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A New Approach for Reject Inference in Credit Scoring Using Kernel-free Fuzzy Quadratic Surface Support Vector Machines

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Abstract

Credit scoring models have offered benefits to lenders and borrowers for many years. However, in practice these models are normally built on a sample of accepted applicants and fail to consider the remaining rejected applicants. This may cause a sample bias which is an important statistical issue, especially in the online lending situation where a large proportion of requests are rejected. Reject inference is a method for inferring how rejected applicants would have behaved if they had been granted and incorporating this information in rebuilding a more accurate credit scoring system. Due to the good performances of SVM models in this area, this paper proposes a new approach based on the state-of-the-art kernel-free fuzzy quadratic surface SVM model. It is worth pointing out that our method not only performs very well in classification as some latest works, but also handles some big issues in the classical SVM models, such as searching proper kernel functions and solving complex models. Besides, this paper is the first one to eliminate the bad effect of outliers in credit scoring. Moreover, we use two real-world loan data sets to compare our method with some benchmark methods. Particularly, one of the data set is very valuable for the study of reject inference, because the outcomes of rejected applicants are partially known. Finally, the numerical results strongly demonstrate the superiority of the proposed method in applicability, accuracy and efficiency.

Keywords: Reject Inference, Credit Scoring, Kernel-free Quadratic Surface SVM, Outlier Detection, Online Lending

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