Detect The Infected Medical Image Using Logic Gates

Baydaa J. Al-Khafaji
Computer Science/College of Education for Pure Science(Ibn-Al-Haitham)/
University of Baghdad

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Abstract

This paper determined the difference between the first image of the natural and the second infected image by using logic gates. The proposed algorithm was applied in the first time with binary image, the second time in the gray image, and in the third time in the color image. At start of proposed algorithm the process images by applying convolution to extended images with zero to obtain more vision and features then enhancements images by Edge detection filter (laplacion operator) and smoothing images by using mean filter ,In order to determine the change between the original image and the injury the logic gates applied specially X-OR gates . Applying the technique for tooth decay through this comparison can locate injury, this difference may be tooth decay or a broken bone , cancerous cells or infected gums, The X-OR gate is the best gates uses in this technique. Simulation program using visual basic has been in order to determine final results.

Keyword: image processing, logic gets, x-ray imaging, CT scanner, laplacion operator, mean filter convolution.

Introduction

Imaging technology in Medicine made the doctors able to see the interior portions of the body for easy diagnosis. It also helped doctors to make keyhole surgeries for reaching the interior parts without really opening too much of the body. Ultrasound and Magnetic Resonance Imaging took over x-ray imaging by making the doctors to look at the body's elusive third dimension. With the CT scanner, the diseased areas can be identified without causing either discomfort or pain to the patient. Converts scanner data into revealing pictures of internal organs. Image processing techniques developed for analyzing remote sensing data may be modified to analyze the outputs of medical imaging systems to get best advantage to analyze symptoms of the patients with ease [1] .

Image processing is computer imaging where application involves a human being in the visual loop. In other words the image is to be examined and acted upon by people.

The major topics within the field of image processing include: Image restoration, Image enhancement, Image compression and Image Restoration*s, the process* of taking an image with some known, or estimated degradation, and restoring it to its original appearance. Image restoration is often used in the field of photography or publishing where an image was somehow degraded but needs to be improved before it can be printed. Image Enhancement *Involves taking an* image and improving it visually, typically by taking advantages of human Visual Systems responses [2] .

One of the simplest enhancement techniques is to simply stretch the contrast of an image. Enhancement methods tend to be problem specific. For example, a method that is used to enhance satellite images may not be suitable for enhancing medical images. Although enhancement and restoration are similar in aim, to make an image look better. They differ in how they approach the problem. Restoration method attempts to model the distortion to the image and reverses the degradation, where enhancement methods use knowledge of the human visual systems responses to improve an image visually. Image Compression involves reducing the typically massive amount of data needed to represent an image. This done by eliminating data that are visually unnecessary and by taking advantage of the redundancy that is inherent in most images. Image processing systems are used in many and various types of environments, such as: Medical community, Computer - Aided Design, Virtual Reality, and Image Processing [3] .

Medical imaging characteristics

Imaging is the technique and process used to create images of the human body (or parts and function thereof) for clinical purposes (medical procedures seeking to reveal, diagnose, or examine disease) or medical science (including the study of normal anatomy and physiology). Although imaging of removed organs and tissues can be performed for medical reasons, such procedures are not usually referred to as medical imaging, but rather are a part of pathology.[4]

As a discipline and in its widest sense, it is part of biological imaging and incorporates radiology (in the wider sense) nuclear medicine, investigative radiological sciences, endoscopy, (medical) thermography,medical photography, and microscopy (e.g. for human pathological investigations).[5]

Advantages of digital processing for medical applications

- Digital data will not change when it is reproduced any number of times and retains the originality of the data.
- Offers a powerful tool to physicians by easing the search for re-preventative Images.
- Displaying images immediately after acquiring.
- Enhancement of images to make them easier for the physician to interpret.
- Quantifying changes over time.
- Providing a set of images for teaching to demonstrate examples of diseases or features in any image.
- Quick comparison of images.

Preprocessing of medical image

The preprocessing algorithm techniques and operators are used to perform initial processing that makes the primary data reduction and analysis task easier. They include operations related to:

- Performing basic algebraic operations on image.
- Enhancing specific image features.
- Reducing data in resolution and brightness.

Preprocessing is stage where the requirements are typically obvious and simple such as removal of artifacts from image or eliminating of image information that is not required for the application for example in one application we needed to eliminate borders from the image that have been digitized from film [7] .

