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Research paper

New methodology for indexing and extracting images

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Abstract

Indexing and image retrieval has become an interesting area of research today because of the lack of advanced methodologies for indexing and extracting images and the existence of huge amounts of images available everywhere; especially on the web. The available solutions are able to find similar items having the exact shape but not the same item if it has a different shape. In this paper, a new method has been proposed for indexing and extracting images from a database or a folder of images. This database consists of a table of images which contains the paths of the images then we begin the comparison between these images, from this comparison the program displays the percentage of the differences between the images and whether the images are the same or not. The proposed methodology is clever in the way the recovery of images leads to a comparison between images from the pixel. In addition to this, the proposed solution will be able to recognize whether two images having the same shape or not.

Keywords: *Indexing; Retrieval; Extracting; Images; Shape.*

1. Introduction

The number of pictures has been growing enormously with the existence of digital cameras. Storing those huge amounts of images is not a disability with the existence of new hard disks that can stock up to Terra's of Bytes. Picking a photo of a bulb for instance from those set of images stockpiled on a hard disk is a handicap. Subsequently retrieving images in a quick and relative way is a must. To retrieve an image you are looking among between plenty of different images each of which containing items unrelated (Fig. 1) is a very hard task if images were not indexed prior to storing them on the hard disk or even prior to searching for any of them. Image indexing and retrieval is a very important task in many various fields like Crime prevention, Military, Architectural and Engineering design, Medical and diagnosis, remote Sensing systems and many others.

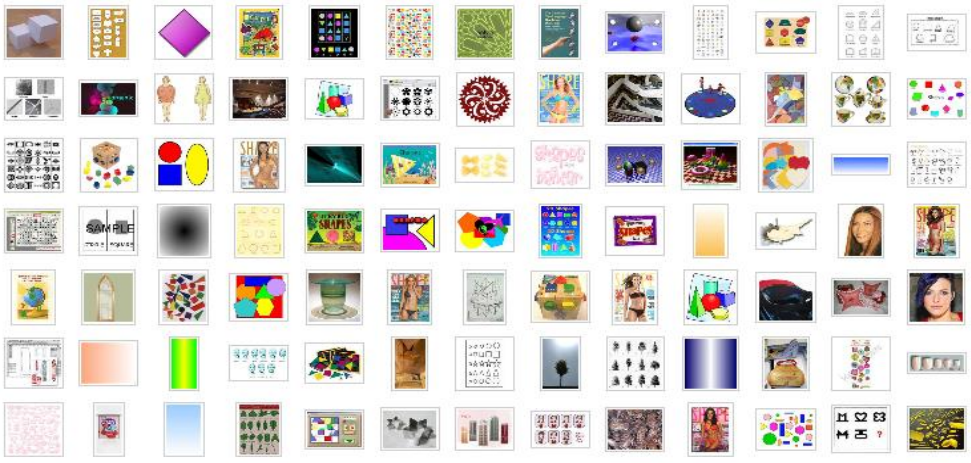


Fig. 1: Collection of Images.

Many Techniques to index and/or retrieve images exist and are to be introduced in the following second paragraph. Some of those techniques are very efficient to identify a specific item that is taken in a picture alone [1]; some other techniques are capable of segmenting and extracting the variety of items that exist in a certain picture; then processing each item for identification [2].

Image features can be textual like the tags manually set all through the web or visual significant to low level feature like colors or shapes such as red or triangle. Human beings search for images using a semantic search like "light bulb".
Moreover, if one uses any of the available methods to search for a bulb (Fig. 2), he/she will be find nothing, even with an important threshold because any object could be redesigned with a new

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shape even within the same company. Subsequently, with a high tolerance the unidentified item will not be found. No matter how the created algorithm is, it will always be looking for similarity between images because it is not interpreting the image content. Whether using Content Based Image Retrieval (CBIR) or Description Based Image Retrieval (DBIR), none of the existing methods can identify any similarity between the light bulbs in Figure 3.



Fig. 2: Light Bulb.



Fig. 3: Different Light Bulb Shapes.

