Scientists teach AI to predict bankruptcy

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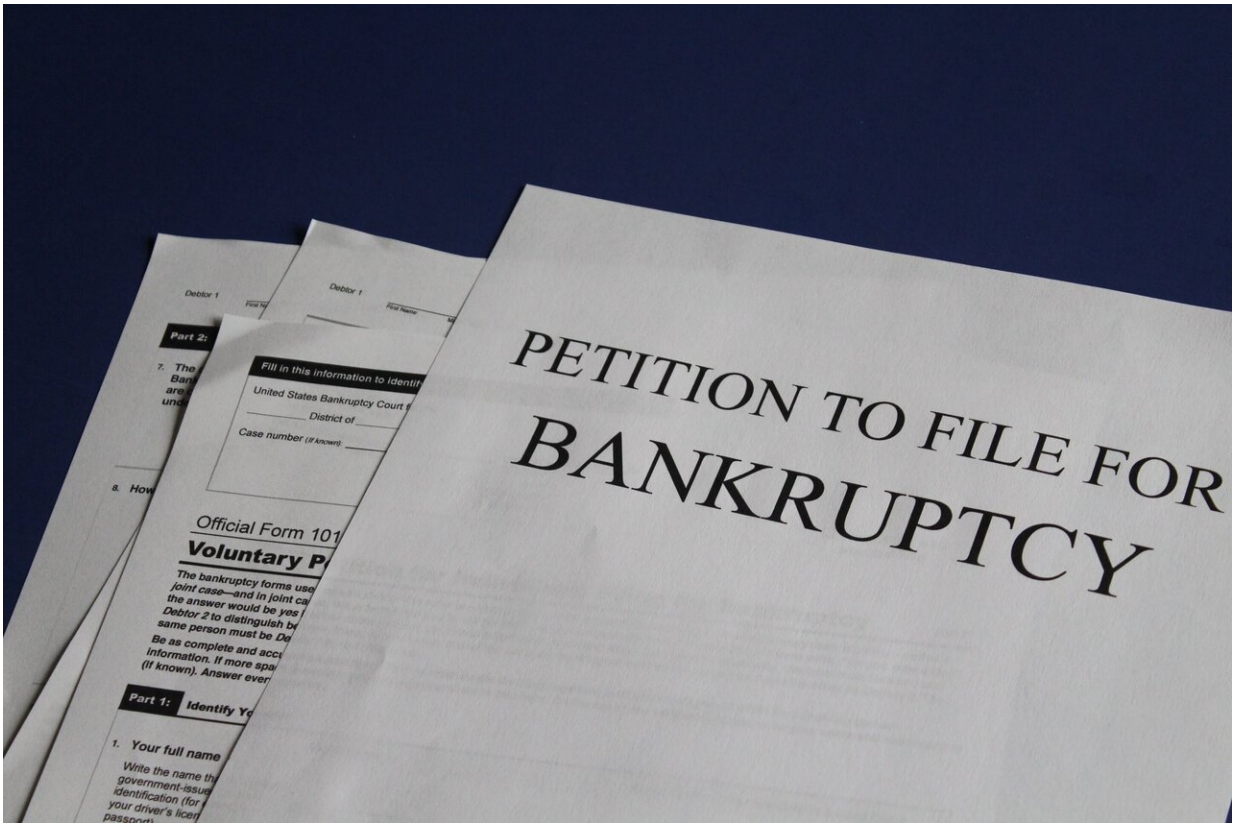

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The ability to accurately assess the financial risks of dealing with a business is vital to both the economy and society. This is particularly true when forecasting bankruptcy, which can result in significant financial losses and hurt the national economy.

The causes of business bankruptcy have long been of interest to research economists. Their work includes empirical and theoretical studies into the processes that lead to business failure in order to identify problems at an early stage. Data on companies' economic performance indicators is also used to develop new forecasting methods.

Currently, bankruptcy forecasting is particularly prominent in the business world. In research published in the journal *Expert Systems with Applications*, HSE Graduate School of Business Professor Yuri Zelenkov and student Nikita Volodarskiy have proposed a new approach to the problem that utilizes machine learning.

Predicting a company's bankruptcy is a type of "classification task," which involves determining whether a given business belongs to one of two categories: those which remain in operation and those which go bankrupt within a certain period of time.

The proposed method was developed using a set of historical data on successful and failed companies. The AI is trained using a set of business performance indicators. It then searches for complex patterns in companies' development and their current state. After being trained on a particular company, the method can be used to predict a business's future trajectory with some degree of accuracy.

Such tasks suffer from the problem of imbalanced classification—statistically, bankruptcy is a rare occurrence (happening to only 5–10% of companies according to the available data), and training sets include much more information on successful companies. Machine-learning methods have insufficient information to understand which sets of attributes can lead to future bankruptcy.

The authors of the research have developed a method that is less sensitive to imbalances in the data. It involves training a large number of

individual classification algorithms, then selecting the most effective among them and combining them to achieve a higher degree of forecasting accuracy.

"We managed to build a fast algorithm that can be trained using unbalanced data to make much more accurate predictions than traditional methods. Notably, the user can manage prediction errors of each class in a visual form. Since the model is exclusively based on companies' financial indicators, its results are still reliable even in the extreme conditions of the COVID-19 pandemic. Interest in machine-learning methods will only continue to grow in the future, and we believe that at some point, it will fully replace traditional methods for forecasting business bankruptcies. At the same time, our method isn't only focused on bankruptcy—it can be used for any kinds of classification tasks that involve imbalanced data. We are currently planning its future research and development," explained Professor Yuri Zelenkov of the HSE University Department of Business Informatics.

More information: Yuri Zelenkov et al, Bankruptcy prediction on the base of the unbalanced data using multi-objective selection of classifiers, *Expert Systems with Applications* (2021). DOI: 10.1016/j.eswa.2021.115559

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