**FACULTY
OF INFORMATION
TECHNOLOGY
CTU IN PRAGUE**

Review report of a final thesis

Reviewer:	RNDr. Vladimíra Sečkárová, Ph.D.
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Thesis title:	Explainability in Time Series Classification
Branch / specialization:	Knowledge Engineering
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Evaluation criteria

1. Fulfillment of the assignment

▸ [1] **assignment fulfilled**
  [2] assignment fulfilled with minor objections
  [3] assignment fulfilled with major objections
  [4] assignment not fulfilled

The final thesis follows the objectives of the assignment; objectives are formulated correctly and fulfilled sufficiently.

2. Main written part   91 /100 (A)

This thesis focuses on comparison of existing algorithms and development of new algorithms for time series (TS) predictions. This is based on generalisation of essential parts of TS by different (existing, new) classifiers. Chapter 1 focuses on classification in general and description of several classification algorithms. Chapter 2 summarizes methods assessing explainability of TS. The implementation was done in Python. Chapter 3 introduces new method based on ARIMA coefficients as time series features together with local surrogate explainability model (LIME). Similarly, the use of method for feature selection based on convolutional kernels (ROCKET) together with LIME is proposed. In Chapter 4 the implementation of classifiers together with prediction summary for classification using confusion matrix is given. Application of several algorithms considered in thesis to real data and discussion regarding their performance with respect to accuracy score and prediction time are part of Chapter 5.

Thematic flow, reader comprehension, citations, references - overall good, but can be improved. Here are some suggestions how to improve the readability:

C1: Include better cross-referencing: focus especially on connection between chapter introducing new methods/algorithms and chapter dealing with performance of these methods and their application on real data.

C2: Any claim stated in the thesis such as 'Lower order ARIMA processes are preferred because there is a possibility that higher orders would sabotage each other.' should be supported by appropriate reference and in-text citation.

C3: When referencing a source, please avoid using 'in paper [.] they used' etc; you can use 'in paper [.] the following method was derived/used' instead.

3. Non-written part, attachments   100 /100 (A)

Python files, provided together with written part of the thesis, contain no errors (warnings about future changes in Python implementation can be disabled) and all outputs are visible.

Comments:

C1: A single .ipynb file containing the whole code with sections following the order of the topics in the thesis would be appreciated.

4. Evaluation of results, publication outputs and awards   94 /100 (A)

Proposed algorithms (Chapter 3) are new; the results in Chapter 4 and Chapter 5 show promising results. Greater discussion regarding their performance could have been included. After proper justification, the proposed algorithms could have large impact in a range of applied fields such as Data Science, Applied Statistics, etc.

The overall evaluation   95 /100 (A)

Overall, this thesis, written in English, is well-structured without any formatting issues and low number of typos. A more detailed description of what led to suggested algorithms and greater discussion regarding their performance could have been included. I recommend this thesis for the defense.

Práci doporučuje k obhajobě.

Questions for the defense

Q1: Table 5.2 and Table 5.3: Algorithms performing well with respect to the accuracy score tend to have high prediction times.
Would it be possible to develop algorithm that has high accuracy and lower prediction time?
What would you recommend to use in practice – the slow, but more accurate algorithm, or the faster algorithm with lower accuracy?

Q2: Which score is used to measure accuracy? The Jaccard similarity coefficient?

Instructions

Fulfillment of the assignment

Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.

Main written part

Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies?

Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 52/2021, Art. 3.

Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.

Non-written part, attachments

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Evaluation of results, publication outputs and awards

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

The overall evaluation

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.