Chapter 1 [1]

A COMMON LOGIC APPROACH TO DATA MINING AND PATTERN RECOGNITION

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Abstract: In this chapter a common logical approach is suggested to solve both data mining and pattern recognition problems. It is based on using finite spaces of Boolean or multi-valued attributes for modeling of the natural subject areas. Inductive inference used for extracting knowledge from data is combined with deductive inference, which solves other pattern recognition problems. A set of efficient algorithms was developed to solve the regarded problems, dealing with Boolean functions and finite predicates represented by logical vectors and matrices.

An abstract world model for presentation of real subject areas is also introduced. The data are regarded as some information concerning individual objects and are obtained by the experiments. The knowledge, on the contrary, represents information about the qualities of the whole subject area and establishes some relationships between its attributes. The knowledge could be obtained by means of inductive inference from some data presenting information about elements of some reliable selection from the subject area. That inference consists of looking for empty (not containing elements of the selection) intervals of the space, putting forward corresponding hypotheses (suggesting emptiness of the intervals in the whole subject area), evaluating their plausibility and accepting the more plausible ones as *implicative regularities*, represented by elementary conjunctions.

These regularities serve as axioms in the deductive inference system used for solving the main recognition problem, which arises in a situation when an object is contemplated with known values of some attributes and unknown values of some others, including goal attributes.

Key Words: Data Mining, Data and Knowledge, Pattern Recognition, Inductive Inference, Implicative Regularity, Plausibility, Deductive Inference.