Detection of Medical Images on Comparison with High Quality Images based on Clinical Decision Support System

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Abstract--- The classification of typical tasks for automatic processing of medical images in clinical decision support systems is provided. The methods for automatic analysis of medical images are de-scribed. Hence the most important clinical decision support system has been developed for automatic analysis of the medical images that has been stored in the database. To propose an effective system for automatic processing of medical image. The proposed method assign a feature with error to indicate its relevance for the problem, and eventually the issue of the problem together with the comparison of the image that has been stored in the database.

I. INTRODUCTION

Modern trend in medical video systems is a transition from different tools for organs inspection by physician, as well from the system, based on state-machine principle, taking a binary decision “it is a disease\it isn’t disease”, to the clinical decision support system CDSS. Systems of this type require the integration between the result of automatic image signal analysis and the result obtained by a doctor. As well as the use of information available in the database of the system. This interaction allows to increase specificity and sensitivity of diagnostic in comparison with independent diagnostic by doctor or by CDSS. Using the results of both visual and automatic analysis defines the main challenges of digital image processing in the construction of CDSS. The first group of tasks allows to provide high-quality images to a physician, as well as special synthesized images with special properties and abilities to improve the visual analysis. The second group of tasks is defined by the requirement to implement multiclass automatic analysis in conditions of a high variability of the input images.

The solution of the tasks from first group follows to a development of: Procedures for quality improving for images, presented to a doctor, such as nonlinear contrast enhancement, providing images with equal uniform sharpness, with sharp edges. Special procedures for medical images: mosaicing of images, obtained in different conditions, automatic selection of region of interest (the area on the image for which it is useful to carry out further analysis), highlights removing and reconstruction. Procedures to synthesize the images with special properties. For example: panoramic images, 3D images, or images, combined from different spectral bands.

Despite the large number of existing methods aimed at improving the image (correction of brightness and contrast, improving the signal/noise ratio, sharpening) the development of new algorithms for quality improvement is highly relevant for medical applications. It is defined by significant degradation of medical imaging because of the complex conditions in which they were obtained. For example, endoscopic images have usually large bright and dark areas. The nonlinear contrast correction should be realized for such images. The histogram stretching and equalization that are used today would not provide good results. Most promising methods for nonlinear contrast and brightness correction are AIDANE-adaptive integrated neighbourhood depend approach for nonlinear

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enhancement, MSR - multi-scale retinex, Multi-scale Image Contrast Enhancement. The result of the last method, adapted for multispectral colposcopic system is shown.

The result of nonlinear contrast and brightness correction. Before (left) and after (right) image

A typical kind of the image processing in CDSS is a synthesis of special images, which improve the effectiveness of organ analysis by physician. For example, for colposcopic system it is a green filter imitation. Normal colposcopic examination always includes the study of blood vessels in different scales and with the using of a green filter, which provides a more complete assessment of vessels structure and condition. Colposcopic CDSS shall be capable of simulating the green filter view by means of digital image processing for every fragment desired by physician.

The result of green filter simulation for a chosen fragment of image during examination of the vessels structure.

The generated image-red-brown vessels on a green background-is a more comfortable for observation and visual analysis than typical images of white light, in which the dark red veins are located on the red background. An important field of image synthesis in medical applications is the formation of images with enhanced information, or content. For example, a combined image, that merges the information from different spectral bands (IR and visible). This kind of images is claimed in endoscopy. The visualization improvement is also connected with the synthesis of mosaic or panoramic images of organ, which provide wide angle view of tissue and are convenient for automatic analysis and navigation during surgery.

A feature of the automatic analysis of medical images is the need to implement the differential diagnosis, which is based on multi-class analysis, under the conditions of the fuzzy boundaries between the classes and the high variability of the initial data. It specifies: building a decision rule based on techniques specific to artificial intelligence systems, namely the methods of fuzzy sets theory and fuzzy logic, methods of data mining [8], methods of machine learning and pattern recognition. Using a set of features: brightness, texture and color characteristics, obtained from images with different types (e.g. images obtained in white light and fluorescence).

II. EXISTING SYSTEM

Modern trend in medical video systems is a transition from different tools for organs inspection by physician, as well from the system, based on state-machine principle, taking a binary decision “it is a disease it isn’t disease”, to the clinical decision support system CDSS. Systems of this type require the integration between the result of automatic image signal analysis and the result obtained by a doctor. As well as the use of information available in the database of the system. Methods aimed at improving the image (correction of brightness and contrast, improving the signal/noise ratio, sharpening) the development of new algorithms for quality improvement is highly relevant for medical applications. It is defined by significant degradation of medical imaging because of the complex conditions in which they were obtained. The nonlinear contrast correction should be realized for such images.

III. PROBLEM STATEMENT

The main drawbacks are, the histogram stretching and equalization that are used today would not provide good results. Efficiency of retrieval image is low using this techniques.

IV. PROPOSED SYSTEM

Procedures for quality improving for images, presented to a doctor, such as nonlinear contrast enhancement, providing images with equal uniform sharpness, with sharp edges. Special procedures for medical images: mosaicing of images, obtained in different conditions, automatic selection of region of interest (the area on the image for which it is useful to carry out further analysis), highlights removing and reconstruction. Procedures to synthesize the images with special properties. The method uses the neighbourhood of processed pixels and high frequency presence level to apply the correction. A typical kind of the image processing in CDSS is a synthesis of special images, which improve the effectiveness of organ analysis by physician. Normal colposcopic examination always includes the study of blood vessels in different scales and with the using of a green filter, which provides a more complete assessment of vessels structure and condition. The visualization improvement is also connected with the synthesis of mosaic or panoramic images of organ, which provide wide angle view of tissue and are convenient for automatic analysis and navigation during surgery. The visualization improvement is also connected with the synthesis of mosaic or panoramic images of organ, which provide wide angle view of tissue and are convenient for automatic analysis and navigation during surgery. Building a decision rule based on techniques specific to artificial intelligence systems, namely the methods of fuzzy sets theory and fuzzy logic, methods of data mining, methods of machine learning and pattern recognition. Using a set of features: brightness, texture and colour characteristics, obtained from images with different types (e.g. images obtained in white light and fluorescence). Classification boundary is defined between the normal tissue and the tissue with CIN, but in medical practice, the greatest interest is the identification of difference between the tissue with CNI and CIN. It is very important task during colposcopic examination.

PROPERTIES	CNI / CIN(I, II, III)	Norm / CIN border (I, II,III)
sensitivity	0.85	0.95
specificity	0.78	0.85

The advantage of the systems are as follows, Provides better result of automatic image signal analysis. Provides high quality image and as well as special synthesized images with special properties and abilities to improve the visual analysis. Provides a more complete assessment of vessels structure and condition.

V. CONCLUSION

Thus the classification of typical tasks for automatic processing of medical images in clinical decision support systems is provided .The methods for automatic analysis of medical images are described .The most important clinical decision support system has been developed for automatic analysis of the medical images that has been stored in the database. To propose an effective system for automatic processing of medical image. The proposed method assign a feature with error to indicate its relevance for the problem, and eventually the issue of the problem together with the comparison of the image that has been stored in the database.

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