

A MULTI AGENT SYSTEM FOR FOREX TRADING

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Degree of Master of Science in Artificial Intelligence

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University of Moratuwa
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March 2021

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Declaration

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters thesis under my supervision.

Name of the supervisor:

Prof. A. S. Karunananda

Signature of the Supervisor:

Date:

Dedication

I dedicate this thesis to my family and friends. I will always appreciate the help of friends for the things all they have done and their valuable thoughts. I dedicate this work and give many thanks to people at University of Moratuwa for their help and specially for lecturer for providing guidance throughout this research.

Acknowledgement

I would like to express my very great appreciation to Prof. Asoka Karunananda for his generous support for this project.

Also, I would like to thank all the lectures of the Department of Computational Mathematics for their guidance during the course and all the resources and support provided to make this project successful.

Abstract

Foreign exchange market (Forex) is a global marketplace which trades in currencies. This market is more distributed, decentralized, disturbed, and disorganized over the servers on the Internet than the stock market. Due to its very nature, individual investors or experienced traders find it difficult to timely access, collect, filter, and analyze information to draw meaningful decisions on Forex. Most Forex traders fail due to poor understanding of the nature of the parameters that govern the Forex market. As such, Forex Traders should consider many facts such as news, social media posts, and previous price variations before making investments. The process of exploring facts of Forex market is also difficult for traders if they cannot comprehend statistical information and extract economic forces by analyzing the news. Because of that many traders always try several practices to avoid the complexity such as follow successful trader's investment patterns, getting signals from market analyzers. Although many computer-based solutions are already offered for Forex trading, they are unable to deal with the inherent complexity in the Forex environment.

According to literature, Multi Agent Systems (MAS) technology has shown potential to model complex systems. Based on that evident, we have come up with a MAS solution, ForexMA, for Forex trading. ForexMA is designed with multiple Agents which access, collect, filter, and analyze the news and price information from multiple sources. Agents in ForexMA ensure deliberation among the information from qualitative and quantitative sources related to Forex trading. ForexMA is significantly different from existing Machine Learning like solution for Forex trading, where they ignore the mutual influence of qualitative and quantitative information in the decision making. Python-based agent development framework, SPADE, has been used to implement the ForexMA solution. Experiments have been conducted to compare the predictions by ForexMA and the experienced human traders. The results show that ForexMA can surpass the average human trading performance. Further, ForexMA can work with high frequency input data and generate a prediction in few minutes, whereas human traders take many hours for a prediction even with low frequency data.

Keywords: Stock Market, Foreign Currency Stock Market, Multi Agent Systems,

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Abbreviations

EUR	European Monetary Unit
USD	United States Dollar
JPY	Japanese yen
FX	Forex
TP	True positive
TN	True negative
FP	False positive
FN	False negative

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