Image algebra for medical image

There are two primary categories of algebraic operations applied to image:

1. **Arithmetic operations.**
2. **Logic operations**.

Addition, subtraction, division and multiplications comprise the arithmetic operations, While AND, OR and NOT make up the logic operations Tthese operations which require only one image and are done on a pixel by -pixel basis. To apply the arithmetic operations to two images, we simply operate on corresponding pixel value [11] .

Addition is used to combine the information in two images. Applications include development of image restoration algorithm for molding additive noise and special effects such as image morphing in motion pictures.

Subtraction of two images is often used to detect motion consider the case where nothing has changed in a sense the image resulting from subtraction of two sequential image is filled with zero a black image. If something has moved in the scene subtraction produces a nonzero result at the location of movement. Applications include object tracking medical imaging law enforcement and military applications.

Multiplication and **division** are used to adjust the brightness of an image. One image typically consists of a constant number greater than one. Multiplication of the pixel values by number greater than one will darken the image (brightness adjustment is often used as processing step in image enhancement).

The logic operation AND, OR and NOT form complete sat meaning that any other logic operation (XOR, NOR, NAND) can be created by a combination of these basic elements. They operate in abet wise fashion on pixel data.

A logic and is performed on two images suppose the two corresponding pixel values are (111) "10" one image and (88) "10" in the second image. The corresponding bit strings the logic operation AND and OR are used to combine the information in two images. They may be done for special effect, but a more useful application for image analysis is to perform a masking operation. Use AND and OR as a simple method to extract a region of interest from image, if more sophisticated graphical methods are not availed. A white square AND with an image will allow only the oprtion of the image coincident with the square to appear in the output image with the background turned block, and a black square OR with an image will allow only the part of the image corresponding to the black square to appear in the output image but will true the rest of the image white. This process is called image masking. The NOT operation creates a negative of the original image, by inverting each bit within each pixel value.

A proposed technique for medical imaging processing

The proposed algorithm three times was applied in the first time with binary image the second time in the gray image in the end was applying with the color image we apply the technique for tooth decay.

1- Loading two images the first one is the natural and the second is the injury.
2-Applying convolution (image extended with zero to obtain more vision and features from the image).
3- Enhancement both images by applying Edge detection filter (laplacion operator).
4- Smoothing the images by using mean filter (to reduce the effects of noise on images).
5- Applying (XOR, OR, AND) between the two images.
6-Final images (the result locates injury).

Conclusions

There is a number of conclusions can be derived from this paper the first one presents a new technique for Medical imaging processing by using logic gates to determine injury . Convolution can be used to implement many different operators, particularly spatial filters and feature detectors such as Smoothing to reduce the effects of noise on images eliminate small details. And blurred image produced by the pinhole camera. We note that the error area detected after applying (AND) in color image but(X-OR) with binary and gray images

