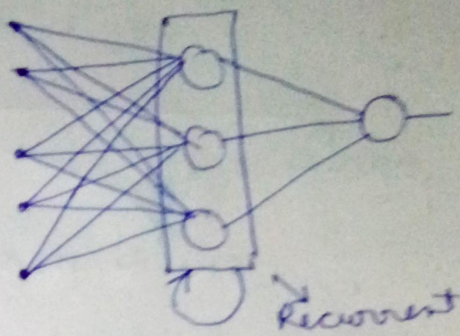
17 Oct 2024

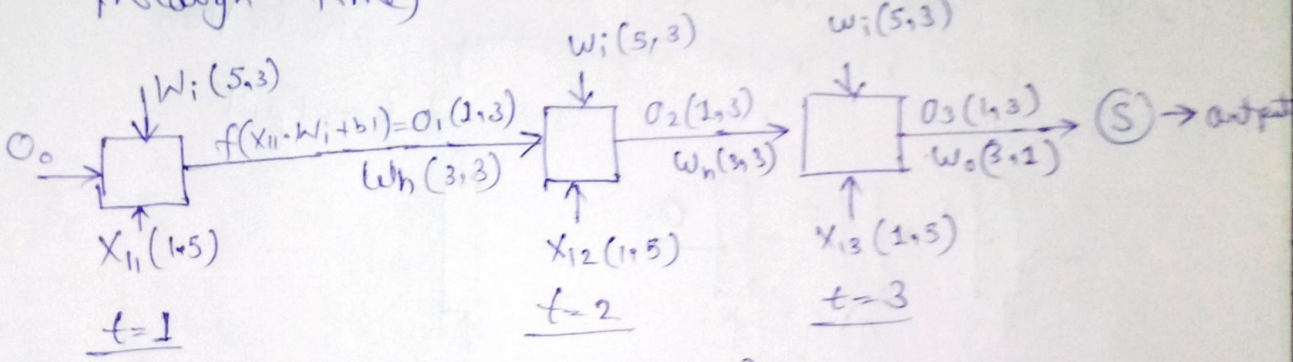
RNN FORWARD PROPAGATION

	review			sentiment
X_1	x_{11}	x_{12}	x_{13}	1
X_2	x_{21}	x_{22}	x_{23}	0
X_3	x_{31}	x_{32}	x_{33} x_{34}	0



Here x_{11}, x_{12} ... are vector in 5dim

- Here Recurrent layer is work is a loop (unfolding through time)



$f(x_{it} w_i + O_{t-1} w_h + b_i)$

(i = row, t = time step) → O_t (vector)

