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Chapter X

Maximum Performance Efficiency Approaches for Estimating Best Practice Costs

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ABSTRACT

Data mining is increasingly being used to gain competitive advantage. In this chapter, we propose a principle of maximum performance efficiency (MPE) as a contribution to the data-mining toolkit. This principle seeks to estimate optimal or boundary behavior, in contrast to techniques like regression analysis that predict average behavior. This MPE principle is explained in the context of activity-based costing situation. Specifically, we consider the activity-based costing situation in which multiple activities generate a common cost pool. Individual cost drivers are assigned to the respective activities, but allocation of the cost pool to the individual activities is regarded as impractical or expensive. Our study focuses on published data from a set

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of property tax collection offices, called Rates Departments, for the London metropolitan area. We define what may be called benchmark or most efficient average costs per unit of driver. The MPE principle is then used to estimate the best practice cost rates. A validation approach for this estimation method is developed in terms of what we call normal-like-or-better performance effectiveness. Extensions to time-series data on a single unit, and marginal cost-oriented basic cost models are also briefly described. In conclusion, we discuss potential data-mining applications and considerations.

INTRODUCTION

In recent years, companies have started to realize the potential of using data-mining techniques as a form of competitive advantage. For example, in the finance industry, in the decade from 1980 to 1990, the number of credit cards issued doubled to about 260 million. But, in the next ten years, there was not another doubling of this number. Given that there are now about 280 million people in the United States, it is widely believed that the credit card market is saturated (Berson, Smith, & Thearling, 2000). In such situations, any gains by one company leads to a loss for another — a zero-sum game. To gain competitive advantage, credit card companies are now resorting to data-mining techniques to retain and identify good customers at minimal cost.

The cell phone industry is also expected to go the way of the credit card market. Soon, the cellular industry will be saturated; everybody who needs cells phone will have one. Companies who are able to predict and understand customer needs better, will probably be the ones who will survive. The cellular industry, like the credit card industry, is likewise resorting to data-mining techniques to identify traits for retaining good customers.

Research in data mining has so far focused on either developing new techniques or on identifying applications. Being a multidisciplinary field, data-mining techniques have originated from areas of artificial intelligence, database theory, visualization, mathematics, operations research, and statistics, among others. Many of the well-known statistical techniques like nearest neighbor, clustering, and regression analysis are now part of the data-mining toolkit.

In this chapter, we present a new technique based on the principal of *maximum performance efficiency* (MPE). While techniques like linear regression analysis are used to predict average behavior, MPE seeks to predict boundary or optimal behavior. In many cases, such models are actually more desirable. For example, in a saturated credit card or cellular phone market, a company may seek to predict characteristics of its best customers. In essence, choosing to concentrate on customers who are low risk/cost to maximize profit. Such models, usually called ceiling/floor models, can also be used as part of data-mining techniques for benchmarking. For example, a company may be interested in comparing the quality of its products over different product lines. The MPE criterion seeks to identify the characteristics of the best performing unit, thus allowing the company to implement these measures in other units to improve their quality, and hence the competitive advantage of the company across product lines.

We propose the MPE principle and show how it can be used to estimate the best practice costs in an activity-based costing situation. The rest of the chapter is organized