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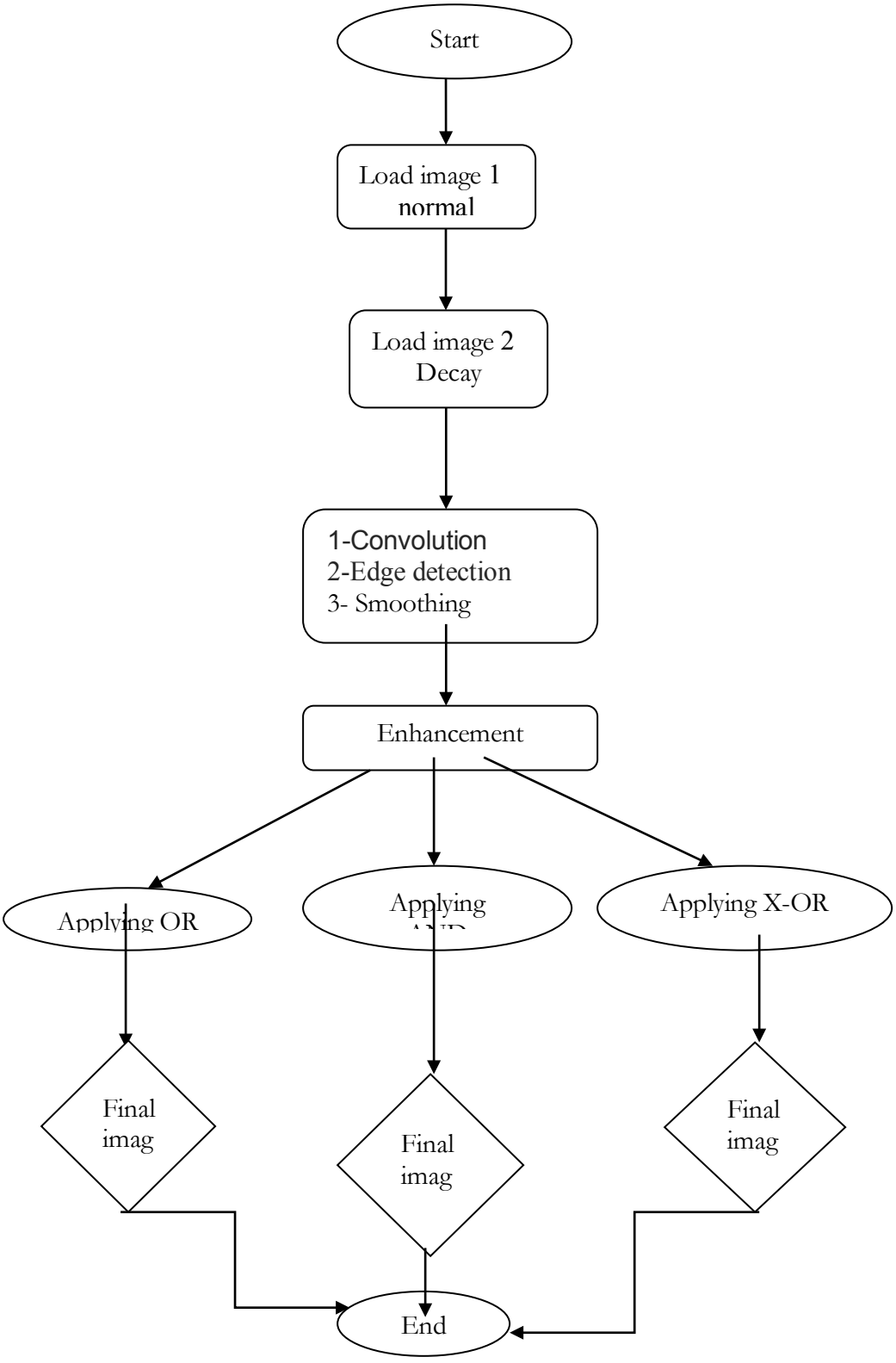

Figure No. (1) A proposed technique for Medical imaging processing

Figure No. (2) implementation technique

الكشف عن الاصابة في الصورة الطبية باستخدام البوابات المنطقية

بيداء جعفر صادق الخفاجي
قسم علوم الحاسبات\كلية التربية للعلوم الصرفة (ابن الهيثم)\ جامعة بغداد

استلم في 5ايار 2014، قبل في 1ايلول 2014

الخلاصة

في هذه الورقة،حدد الفرق بين الصورة الأولى الطبيعية ،والصورة الثانية المصابة باستخدام بوابات المنطق. الخوارزمية المقترحة طبقت ثلاث مرات في المرة الأولى مع الصورة الثنائية، ومرة ثانية في الصورة الرمادية، وفي نهاية المطاف كان تطبيق في الصورة الملونة في بداية الخوارزمية المقترحة علينا معالجة الصور عن طريق تطبيق الالتواء للصور للحصول على مزيد من الرؤية والميزات، ثم تحسين الصورعن طريق الكشف عن حافة التصفية (عامل لابلاسيون) ، وتجانس الصور باستخدام عامل تصفية ، بغية تحديد التغيير بين الصورة الأصلية والصورة المصابة باستخدام بوابات المنطق. من خلال هذه المقارنة يمكن تحديد موقع الإصابة، وهذا الفرق قد يكون تسوس الأسنان ،أو كسر العظام ،أو خلايا سرطانية ،أو إصابة اللثة، اجري التطبيق على صورة حدد فيها التسوس في الاسنان و باستخدام لغة البرمجة الفجوال بيسك.

الكلمات المفتاحية: معالجة الصور،الالتواء'التصوير الماسح الضوئي،البوابات المنطقية'الاشعة السينية'لابليسيون،