Proceedings of the IV Brazilian Conference on Neural Networks - IV Congresso Brasileiro de Redes Neurais
pp. 270-275, July 20-22, 1999 - ITA, São José dos Campos - SP - Brazil

A Neural Network Based Solution for the Credit Risk Assessment Problem

Germano C. Vasconcelos
Paulo J. L. Adeodato
Domingos S. M. P. Monteiro
Departamento de Informática,
Universidade Federal de Pernambuco,
Cx. Postal 7851, 50732-970, Recife-PE, Brazil
E-mails: {gcv,pjla,dsmpm}@di.ufpe.br

Abstract

The automation of decision making in financial markets is one of the major application areas of neural networks. Risk analysis is one of the problems where the technique has been efficiently applied. This paper investigates a solution to a credit analysis problem in a rather peculiar environment, characterized by a stabilized economy but subject to a high interest rate, namely the Brazilian market. A neural network based credit scoring system has been developed for the retail business in Brazil and its performance has been evaluated against that attained by a traditional discriminant analysis system. Extensive experimental results carried out with a database of 18,000 consumers of a leading Brazilian supermarket chain clearly indicate that a better solution is found with the connectionist based system.

1. Introduction

In the globalized economy, efficiency and low cost are fundamental aspects in making a product or service become competitive in the market. The huge volume of transactions turns the information processing automation into a crucial factor for cost reduction, high speed and high quality standards. The scientific and technological advance has modified the characteristics of managerial work. Automation has reached activities normally thought of as "reserved for humans" and many skeptics about this have changed their opinions as a result of the relevant successes achieved by state-of-the-art computer solutions applied nowadays. In the past, people tended to think that financial market analysis requires knowledge, experience and intuition and wondered how this activity could be automated. However, in developed countries the automation of financial market analysis has been steadily growing along with the scientific and technological advances [2]. In Brazil, the automation of this task was not possible until recently due to the high rates of inflation (at least 10% per month). This has only become feasible after the stabilization of the Brazilian economy with *Plano Real* which lowered inflation to less than 10% per year since 1994. Since then several financial institutions have already automated part of their decision support systems. But the demand for automation is still growing with new services being offered (e.g. personal leasing) and the need to expand the services to a broader market.

A major application of neural network [8,9,10] based systems to finance is risk analysis [2,3,4,7]. It involves the estimation of several aspects concerning a credit/insurance applicant: credit limit, expected profit, mean time for tardy payments, concession of credit, insurance coverage, etc.

This paper focuses on the problem of credit analysis particularly the decision on the concession of credit cards to customers [6]. A case study has been carried out on the actual database of a leading supermarket chain in Brazil which has its own credit card operator. The company had already automated the credit evaluation process and was interested in improving its performance and flexibility. This case of study is particularly interesting because of the peculiar aspects currently associated with the Brazilian market : a stabilized economy with low inflation rates (less than 1% per month) but with very high monthly interest rates (more than 5%). This has influenced the percentage of bad payers in the market. The system presented here has attained a better performance than the company's credit score system based on linear discriminant analysis on a set of customer independent data retained at the company for evaluation.

The paper is organized as follows. Section 2 characterizes the credit concession problem. Section 3 particularizes the problem to the actual case investigated and Section 4 presents the solution adopted. Section 5 presents the results of the neural network based system and compares it to the existing credit score system. Finally, Section 6 presents final remarks on the limitations of the solution achieved, on the future work for improvement and on new desired features for such a system.