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Dehumanizing financial markets

Financial markets are becoming more dehumanized. As of 2018, 70% of trades in Wall Street were made via algorithmic trading, thus reducing the need of a human element. However, the academic world is still playing catch up as none of the major finance journals touch on areas like machine learning, artificial intelligence and deep learning in financial markets.

My PhD is structured as an independent, industrial PhD and thus varies from a traditional academic one.

PhD Title: Deep learning in finance

Exploring the usage of deep learning in finance, plus comparing how neural networks fair against machine learning.

Motivation

I used to be an investment banker at the Royal Bank of Canada (RBC), initially in market risk and then I moved into corporate finance. I was aware even back then, risk models were coded by the tech guys and econometrics that was taught in university simply were not used because they do not work. But why doesn`t academic finance shifting towards what the industry is using?

My background was quantitative finance and risk management so I knew how to design risk models but since I couldn`t code, I needed someone to do it for me. My target in 2018 was to teach myself deep learning and AI, so I started with the deep learning specialization on Coursera and this was the starting point for me to eventually apply for a PhD in TTU.

The Problem

Deep learning uses 3 points of data- the training set to train the model, a test set to test the fit and finally a validation set to see if the model is validated. Econometrics, on the other hand is backwards looking, finding a model of best fit with past data without any forward-looking testing nor validation.

Study Design

As mentioned above, with deep learning, there is the training element of the algorithm, testing and validation. Neural networks itself is not a new concept, in fact there was a paper on using it to predict stock prices in the CFA journal some 20+ years ago but the CFA journal is widely regarded as a practitioners journal.

The current areas I am working on:

- Using neural networks to predict the price of blockchain 2.0 cryptocurrencies.
- Using neural networks to predict the EUR/USD spot contract

Besides these, I am exploring the possibility of using deep learning in credit risk, in particular, applied to personal mortgages.

Prediction and Results

Blockchain 2.0 cyptocurrencies were more difficult to model compared to traditional financial instruments as they also include a technical element. Deep learning techniques are superior to machine learning simply due to the multiple hidden layers and the amount of forward and backward propagations needed.

Training deep learning models took significant more processing power than I expected.

Conclusion

It is hoped that these soon to be published papers will give more exposure to applying data science in academic finance and thus reducing the gap between academic finance and what is practiced in the industry.