Chapter 6

Knowledge-Driven Marketing Management Support Systems II: Case-Based Reasoning, Neural Networks, and Creativity Support Systems

Learning Objectives

- To understand the basic philosophy underlying case-based reasoning as a tool for processing knowledge.
- To become familiar with the concepts and techniques used in case-based reasoning, such as representation of cases, measures of similarity between cases, retrieval of cases, adaptation, and revision of cases.
- To learn about the current application of case-based reasoning in marketing and the prospects for its extended use.
- To understand the principles of connectionism or neural networks as a pattern-recognition tool.
- To become familiar with the basics of designing, training, and testing (artificial) neural networks.
- To understand how neural networks can be applied to time-series data and cross-sectional data in marketing and to learn about the results of studies comparing neural networks with conventional methods.
- To learn about the role of creativity support systems in problem solving and their contribution to the creativity of solutions.
- To acquire an overall perspective on the different marketing management support technologies discussed in this and the last two chapters.
6.1 Case-Based Reasoning Systems

In this book we discuss two major techniques for knowledge processing or reasoning with knowledge. In the previous chapter we dealt with the first one, *rule-based reasoning* (which is the basis of expert systems). In this chapter we discuss the second technique, *case-based reasoning*. The idea underlying case-based reasoning is that, when solving a new problem, a person remembers a previous, similar problem situation and reuses information and knowledge from that prior problem to solve the current one. *Case-based reasoning systems* are computer programs that follow this principle and consist of a “case base” of earlier cases and mechanisms for storing, retrieving, adapting, and learning from cases.

6.1.1 Reasoning by Analogy

Case-based reasoning systems find their origin in two basic notions. The first is that humans tend to understand a novel situation in terms of one that is already familiar. In the last two decades, the power of the *analogy* has become apparent to cognitive psychologists. Some of the greatest scientific discoveries have emerged through analogies, for example, the double helix that triggered Watson and Crick’s discovery of the structure of DNA. The great astronomer Kepler was a prolific *analogizer*; in 1609 he used the analogy of light to understand gravity (Gentner and Markman 1997). Like light, gravity is not something material or tangible, yet it has demonstrable effects. (Kepler lived many centuries before the discussion about the wave/particle nature of light.) Not only have the great discoverers made use of analogies, but we all use them all the time. Professionals such as physicians and automobile mechanics do not go back to basic theories of how the human body or a car engine works. They use experiences (similar symptoms shown by earlier patients or cars) to generate hypotheses about what’s the matter with a patient or car and to come up with solutions and therapies. Architects and caterers also tend to recall, merge, and adapt old design plans to create new ones (Kolodner 1993).

Analogical reasoning also occurs in marketing. For example, Goldstein (1993) examined how product managers use scanning data. He found that product managers organize what they have learned from analyzing scanner data into a set of *stories* about their products and marketing environments. Thus humans often use experiences instead of general rules to solve problems. “Human experts are not systems of rules, they are libraries of experiences” (Riesbeck and Schank 1989, p. 15). Therefore, analogical reasoning is a plausible model for human problem solving in general and marketing problem solving in particular. Although case-based reasoning and analogical reasoning are sometimes used as synonyms, it is more appropriate