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A PATH FOR HORIZING YOUR INNOVATIVE WORK

CLEANING AND SEGMENTATION OF WEB IMAGES USING DENOISING TECHNIQUES

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Abstract: Visual information transmitted over internet in the form of digital images is becoming a major method of communication in the modern age, but the image obtained after transmission is often corrupted with noise. The received image needs processing before it can be used in applications. Image denoising involves the manipulation of the image data to produce a visually high quality image. This study reviews the existing denoising algorithms, such as filtering approach, and performs their comparative study. Different noise models including additive and multiplicative types are used. They include Gaussian noise, salt and pepper noise, speckle noise and Brownian noise. Selection of the denoising algorithm is application dependent. Hence, it is necessary that we have knowledge about the noise present in the image so that it's easy to select the appropriate denoising algorithm. The filtering approach has been proved to be the best when the image is corrupted with salt and pepper noise.

Keywords: Semantics, Web images, Segmentation, Sorting images, Denoising

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INTRODUCTION

Web image search engines on the Internet (e.g. Google, Yahoo!, Ask) now give access to more than two billions of images. However, these images have been indexed only with the text surrounding the images in the web pages, which often leads to inaccurate annotation and subsequently brings a lot of noise when retrieving images. A quick study on the 50 first images of 50 queries using a simple word to retrieve animals or man-made objects showed that for Google and Yahoo!, the two most used image search engines, the average noise is about 50%: half of the images returned are not related to the query.

The position of the object in the image is unknown, and manual segmentation would be too long to do, so we need automatic segmentation, _ some images are relevant, but the object of interest can be too small to allow proper feature extraction, which makes them useless for learning, on the contrary, the photography can have been taken too close to the object, so that only a part of it is visible.

We cannot assume that all images are relevant when segmenting, and try to deal with irrelevant images after the segmentation process. The capacity to reject irrelevant images using the segmentation results will be used to evaluate our segmentation algorithms.

However, for queries that come with too many noise when grabbing the images on the Internet, it shows poor performances. For example, we tried the query banana fruit expecting to obtain a group of images corresponding to yellow bananas. The 20 ‘‘best” images we obtain are shown in Fig.2.In fact, in the 100 first images from Yahoo! Image Search, after Removing clipart’s, there are only 20 images that contain a yellow central banana, which means that the noise is about 80%. Other images are mainly about banana trees (or other trees), pictures of several fruits together, or products derived from banana. For the segmentation, yellow has been identified correctly as an object color, but green, red and orange as well.

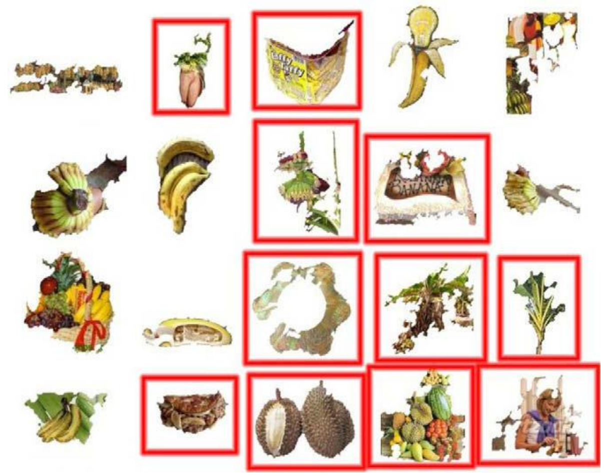

Fig. 2. The 20 first segmentation results for the query banana fruit. A red frame shows all the irrelevant and unnecessary images. There were not enough yellow banana in the images to allow the algorithm to identify yellow as the main color of interest. That happens with queries where the proportion of irrelevant images from the Internet image search engine is too high.

1. Problem Formulation

The basic idea behind this study is the estimation of the uncorrupted image from the distorted or noisy image, and is also referred to as image "denoising". There are various methods to help restore an image from noisy distortions. Selecting the appropriate method plays a major role in getting the desired image. The denoising methods tend to be problem specific. For example, a method that is used to denoise satellite images may not be suitable for denoising medical images. In this , a study is made on the various denoising algorithms.

The "Linear operation" shown in Figure 1. is the addition or multiplication of the noise $n(x,y)$ to the signal $s(x,y)$ [Im01] (Refer to Chapter 2 for a detailed discussion). Once the corrupted image $w(x,y)$ is obtained, it is subjected to the denoising technique to get the denoised image $z(x,y)$. The point of focus in this thesis is comparing and contrasting several "denoising techniques".

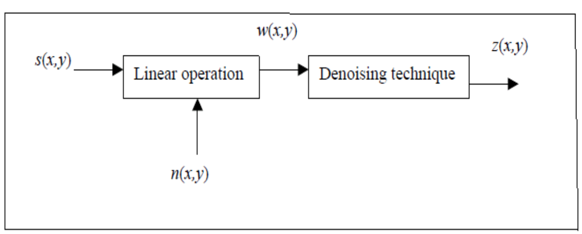

Fig.: Denoising Concept

Three popular techniques are studied in this thesis. Noise removal or noise reduction can be done on an image by filtering, by wavelet analysis, or by multifractal analysis. Each technique has its advantages and disadvantages.

2. Types of Noise

2.1Additive and Multiplicative Noises

Here, we discuss noise commonly present in an image. Note that noise is undesired information that contaminates the image. In the image denoising process, information about the type of noise present in the original image plays a significant role. Typical images are corrupted with noise modeled with either a Gaussian, uniform, or salt or pepper distribution. Another typical noise is a speckle noise, which is multiplicative in nature.

Noise is present in an image either in an additive or multiplicative form [1].

An additive noise follows the rule

$w(x, y) = s(x, y) + n(x, y)$,

While the multiplicative noise satisfies

$w(x, y) = s(x, y) \times n(x, y)$

Where $s(x,y)$ is the original signal, $n(x,y)$ denotes the noise introduced into the signal to produce the corrupted image $w(x,y)$, and (x,y) represents the pixel location.

CONCLUSION

In this study, we have focused on the denoising of images using the linear and nonlinear filtering techniques where linear filtering is done using the mean filter and the LMS adaptive filter while the nonlinear filtering is performed using a median filter. These filters are good for removing noise that is impulsive in nature. The mean filters find applications where a small region in the image is concentrated. Besides that implementation of such filters is easy, fast, and cost effective. It can be observed from the output Images that the filtered images are blurred. The median filter provides a solution to this. From our experimentation, it has been observed that the filtering approach does not produce considerable denoising for images corrupted with Gaussian noise or speckle noise.

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