The aims of this paper are numerous. On the one hand, comparison of images using pixels then it shows the percentage of the difference between the two images then the program checks us if the two images are the same or different, on the other hand we can compare two images then the result will be displayed in an image box depending on the color if the color is white so these pixels is identical if red so are different.

2. Related works

In this paragraph, the most important techniques are to be exploited. Researchers in the field of computer vision arise the problem of automatically indexing images by their content, which allows the search of images by the content (CBIR). This new technique overcomes the problems posed by textual research, and allows improve interrupted applications and also helps bring out new applications in various fields [3]. The CBIR differs from the search for textual information essentially by the fact that the image databases are unstructured, the digital images being only matrices of pixel intensities, without meaning inherent to each other. Which explains that one of the key issues in any kind of image processing is the extraction of useful information from these pixel arrays, before even begin to make assumptions about the content of the image [4]. The performance of image search systems depends on much of the choice of descriptors and techniques associated with their extraction. A descriptor is defined as the knowledge used to characterize the information contained in the images [5].

To characterize the shapes in an image, Jain and Valaya [7] out proposed to use a histogram of orientation of the gradients on the contours (EOH Edge Orientation Histogram). A first contour detection step isimplemented using the canny oper ator - Deriche [8, 9]. For each pixel belonging to a contour, we accumulate the orientation of its gradient in a histogram me. The orientations are quantified on n bins. In order to partially mitigate the effects of quantization, the histogram is smoothed. Each bin is actually associated with the average of its value and those of the two adjacent bins. This descriptor is invariant to the translation, but, of course not to the rotation.

On the other hand, Ferecatu [10] in his thesis proposed a descriptor of forms inspired by the Hough transform (to detect lines in a picture). This descriptor works on the grayscale image. For each pixel, we use the orientation of its gradient as well as the size of the projection of the pixel vector on the axis tangent to the gradient. These two information is captured in a two-dimensional histogram. It also proposes a texture descriptor. This descriptor is based on 2D Fourier transform of the image. After getting the transform of image, two separate histograms are calculated on the amplitude of the Fourier transform.

As for Hu [1 1], he proposed several nonlinear functions defined on geometric moments that are invariant to translation, to rotation and changes of scale. These descriptors have been applied with success to the identification of aircraft, ships and faces. In this category we will also find the Fourier descriptors that describe the contour by its frequency components, the moments of Zernike and Zernike modified, which have been adapted by many authors [12]. These invariant moments, which can be extracted from a binary image or a grayscale image, usually offer properties of reconstructability, which ensures that the primitives extracted contain most of the information included in the form studied. Oliva and Torralba [13], are based on the way in which the vision human perceives the general structure of a scene. It appears in their experiences that the general appearance of an image is viewed in a rather coarse, regardless of the many details that may appear.

Thus, the fact that an image is particularly blurred prevents from perceiving details, but nevertheless allows understanding the overall structure of the image. They therefore propose to calculate a shape descriptor on reduced images in square images, of a size between 32x32 pixels and 128x128 pixels. The reduced images are then divided into one regular grid of 4 regions of height and 4 regions of width. Finally, a descriptor is calculated for each of the 16 regions obtained. This descriptor is based on gradient orientation histograms, also widely used for local description of images that allow capturing in a compact but precise way the overall shape an image region by characterizing the orientation of the different contours who appear there. As well as the shape, the texture is a fundamental characteristic image because it concerns an important element of human vision. Of Many methods have been proposed in order to define descriptors characterizing this concept as rich as it is complex. One of methods of describing the texture most used for research of images by the content is based on the frequency properties as the Fourier transform, the Gabor representation, the wavelets and the transformed into discrete cosine [14].

The filters Gabor are widely used today, especially because their relevance to the human visual system. Indeed, Marcelja [15] showed that cells of the human cortex could be modelled by functions of Gabor. A dimension. The main idea of the method of Gabor is to decompose the image on analytic functions obtained from a sinusoidal function oriented on the x axis and modulated by a Gaussian envelope in the x and y directions. This decomposition was used by Manjunath and Ma [16] for indexing by

textures. The idea of using wavelets in image search by content is not new. In his thesis, Landré [17] proposed a technique of multi-resolution decomposition of images using the analysis in wavelet using the algorithm scheme facelift. He uses a classification automatic image to build a visual search tree. This technique is close to the method of Bouman et al. [18] who uses a quaternary search tree for navigation.

