

Project Report

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This a report for our project assignment for the course Neural Fuzzy Logic, taught by Dr. Katsaros. Firstly we are going to start by giving details for the architecture of the neural network. By doing our research we have found that the most suitable neural networks for Time Series prediction are the Recurrent and the Convolutional Neural Networks. Although both of them are good for the prediction we have chosen the CNN because it has a faster training. This is the summary of the model that we have used:

Layer (type)	Output Shape	Param #
conv1d_80 (Conv1D)	(None, 35, 256)	768
max_pooling1d_80 (MaxPooling)	(None, 17, 256)	0
flatten_80 (Flatten)	(None, 4352)	0
dense_157 (Dense)	(None, 50)	217650
dense_158 (Dense)	(None, 2)	102
Total params: 218,520		
Trainable params: 218,520		
Non-trainable params: 0		

It is important to mention that we have used 256 filter; we have observed that the smaller the number is the worse the prediction, while if the number is very large, the prediction is bad as well. Also, we have used as activation function the rectifier, the most popular activation function for neural networks.

Now we are going to explain the training method that we followed. We have grouped the data that has been given to us, and we kept the the citations number, the years and the id of each paper. We have decided to take only the 10 papers with the most citations. We believe that this is the best way to do the prediction, because as we can see those papers have the largest time series. For each time series we have taken as training set the time series minus the 5 last elements which we predict. Then the algorithm does 1000 epochs and it trains the weights of the algorithm.

They weights that we have used are the ones below:

```
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For the time that takes for the training and the prediction we have observed that it takes 9.5 seconds, which is pretty good optimised, compared to other neural networks.

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```

and

We are going to give next, our prediction which is the citations the last 5 years of a paper. The algorithm produced 9, 4, 7, 5, 4. The real values are 10, 9, 5, 17, 9. So we can see that we are pretty close!

last
of

References:

<https://docs.python.org/3/tutorial/classes.html>

<https://machinelearningmastery.com/how-to-develop-convolutional-neural-network-models-for-time-series-forecasting/>