An improved Artificial Bee Colony algorithm for feature selection combined with SVM-adaboost ensemble model for the prediction of SMEs credit risk considering digital transformation influence

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Abstract

Prediction for enterprise credit risk in the era of the digital economy is important for early credit crisis warning. Existing evaluation methods for small and medium-sized enterprises (SMEs) credit levels simply using financial information have two major limitations. Firstly, it relies heavily on financial reports to ignore the soft information related to enterprise digital development. Secondly, both the process of feature selection and unbalanced sample could influence the prediction performance of model. Therefore, we introduce a novel credit risk prediction method for SMEs and improved Artificial Bee Colony (ABC) algorithm for feature selection (IABCFS). Firstly, we expand the evaluation system for credit risk with features on digital transformation, and combine SMOTE algorithm with Tomek Link Removal to do the work of data cleaning. Then we introduce an initialization method based on Tent Chaotic Map and improve the standard ABC algorithm by a new search strategy to increase the efficiency of feature selection process. To further decrease the redundancy between features, we use Symmetric Uncertainty (SU) to construct the fitness function. Finally, we develop a prediction method of credit risk based on IABCFS combined with an SVM-Adaboost ensemble model. The experiments indicate that the improvement for IABCFS is effective and our proposed method achieves competitive results both on a Chinese SMEs dataset and three public datasets.

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