Part II
Decision Trees

This part is devoted to the development of extensions of dynamic programming to the study of decision trees. The considered extensions allow us to make multi-stage optimization of decision trees relative to a sequence of cost functions, to count the number of optimal trees, and to study relationships: cost versus cost and cost versus uncertainty for decision trees by the construction of the set of Pareto-optimal points for the corresponding bi-criteria optimization problem.

The applications include the study of totally optimal (simultaneously optimal relative to a number of cost functions) decision trees for Boolean functions, improvement of bounds on complexity of decision trees for diagnosis of circuits, computation of minimum average depth for a decision tree for sorting eight elements, study of optimal tests and decision trees for modified majority problem, design of an algorithm for the problem of reduct optimization, study of time and memory trade-off for corner point detection, study of decision rules derived from decision trees, creation of new procedure (multi-pruning) for construction of classifiers, and comparison of heuristics for decision tree construction.

In Chap. 4, we consider different kinds of decision trees. In Chaps. 5 and 6, we discuss multi-stage optimization of decision trees relative to different cost functions and its applications. We study bi-criteria optimization of decision trees and its applications in Chap. 7 for two cost functions, and in Chap. 8 for cost and uncertainty.