Chapter IV

Four Different Types of Classification Models

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INTRODUCTION: THE ROLE OF CLASSIFICATION MODELS

EDP stands for electronic data processing. Data bear imminent information—but what kind of information? The question becomes particularly apparent when a great deal of data is to be processed. In this case, the data have to be structured in order to give evidence of the information they bear. Thereby it is important: The primary data collected from a series of discrete observations are more comprehensive than any derived interpretation. They carry more information than any subsequent analysis or interpretation requires or can express.

Due to the reduction in the amount of data (and bits), the process of interpretation brings about a loss of information. It is only by structuring of the data that a proposition can be derived, and this brings about a loss of some primarily available information (Figure 1).

What kind of information is omitted? The question is not rhetorical at all, since it is the categorization which determines both the kind of information that is made explicit and the kind of information that is omitted. One might be tempted to anticipate a pre-existing, objective categorization. This is not the case, since the categorization is not only based on the data under consideration, i.e., the “object,” but also on the aim of the study. The latter refers to the research question as posed by the investigator, i.e., the “subject.” Depending on the research question, the point of view changes, resulting in a different way of extracting the relevant information.

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In order to preserve as many details and possible views as possible, while providing for a maximal clarity, the structuring of the data for interpretation and, thus, the applied model for knowledge representation are pivotal. In other words, the product of clarity \( \times \) granularity must be optimized. This contribution is about the inner architecture of knowledge representations for classifications. It presents four different, successively refined models, the fourth of which allowing for a modeling of concepts which is close to the real world.

The value of classification models in the medical field cannot be overestimated. The amount of medical data gathered in hospitals is huge, and a systematic interpretation would substantially contribute to the creation of knowledge. The reason why such a systematic interpretation is not made on a routine basis becomes obvious: Information about treatments and diagnoses is provided as free texts and cannot be analyzed by mathematical (computational) methods without a proper classification of the underlying concepts. Because of the rich semantics of medical information, the classification model should not be too simple. It should be as detailed and close to reality as possible and, at the same time, clear and easily processable by computers. This chapter gives an overview of the strengths and weaknesses of the different classification models. The rising interest of public health in epidemiological data and of medical payment systems in fair Diagnosis Related Groups (DRGs) reflects the growing need to handle classification systems in a comprehensive way.

**ONE-DIMENSIONAL, HIERARCHICAL MODEL**

Confer with Table 1 for the characteristics of the four models. Concepts can be regarded as “drawers” where similar objects or events of the
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