$g(O_t \cdot w_o) = \hat{y}$

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

$O_2 = f(x_{12} \cdot W_i + O_1 W_h + b_2)$

$O_3 = f(x_{13} \cdot W_i + O_2 W_h + b_3)$

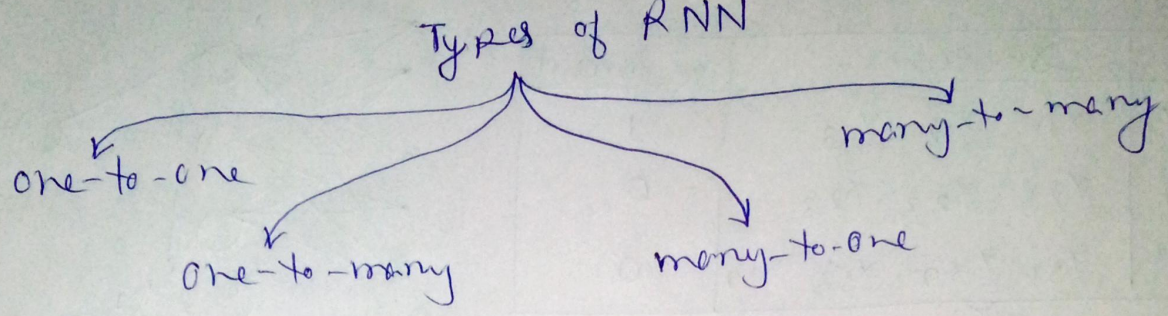
$O_0 = [0.0.0]$ or random numbers

S → sigmoid function

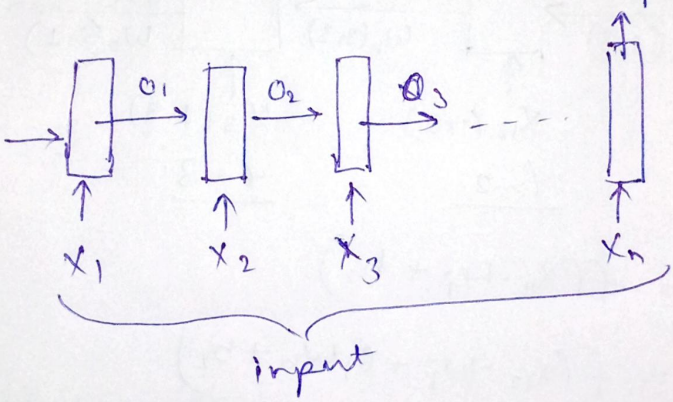
$f()$ → tanh activation function (default)

- input is change but same layer (Recurrent layer) is used again and again there it is called Recurrent Neural network
- same weight is used again and again

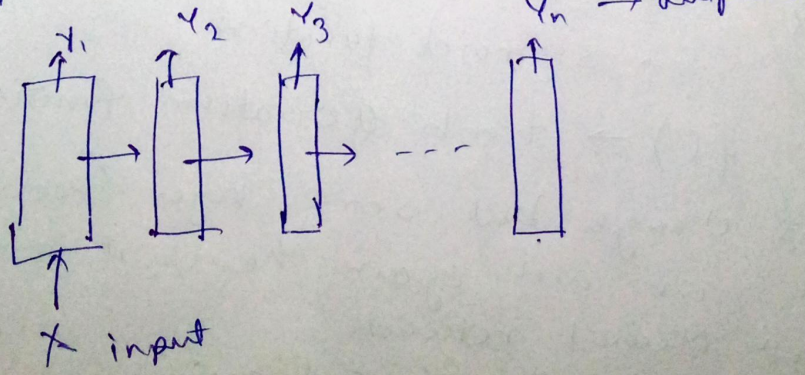
TYPES OF RNN



1. Many to one:
   - input - sequence (sentence, time series data)
   - output - non-sequencial (integer or number)
   - it is used in sentiment analysis
   - it can be used in rating prediction



2. One to Many:
   - input - non-sequential data (image)
   - output - sequential (text, time series etc)



- it is used in image captioning
- other use case of this RNN is music generation.

3. Many to Many:

input - sequential data

output - sequential data

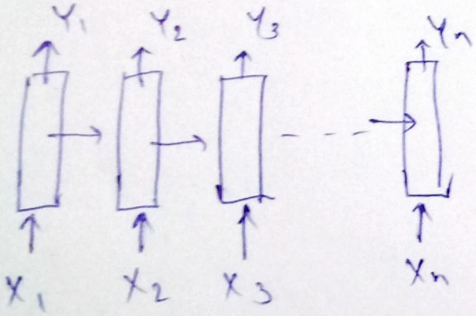
- it is also called seq2seq model

type of Many to many RNN

Same length

input seq = output seq

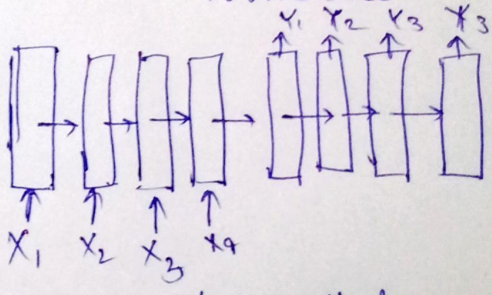
example: POS tagging and NER



variable length

input seq ≠ output seq

example: machine translation. (chatGPT), google translate



it is also called encoder-decoder

4. One to One:

- this is not a type of RNN because input is non-sequential and output is also a non-sequential
- example: image classification. (cat/dog classification)