



Description

The problem of assuring an adequate medical assistance to the population depends both on training and qualification levels of doctors and performance of diagnostic equipment they use. In order to obtain quickly and correct information about the specific disease we are developing a decision support system SonaRes destined to support ultrasound diagnostics. It is based on experts' knowledge, presented as a system of rules and allows storing of the images and image annotation information based on the specific descriptions which guide the ultrasound operators to justify their final conclusions. The system helps the specialist in ultrasonic analysis to draw the conclusion more correctly, especially, in emergency cases or in unspecific clinic/paraclinic cases, which do not seem to be included in any classical presentation; in cases where the obtained ultrasonic semeiology can provide a correct diagnosis without complicated and, often difficult of access, medical investigations. SonaRes offers to a user a second opinion with necessary explanations and images that are similar to the examined case. The system contains the following main components: Knowledge acquisition, examination support, unified database (knowledge, images, annotations etc.), image processing algorithms, reports generator.

At the first stage we deal with abdominal zone investigation. The investigation process of this zone is especially difficult (more organs with additional interactions, higher level of confusion, etc.). We have approved our technique on gall bladder and extend it on other organs.

Innovative Aspect and Main Advantages

The proposed informational tools offers a combined solution based on image classification and rules systems and is grounded on advanced methods in signal processing, knowledge-bases, specialized languages of image description, and on various information integration methods. Our approach includes interaction between organs and uses current and precedent similar images in decision making process. Special attention is paid to ergonomic user interface, which is generated dynamically by system according to the DB content and is adaptable to preferences and objectives (of investigation type) of the physician-echographist.

Areas of Application

Ultrasound equipment is much cheaper than other examinations apparatus. Technical progress of the last years in the field of ultrasound diagnostics allowed these methods to come to a leading position among imagistic procedures.

The primary use of the system might be as a 'second opinion' in difficult cases and in emergency; it does not replace physician who interprets echograms. Thus, SonaRes is destined to improve health care by providing a highly efficient diagnostics tool. It is well-suited to needs and current state of the medical equipment in hospitals and clinics and permits operating in remote mode. The system also can be used for automated learning and students training.

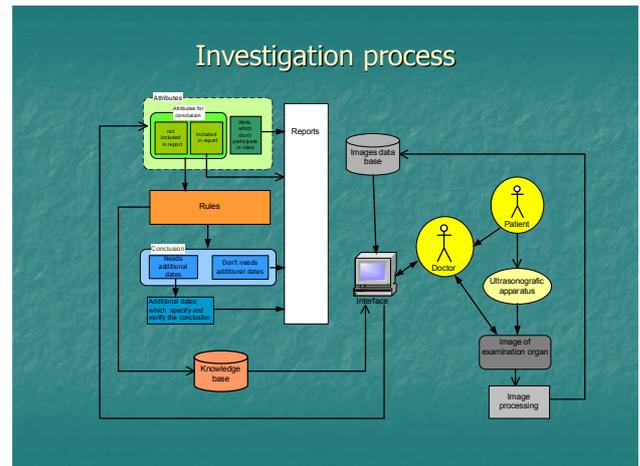


Fig.1. Investigation process algorithm.

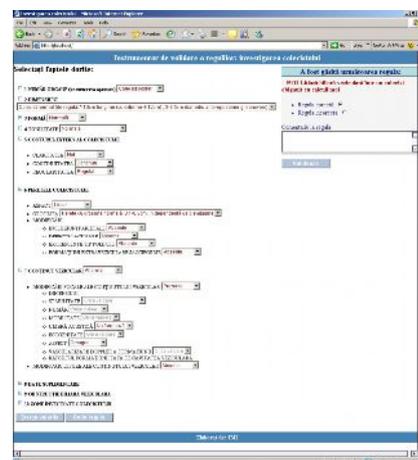


Fig.2 Diagnostics validation tool for making decision rules.

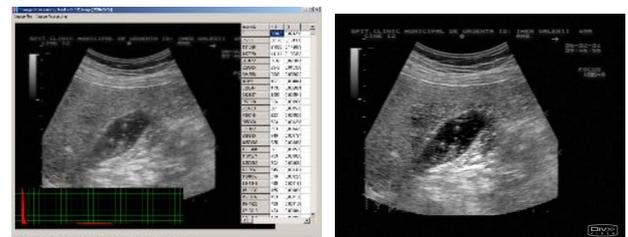


Fig.3 Ultrasound image processing for image clusterization needs (image statistics & histogram equalization for region of interest).

Stage of Development

Prototype available for testing

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