Avinash and Meshram present the efficient content based image retrieval systems which employ the color, texture and shape information of images to facilitate the retrieval process. For efficient feature extraction, they extract the color, texture and shape feature of images automatically using edge detection which is widely used in signal processing and image compression. For facilitated the speedy retrieval they are implements the antipole-tree algorithm for indexing the images [19]. Text data present in multimedia contain useful information for automatic annotation, indexing. Extracted information used for recognition of the overlay or scene text from a given video or image. The Extracted text can be used for retrieving the videos and images. they are discussed the different techniques for text extraction from images and videos. Secondly, they are reviewed the techniques for indexing and retrieval of image and videos by using extracted text [20].

The digital comic book market is growing every year now, mixing digitized and digital-born comics. Digitized comics suffer from a limited automatic content understanding which restricts online content search and reading applications. [21] shows how to combine state-of-the-art image analysis methods to encode and index images into an XML-like text file. Content description file can then be used to automatically split comic book images into sub-images corresponding to panels easily indexable with relevant information about their respective content. This allows advanced search in keywords said by specific comic characters, action and scene retrieval using natural language processing. We get down to panel, balloon, text, comic character and face detection using traditional approaches and breakthrough deep learning models, and also text recognition using LSTM model.

One of the most important applications of remote sensing is presented in mining and exploration of mineral deposits and evaluation of prospective targets. [22] discusses how to use remote sensing knowledge in order to make classification and separation of surface rocks in the Dir-o-Morreh mine. The main purpose of this research is to identify the areas containing high-quality basalt. In this regard, they utilize ASTER multi-spectral satellite imagery, which has relatively good spectral and spatial resolution. At the first step, in order to achieve the correct spectral composition of the basalt spectrum, the spectral signature of basalt stone, defined by Johns Hopkins University, was used. Afterward, the basalt extraction index (BEI) was defined regarding the behaviour of the ASTER satellite image bands as well as the initial data provided by the owners of the intended study area. Then, the Convolution and Morphology filter was applied over the images to extract high-quality basalt using an appropriate color composition of the images. At the next step, in order to have better visualization, different maps containing different classes were created using the Maximum Likelihood algorithm. Finally, two indices were developed regarding all research data and field investigations in order to extract basalt zones. The first index discovers basalt zones in the study area, and the second one classifies high-quality basalt and altered basalt zones.

3. Architecture of our system

In this paragraph, we present the architecture of our system that allows to index images from a database or from selected images. In this flow chart (Fig. 4), shows the structure of our system step by step, it is divided into two parts, Compare and Capture Image.

In the first part there are 3 choices (Compare i to i – Compare Color – Compare All):

- In the first choice, we can compare one image by another, the program displays the percentage the difference between them and check, whether the two images are identical or not.
- In the second choice can compare two images, the program displays in an image box white color if a pixel in the first image is the same in the second image and the color red if not, and see if the two images are identical or not.
- In the third choice, a number of images are compared with a selected image, at using a timer to automatically compare and display the percentage of the difference between them and check whether the two images are different or not.

Finally, in these three choices it is necessary to select: a database which consists of the table contains the paths of the images or an image folder, and then an image that she wants to be compare, comparison after the program checks if the image does not exist in the database, it will be saved automatically in the database.

In the second part, there is one choice (Image Capture):

- - we can select a record of images or e database then starts webcam of a computer, followed we capture an image, then it was compared with the images of the database or the file images then the program displays whether the two images are identical or not, finally we can save this image in a folder.

