Chapter 3.14
Three Dimensional Medical Images

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ABSTRACT

The revolution of technology has lead to a change; from the analogic to the digital function of medical devices. Some of them were produced in the last years to improve the quality of images. Although the procedure of acquiring and using the devices has been very complicated, the analysis of the images is so dependable that a big amount of the annual budget is spent for their acquisition.

INTRODUCTION

The rapid development of science and the continuous manufacture of pioneer medical technological products, together with the modern requirements for high-quality medical services, led to the growth and introduction of modern technologies in the health sector. This development has been really impressive and rapid.

At the beginning of the 20th century, the progress of applied sciences, such as chemistry, physics, microbiology, physiology, pharmacology, and so forth enforced medical research, which resulted in the continuous discoveries in medical technology. In 1895, W. K. Roentgen discovered X-rays, which was a turning point for medical imaging and diagnostics in general. In the 1950s, there was the development of computerized systems, while in the 1960s, there were applications such as the transport of biological signals from equipped space missions and teletransfers of information.

To be more specific, the dynamic entry and the enforced intervention of sciences such as informatics gave an enormous impulse to the medical field and created new data for treatment

and diagnosis. Thus, we now have the interaction and participation of many different scientific sectors, which aim at the best medical care. One of these sectors is the imaging and treatment of medical pictures, whose development and use are a crucial point in modern therapeutics.

Medical imaging is related to issues such as the descriptive principles of medical images and their elaboration, together with whatever they include. Therefore, it is easy for someone to understand the importance and the role of imaging in diagnosis, treatment, and recovery in general.

This chapter will discuss the basic concepts, such as the analysis of medical images, their elaboration, various uses and applications, as well as an analysis of the functional requirements of such applications in order for them to be fulfilled.

DIGITAL ELABORATION OF IMAGES

The digital elaboration of images is actually a new sector of informatics and has been applied for only 15 years. Its development is revolutionary in the health field and constitutes a major contribution for the promotion of health.

The vast amount of optical information and the need for elaborating them led scientists and technicians to the discovery of storage means for the images and their elaboration by using computers combined with the development and improvement of biomedical equipment.

Digital elaboration, as the title itself declares, deals with the digital registration of images and their elaboration by computers. The objective of elaboration can be the quality improvement of images, the straining of recording or transmission noises, the compression of the amount of information, the storage of images, and their digital transmission and depiction.

In the picture below, we schematically represent all the necessary equipment that is needed to fulfill a digital registration of images to be elaborated by the appropriate personnel in order to give all the necessary information and conclusions.

Thus, everyone can understand that for the elaboration of three-dimensional medical images, a device for the admission of images is required, and this can be an axial tomographer, a magnetic tomographer, an ultrasound device, or even more developed depiction systems. A computer is also required, with all the necessary equipment in order to elaborate the images, analyse them, and store and transmit them, and finally all the appropriate exit devices that will project the images will be needed, which can be terminal stations, special films, and printers. Finally, it is very important that the whole system will support network

Figure 1. Three dimensional imaging