4

for third : 48×4

- ~) for every record input size is different, so trainable weights are also different, which is not possible in ANN. [test input \rightarrow varying size]
- ~) Zero Padding is one work around but when vocabulary will contain large number of words then we will end up doing unnecessary computation.
[Zero Padding \rightarrow unnecessary computation]
- ~) Prediction problem [text may contain different number of words]
- ~) Totally disregarding the sequence information
- ~) we lose semantic meaning of our text input which it has because of sequence.

Application of RNN :

- (i) Sentiment Analysis
- (ii) Sentence completion
- (iii) Generate image caption
- (iv) Google Translate

Roadmap

Simple RNN \rightarrow Back Propagation RNN \rightarrow LSTM GRU \rightarrow Types of RNN

