Report on Bachelor / Master Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University

Student:	**Michal Bodický**
Advisor:	**Jan Šíla**
Title of the thesis:	Forex forecasting with Support vector regression and Long short-term memory recurrent neural network

***OVERALL ASSESSMENT** (provided in English, Czech, or Slovak):*

Please provide a short summary of the thesis, your assessment of each of the four key categories, and an overall evaluation and suggested questions for the discussion. The minimum length of the report is 300 words.

Short summary

The thesis contributes to the empirical literature of forecasting high frequency data, namely on the forex market. The author builds on well established literature of time series forecasting and compares novel methodology. Moving from traditional econometric forecasting approaches such as ARMA processes to modern and computationally more demanding methods.

The work is well written and author demonstrates a very good understanding of the current literature and its scope which he is extending.

Contribution

The thesis compares a well used Neural networks and Support Vector Regression as a possible alternative. Some of the results are expected and stemming from memory-ability of LSTM RNN. Other results offer new insights into the performance of popular models on high frequency financial data.

Methods

Overall the methods used are defnitely relevant and used in academia as well as in practice. Author demonstrates a very solid understanding and command of them. It might benefit the work if the use of those two particular methods were motivated little more, particularly the SVR method. Neural nets are motivated by the Universal approximation theorem well.

The work does not explicitely say what it models. Reader assumes, logarithmic returns are modelled, but it is unclear and I failed to find it in the text. In my opinion, a reader would benefit from some visual description of the data as well, to have an idea about the trends and overall nature of the data.

I would welcome some financial oriented discussion into the nature of working with 1-minute data and its challenges as, even the author mentions it, there is not a large body of literature on this topic.

Literature

Chapter 2 presents relevant literature in the context of thesis's motivation. As the topic is relatively new, the review covers the sources well. The sources are references in an appropriate way and format. It does not seem there are bibliographical entries not mentioned in the text.

Manuscript form

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The text is logical, well organized and concisely written. The manuscript itself attains a high academic quality and the outputs are well readable. The reader can benefit from convenient graphical description of the methodological principles. However, Figure 5.1 dos not have labeled axes.

Overall evaluation and suggested questions for the discussion during the defense

Suggested questions for a defense:
- Could you describe what time series were you forecasting?222
- Was it surprising that in the one-step-ahead forecasts, that LSTM was much better predictior?
- How do you interpret that SVR's performance did not change given the input dimension for the one-step-ahead forecasts?
- Would it make sense to try a very large input dimensions? Say tens of values?
- Did you struggle somehow with market microstructure? How would you describe the variance of the inspected series?

In my view, the thesis fulfills the requirements for a bachelor thesis at IES, Faculty of Social Sciences, Charles University, I recommend it for the defense and suggest a grade B.

The results of the Urkund analysis do / do not indicate significant text similarity with other available sources.

SUMMARY OF POINTS AWARDED *(for details, see below):*

CATEGORY		**POINTS**
Contribution	*(max. 30 points)*	25
Methods	*(max. 30 points)*	24
Literature	*(max. 20 points)*	17
Manuscript Form	*(max. 20 points)*	18
TOTAL POINTS	*(max. 100 points)*	**84**
GRADE	**(A – B – C – D – E – F)**	**B**

NAME OF THE REFEREE:

DATE OF EVALUATION:

Digitálně podepsáno (26.5.2021):
Jan Šíla

Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Overall grading:

TOTAL	**GRADE**
91 – 100	**A**
81 - 90	**B**
71 - 80	**C**
61 – 70	**D**
51 – 60	**E**
0 – 50	**F**