**Reuters newswire classification.(RNN)**

Recurrent neural networks (RNN) are the state of the art algorithm for sequential [data](https://builtin.com/data-science)and are used by Apple's Siri and and Google's voice search.

 This is why they're the preferred algorithm for sequential data like [time series](https://builtin.com/data-science/introduction-segmentation-correlation-time-series-modeling), speech, text, financial data, audio, video, weather and much more.

RNNs exhibit similar behavior to how human brains function.

In a feed-forward neural network, the information only moves in one direction — from the input layer, through the hidden layers, to the output layer. The information moves straight through the network and never touches a node twice.

In a RNN the information cycles through a loop. When it makes a decision, it considers the current input and also what it has learned from the inputs it received previously.

**A usual RNN has a short-term memory. In combination with a LSTM they also have a long-term memory (more on that later).**

**Simply put: recurrent neural networks add the immediate past to the present.**

A feed-forward neural network assigns, like all other deep learning algorithms, a weight matrix to its inputs and then produces the output. Note that RNNs apply weights to the current and also to the previous input. Furthermore, a recurrent neural network will also tweak the weights for both through [gradient descent](https://builtin.com/data-science/gradient-descent) and backpropagation through time (BPTT).

## TYPES OF RNNS

* One to One
* One to Many
* Many to One
* Many to Many

**Dataset: from keras**

This is a dataset of 11,228 newswires from Reuters, labeled over 46 topics.

Each newswire is encoded as a list of word indexes (integers). For convenience, words are indexed by overall frequency in the dataset, so that for instance the integer "3" encodes the 3rd most frequent word in the data. As a convention, "0" does not stand for a specific word, but instead is used to encode any unknown word.

**Description:**

Used sequential model using different layers to compare the accuracy and performance.

Used simple RNN model,LSTM,conv1D and conv1D with LSTM .

**Result:**

Model showed best performance for a middle layer of conv1D with LSTM.