Chapter IV

Background 3: Databases in Cardiology: Current Issues

Databases are commonly understood as reservoirs of data storage, retrieval, and interchange systems. The specificity of medical databases applications is a result of the modality multitude and the role that databases play in current information technology-based societies. In this application, database formats and standardization have a direct impact on health monitoring and prevention in society. They also play an important role in global range scientific investigation in the area of medicine.

This chapter defines the set of standard diagnostic parameters and metadata expected from cardiac examinations. Rest ECG, exercise ECG, and long-term recording techniques are compared with regard to method-appropriate hierarchies of diagnostic results. This summary is approaching the idea of high redundancy in the dataset influencing data transmission and database operations. As far as the paper record was concerned, these spare data were useful in the validation and correction of human errors. Nowadays, automatic error detection and correction codes are widely applied in systems for storage and transmission of digital data.

Basic issues about DICOM and HL7, two widespread medical information interchange systems, are presented thereafter. These general-purpose systems integrate multi-modal medical data and offer specialized tools for the storage, retrieval, and management of data. Both standards originate from the efforts of standardizing the description of possibly wide aspects of patient-oriented digital
data in the form of electronic health records. Certain aspects of data security are also considered here.

Following this, the reader’s attention is focused on cardiology-oriented data specifications: SCP-ECG and MFER. These two examples provide ECG-specialized tools, data formats, and management methods. Some of the specifications (e.g., local signal decimation) are based on medical findings derived from the signal by diagnostic procedures and already anticipate the presentation of the authors’ proposal of data-dependent reporting formats.

The interoperability of diagnostic equipment is presented as an important aspect of patient safety. Since many diagnostic techniques are based on trends and time-series analysis rather than on isolated measurements, the independence of data from the equipment- or manufacturer-specific technical issues is crucial. The international initiative Open ECG is mentioned as an example of efforts towards the interoperability. The consortium consists of researchers, medics, and industry representatives with the aim of widening the impact of common data exchange in the public health sector. Besides the promotion of the SCP-ECG standard, Open ECG is a non-commercial platform for volunteers to exchange tools and ECG interpretation procedures, viewers, format converters, and other cardiology-related software.

STANDARD REPORT OF A CARDIAC DIAGNOSIS

Modalities in Cardiac Diagnostics

Electrocardiography, although the most widespread cardiac functional examination and the most known electrophysiological test, does not pretend to be the only examination in cardiology. The variety of modalities reflects almost the full range of diagnostic methods applied in medicine, and consequently the use of medical data varying in their origin, nature, and volume is common in the description of the heart. Particular modalities are based on different phenomena triggering the action, directly included in the action, resulting from the action or accompanying the action of the heart. Therefore, these techniques are used as complementary depending on patient status and history.

Electrocardiography is focused on the generation and conduction of electrical activity stimulating the heart muscle contraction and accompanying the subsequent refraction. All sources of the heart action and the stimulus conduction pathways are represented in the ECG. Conduction conditions are also reflected in the electrical relations in the cellular level (drugs or ischemiae) or by the muscle tissue alterations resulting from the infarction. The principal advantages of the ECG are its very low
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