Chapter XIX
Data Mining for Credit Scoring

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ABSTRACT

Credit scoring is one of the most popular uses of data mining in the financial industry. Credit scoring can be defined as a technique that helps creditors decide whether to grant credit to customers. With the use of credit scoring, decisions about granting of loans can be made in an automated and faster way in order to assist the creditors in managing credit risk. This chapter begins with an explanation of the need for credit scoring followed by the history of credit scoring. Then it discusses the relationship between credit scoring and data mining. The major applications of credit scoring in three areas, which include credit card, mortgage, and small business lending, are introduced. This is followed by a discussion of the models used for credit scoring and evaluation of seven major data mining techniques for credit scoring. A study of default probability estimation is also presented. Finally the chapter investigates the benefits and limitations of credit scoring as well as the future developments in this area.

INTRODUCTION

Data mining has been widely applied in the financial industry to predict stock prices, forecast interest rates, assess credit ratings of bonds, and manage portfolios. Among all applications of data mining in the financial industry, credit scoring, which is prediction and management of risk, is
one of the most popular applications with a long history. This chapter will describe the history, applications, models evaluation, benefits, and limitations of credit scoring.

**Credit Scoring**

Credit scoring refers to the “techniques that help lenders decide whether or not to approve loan applications” (Lyn, 2006). It is a procedure in which every single piece of information obtained from a customer’s credit application is assigned points that are consequently aggregated to form a numeric figure called credit score (Mays, 2004). To determine these points, a “scorecard” is used. Credit scoring grew in response to a surging demand for offering more credits in a quicker, fairer, and more consistent way in the expanding financial markets. Lenders are turning to this decision-making system because lending to consumers represents chances of default, and they seek ways to minimize the default risk and increase debt repayment (Limsombunchai, Gan, & Lee, 2005).

The classification of an applicant as a good or a bad payer is determined by the characteristics noted on the credit application and creditworthiness behavior of the person. Various factors are considered that include data from the application form (e.g., occupation, income, address, age, marital status, etc.) and behavioral data activities (credit history, average balance, etc.) (Thomas, Ho, & Scherer, 2001; Thomas, Edelman, & Crook, 2002). There are two types of decisions that lenders need to make. The first decision is whether to grant credit to a new applicant, and the second decision is how to deal with existing applicants and whether to increase their credit limits or not. The former is called application scoring and it applies the technique of credit scoring and is performed for credit risk determination, loan amount approval, and limit setting on the grounds of statistical analysis. The latter is known as behavioral scoring or a statistical approach to forecast future performance of customers by utilizing their current and recent behavioral data. Credit restriction or marketing efforts directed towards a current customer are adjusted after recalculation of score to capture the risk level over a timeline. Decisions on authorizations, limitation of overdraft applications, renewal reviews, and collection strategies are made based on behavioral scoring. In both cases, the essence lies in the fact that a large sample of customers with their application details and subsequent credit history are available. Both scoring techniques use the sample to identify relationships between the characteristics of the consumers and how ‘good’ or ‘bad’ their subsequent history is. Thus, it can be said that both application and behavioral scoring techniques are focused on predicting how the borrower will behave in the future given how they have behaved in the past.

**BACKGROUND**

Manual assessments of credits by analysts in the early days before the Second World War were error-prone and inconsistent as firms depended on the credit analysts’ rules of thumb to decide to whom to give loans. Automation of credit decisions and the classification techniques developed in statistics were linked together to give rise to a systematic practice in making lending decisions. The forerunner roles were taken up by Bill Fair and Earl Isaac in the United States in 1958 to develop the first commercial scorecard system. The initial adoption of FICO scores proved to be a successful move, as delinquencies were reduced by 20-30% while maintaining similar volumes of lending, or lending volume increased by 20-30% when delinquency was maintained at the same level (Fishelson-Holstine, 2004).

Credit scoring was not widely embraced until the arrival of credit cards in the late 1960s. The large number of people applying for credit cards everyday made it impossible in manpower terms
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