ANALYSIS OF METHODS OF INTERPRETATION OF BIOMEDICAL IMAGES

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The article presents review of decisions in the field of interpretation of biomedical imaging solutions. Processing of digital images in recent years is one of the most important directions of development of computer technologies in medicine. Recognition of pathology is the main task of processing and analysis of medical images. In solving recognition problems, often use computer diagnostic system (computer aided diagnostic). The algorithm of computer diagnostic system consists of the following steps: image segmentation, selection of objects of interest, the analysis of objects, parametric description and classification. The article notes that selected objects reflect pathology in the body, and their classification determines the pathological of selected objects. In some cases, the classification of objects is carried out by the method of neural networks, support vector machines, discriminant analysis, etc.

Keywords: interpretation methods of medical images, ontology, segmentation, a contrasting, sharpness, etc.

Introduction

Modern biomedical image formed by the data process or multi-angle multi-frequency scanning, in most cases, are the result of the implementation of these algorithms for digital reconstruction. These images have certain specificity and require a lot of experience at the diagnostician for its interpretation. [1-5].

Except for atlas images, change brightness and contrast of images, to help medical personnel come solutions of segmentation problem of biomedical image, namely the allocation to those areas of the image corresponding to tissue with the same characteristics, it remains one of the most relevant for development of modern diagnostic methods.

Methods and problems of interpretation of biomedical images. The problems of images interpretation related to the broadest field of research and development of detection tools and visualization of images

By the advantages of neural network technology to the traditional mathematical methods: should include the following abilities:

- The ability to solve problems that can't be adequately formalizing;
- The ability to solve formalized problems, where there is no solutions mechanism;
- The ability to solve formal problems with a specific mathematical apparatus, but with poor implementations of calculations for time-consuming and labor-intensive options.

Increasing the information content of medical images:

- Improving the visual characteristics of images database information without losses and minimize distortion [6-8];
- Allocation of substantial parts of images and the suppression of non-essential data, which is more convenient for visual analysis.

Enhancing image contrast

To increase the image contrast is often used methods that operate with a histogram of the image. The essence of these methods is to convert the brightness of the original image so that the brightness distribution histogram acquired desired shape. The easiest - linear scaling method, which consists in stretching the image histogram to the maximum allowable range [2]. Typically, this set the minimum and maximum thresholds, which provides a higher quality of the subjective perception of the image, especially if the processed image contains relatively few items in excess of the level of restriction.

Sharpening methods

Visually image with a blurred and fuzzy perceived as defocusing or deterioration of image sharpness. Consequently, increased image sharpness should be to increase the level of high image frequency spectrum (in his high-pass filtering).

The simplest and most effective method of treatment is "sliding window" of small size. Sharpening algorithm is implemented as a two-dimensional filter with finite impulse response.

Noise filtering methods

In this regard, especially the equipment, as well as errors of reconstruction techniques on the final image has a noise component. Possible noise models are addition and pulsed [7.12]. An effective method of improving the quality of the image - median filtering.

In addition, there adaptive filters with finite impulse response filter where the coefficients pulse characteristics change in accordance with the structure of the processed image.

Image segmentation methods

Segmentation of the image - is the process of separating the image into regions with the same characteristics.

Segmentation can be performed diagnostician manually based on his experience with specific atlases of clinical images. Modern instruments of digital processing allows us to image segmentation process is automated, saving, the right to a final decision of an expert diagnostician. In the past decade to address the problem of segmentation developed a variety of approaches, most of which operate on a binary or monochrome images. The methods of segmentation of such images can be divided into the following groups:

1. Segmentation based on the definition of the boundaries (contour segmentation);
2. Clustering,
3. The method of growth areas,
4. The method of partition-merge fields.

All segmentation methods can be divided into binary and fuzzy. The binary segmentation implies a precise definition of supplies pixel art and fuzzy segmentation assigns only the probability of affiliation of a particular structure.

Methods based on the definition of the boundaries, operate the digital image characteristics by analyzing a range of local data and the two-dimensional vector space, using gradients calculated in this space.

Methods of Sobel, Roberts and Previta apply different approximation of the derivative in the analysis of image pixels, and the boundaries between the regions are defined as the point of maximum gradient.

Laplacian-Gaussian method detects the border areas, defining them as the zero-crossing point after the application to the image filter Laplacian-Gaussian.

Canny method is the most complex and sophisticated, as it is based on the use of two thresholds which define the boundaries of two types - "strong" and "weak", and "weak" boundary marked only when connected to a "strong".

After separation borders require additional post-processing to create objects and segments that describe elements present in the image.

There are also other methods of contour segmentation, for example, contour tracking method [8], which uses a point moving on a particular algorithm along the edges of the object, forming its outline.

Methods of growth areas and partition-merge operate mainly brightness thresholds.

In solving the problem of clustering to allocate different classes of commonly used method of fuzzy centers (fuzzy c-means) [8]. The main limitation of this method is that the number of classes in most cases need to know in advance. Another effective method is the method of allocation of areas of the watershed. The method operates exclusively with halftone images.

Grayscale images can be perceived as a kind of landscape - the brighter the pixel, the higher point of the surface. Segmentation problem is reduced to finding the minimum stable areas separated by areas of high stability. The disadvantages of this method include the fact that its effectiveness is low in images with lots of fine detail.

In conclusion, it should be noted advances in the use of other statistical techniques such as wavelet analysis and Markov models, which have recently been successfully applied to solve the problems of segmentation and image recognition.

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