Report on **Master Thesis**

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

Student:	**Jan Sinčák**
Advisor:	**doc. PhDr. Jozef Baruník, Ph.D.**
Title of the thesis:	**Machine Learning Methods in Payment Card Fraud Detection**

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

Short summary

The thesis under evaluation uses machine learning methods for detection of fraudulent card transactions to answer the question if data-driven methods can improve the detection of fraudulent behavior to protect clients. Author compares the approach to standard methods used by banks and finds there is a potential in the modern machine learning based methods for client protection.

Contribution

The contribution of the thesis is application of the modern machine learning based methods to improve detection of fraudulent transactions. Author compares the results to standard methods and finds promising results. The detection of fraudulent transactions is one of the key problems for risk managers of banks and its proper treatment can reduce losses from such operational risk.

Methods

Author uses number of advanced state-of-the-art methods such as logistic regression, neural networks, random forests, and extreme gradient boosting to achieve the goal. Author compares the machine learning based methods to the bank system. Author uses publicly available datasets used by researchers.

Literature

Jan demonstrates deep understanding of the literature and gives credit to all important as well as relevant studies. The author works with relevant literature properly and develops his own original ideas based on proper understanding of the previous literature. With this respect, Jan provided excellent work.

Manuscript form

The text is logical, well written, connects findings to the existing literature well. Jan worked consistently to obtain the results for long period, and we have discussed the results and text on a regular basis during the year together with her consultant, as well as during the last stage of writing. Formally, manuscript meets all requirements.

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Overall evaluation and suggested questions for the discussion during the defense

In conclusion, I believe that during the work Jan proved himself to be an independent researcher, he obtained interesting original results, mastered advanced econometric techniques, and finally was able to use all these skills to deliver sound and economically relevant work. Hence the thesis deserves to be defended without doubts. In case Jan is confident in presenting the details of the work during the defense, and especially present implications of his findings including possible limitations in practical use, I suggest to award the work with grade „A" without further questions.

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

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

NAME OF THE REFEREE: Jozef Barunik

DATE OF EVALUATION: 18.5.2023

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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