



Chapter XIV

Financial Benchmarking Using Self-Organizing Maps – Studying the International Pulp and Paper Industry

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ABSTRACT

Performing financial benchmarks in today's information-rich society can be a daunting task. With the evolution of the Internet, access to massive amounts of financial data, typically in the form of financial statements, is widespread. Managers and stakeholders are in need of a tool that allows them to quickly and accurately analyze these data. An emerging technique that may be suited for this application is the self-organizing map. The purpose of this study was to evaluate the performance of self-organizing maps for the purpose of financial benchmarking of international pulp and paper companies. For

the study, financial data in the form of seven financial ratios were collected, using the Internet as the primary source of information. A total of 77 companies and six regional averages were included in the study. The time frame of the study was the period 1995-2000. A number of benchmarks were performed, and the results were analyzed based on information contained in the annual reports. The results of the study indicate that self-organizing maps can be feasible tools for the financial benchmarking of large amounts of financial data.

INTRODUCTION

There are many parties interested in the financial performance of a company. Investors want to find promising investments among the thousands of stocks available on the market today. Managers want to be able to compare the performance of their company to that of others in order to isolate areas in which the company could improve. Creditors want to analyze the company's long-term payment ability, and auditors want to assess the accuracy of a company's financial statements. Financial analysts want to compare the performance of a company to that of others in order to find financial trends on the markets. A tool commonly used by these parties is *financial competitor benchmarking* (Bendell, Boulter & Goodstadt, 1998).

The purpose of financial competitor benchmarking is to objectively compare the financial performance of a number of competing companies (Karlöf, 1997). This form of benchmarking involves using *quantitative* data, i.e., numerical data, usually in the form of a number of financial ratios calculated using publicly available financial information. The information required for these comparisons can commonly be found in companies' annual reports.

The problem with these comparisons is that the amount of data gathered quickly becomes unmanageable. Especially with the advent of the Internet, access to financial information is nearly infinite. This has led to a situation, faced by many managers and investors today, in which the amount of data available greatly exceeds the capacity to analyze it (Adriaans & Zantinge, 1996).

A possible solution to this problem is to use *data-mining tools*. Data-mining tools are applications used to find hidden relationships in data. One data-mining tool that could be particularly suitable for the problem in this case is the *self-organizing map*. Self-organizing maps are two-layer neural networks that use the *unsupervised learning* method. Self-organizing maps have been used in many applications. By 1998, over 3,300 studies on self-organizing maps had been published (Kaski, Kangas, & Kohonen, 1998). Today, this figure is over 4,300 (Neural Networks Research Centre, 2001). Most applications of self-organizing maps have dealt with speech recognition, engineering applications, mathematical problems, and data processing (Kaski et al., 1998). Some examples of more recent research papers include cloud classification (Ambrose, Seze, Badran, & Thiria, 2000), image object classification (Becanovic, 2000), breast cancer diagnosis (Chen, Chang, & Huang, 2000), industrial process monitoring and modeling (Alhoniemi et al., 1999), and extracting knowledge from text documents (Visa, Toivonen, Back, & Vanharanta, 2000).

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