UNIVERSITY OF PARDUBICE
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Review of dissertation:

Forecasting Regional Financial Performance Using Soft-Computing Methods

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Study programme: System Engineering and Informatics

The goal of the dissertation

The author of the dissertation declares the research topic to design and demonstrate the effectiveness of the combinations of soft computing methods (feature selection and classifier/hybrid methods/ensemble learning models) in forecasting regional financial performance. The dissertation topic is very relevant, especially now, when we can see so many economic instabilities. The forecast of future development is associated with a large degree of uncertainty, which stems from the imperfection of input data, incomplete knowledge of the functioning of the economy, the necessary model simplification of complex economic relationships and uncertainty regarding the expected development of input quantities (world commodity prices, natural disasters, etc.).

Methodology and results

The first chapter of the dissertation provides an overview of the state-of-the-art forecasting of regional financial performance. I appreciate the tables (one and two) where the author details the studies orienting corporate credit rating modelling in literature. The following part (chapter two) brings the dissertation's objectives and the research methodology (figure 1).

Chapter number three explains the used dataset. Data are from Moody's credit rating agency from 2003-2007 and the forecasts for 2008 and 2009 (table number 3). The data were normalised, trained, and tested. The SMOTE technique and classification methods were later used (bagging, Random Forest, RadaBoost). Chapter four brings experimental settings. The following classification measures were used to evaluate the performance of the prediction models. That minimizes the misclassification cost in credit rating classification for sub-sovereign entities across various countries and world regions. Cost-sensitive learning was employed to adjust the training instances following the total cost associated with each class, facilitating the prediction of nominal rating classes at a lower misclassification cost).

The following evaluation measures were taken into consideration: Accuracy (Acc), AUC to assess the performance on imbalanced classes, F-measure (the combination of precision and recall), and misclassification cost (to consider different financial effects of misclassified regional units). Chapter five explains the experimental results. Experiments were carried out in the Weka program environment (machine learning sw), and STATISTA and SHAP libraries were used in Python 3.12 environments. The results show that the proposed hybrid model surpasses existing forecasting models regarding misclassification cost and other classification metrics. The model fitting/chi-square values indicate how well the model fits the data, with higher values generally showing a better fit. **It proves that the author fulfilled all the goals of the dissertation**. Chapter six discusses the limitations and provides further research suggestions. Chapter seven aims at the experiment's contributions, which are scientific and applicable. The proposed model gives an easier idea of the evaluation of the sub-sovereign credit rating for public administration managers, banks, investors, or rating agencies.

The formal quality of the thesis

The author proceeded with her topic very carefully, profoundly, and understandably. The dissertation is logically organised, with figures and tables. In addition, the English has high quality. The student has excellent publication results that demonstrate the understanding and aim of the topic.

Conclusion

I consider the work as a whole very positively and beneficial. The theses meets the demands placed on this type of work regarding both form and content. The author has demonstrated the ability of independent scientific work and the mastery of the procedures that make this possible. In addition to the ability to actively work with information sources, the dissertation demonstrates her own methodological systematic approach of the procedure and own experience, which provides prerequisites for further scientific and professional growth of the doctoral student. I recommend the dissertation for defence and, in case of the successful presentation, to award the degree of doctor (PhD) before the relevant committee of the Applied Informatics program (according to § 47 law num. 111/1998).

Questions

What do you consider as the most challenging part of the data processing?

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