Text Extraction plays a major role in finding vital and valuable information. Text extraction involves detection, localization, tracking, binarization, extraction, enhancement and recognition of the text from the given image. These text characters are difficult to be detected and recognized due to their deviation of size, font, style, orientation, alignment, contrast, complex colored, textured background. Due to rapid growth of available multimedia documents and growing requirement for information, identification, indexing and retrieval, many researches have been done on text extraction in images. Several techniques have been developed for extracting the text from an image. [23] discusses various schemes proposed earlier for extracting the text from an image. This paper also provides the performance comparison of several existing methods proposed by researchers in extracting the text from an image.

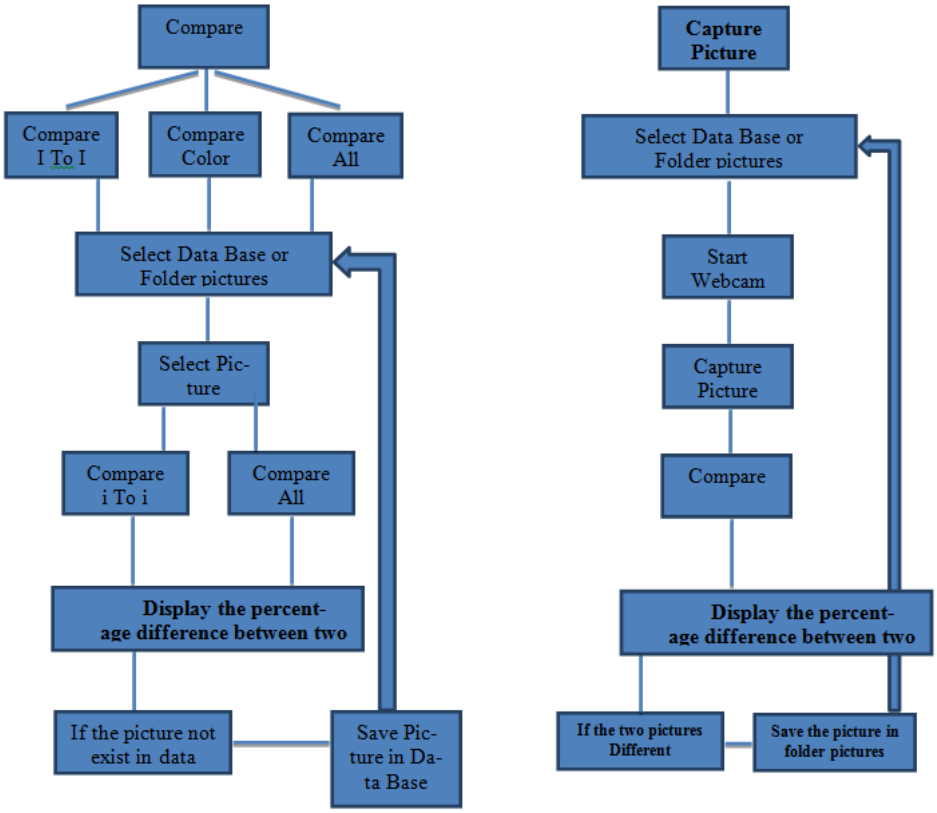


Fig. 4: Functionalities of Our System.

4. Simulation and validation

In this paragraph, we present simulation and validation of our system. In this following form (Fig. 5), we clicked SELECT DB (Database) or SELECT IMAGES to load an d images in the combo box and click on SELECT PICTURE to load an image to check if it could be compared, then click the Compare button and we observe that the percentage is 100 so the two images are identical.

At the end of the comparison if the image that has been compared does not exist in the database, immediately the program save it in the database then it displays a message to show us that save it is Success (Fig. 6).

If we click on Compare Color we get this form (Fig. 7), one can select the database or the folder of images and load r in the combo box, then we select an image we want compare, then click on Compare I To I to compare image by another image or Compare All to Compare all images automatically using timer, finally it displays in an image box the white color is to say that the two images are identical.

In Figure 8, it is observed that the two images are different and it displays in another image box the red color that is to say that this pixel is different in the images and the white color means that the pixels are identical.

