CHEAT SHEET

Recurrent Neural Networks

Algorithm Name	Recurrent neural networks
Description	A special type of neural network that is well suited for sequence data
Applicability	Any supervised learning problem (classification or regression) when the input data are sequences
Assumptions	The data is a discrete sequence
Underlying Mathematical Principles	Hidden states
Additional Details	A recurrent neural network keeps track of a hidden state that can be viewed as a summary of the input sequence. In essence, an RNN processes the input sequence in a stage-wise manner, i.e., it takes in a random starting hidden state and combines it with the first item in the sequence to form a new hidden state, and this new hidden state is combined with the next item in the sequence to produce another new hidden state. Sometimes the RNN also produces an output at each state, which is typically a linear transformation of the hidden state at this position. This process is repeated until every item in the sequence is processed. Depending on the task, the final hidden state will be used differently. If we want to classify a sequence (sentiment classification), then the final hidden state will be passed to a classifier. If we want to produce another sequence (machine translation), then the hidden state can be used as the initial hidden state of another RNN.