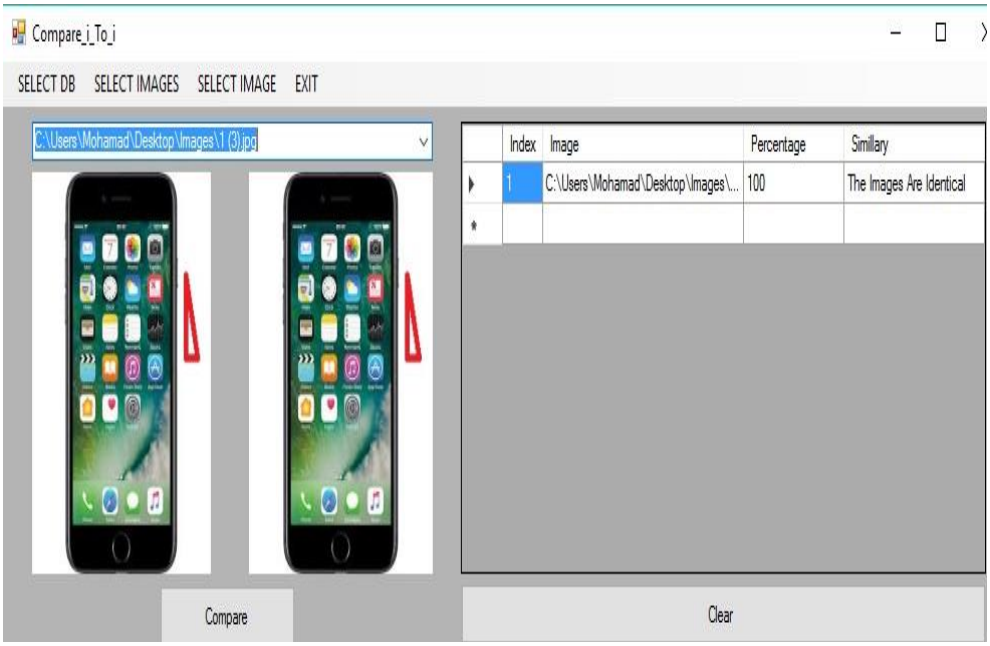


Fig. 5: Identical I to I Compare.

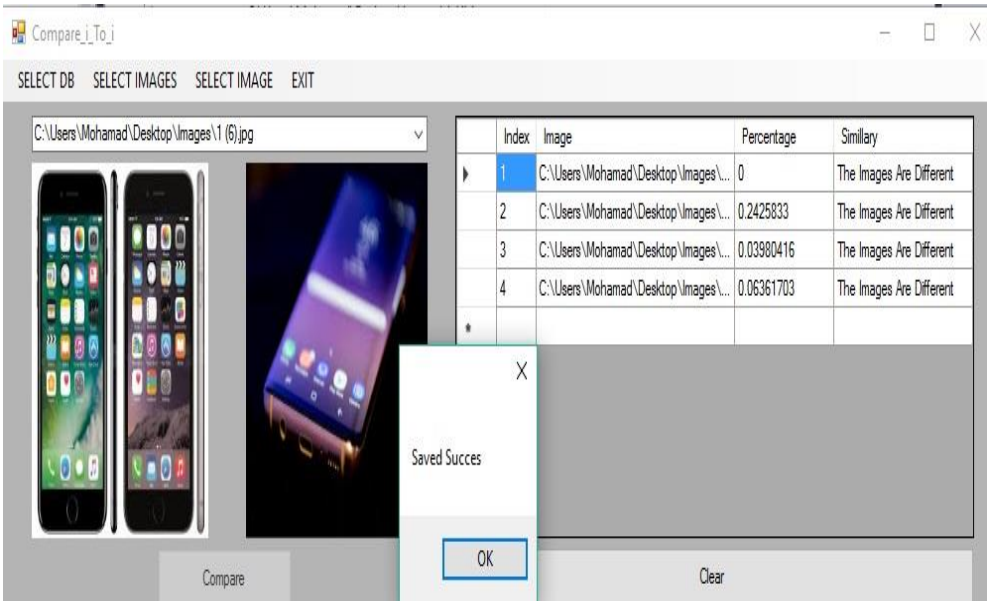


Fig. 6: Compare IT o I Save.

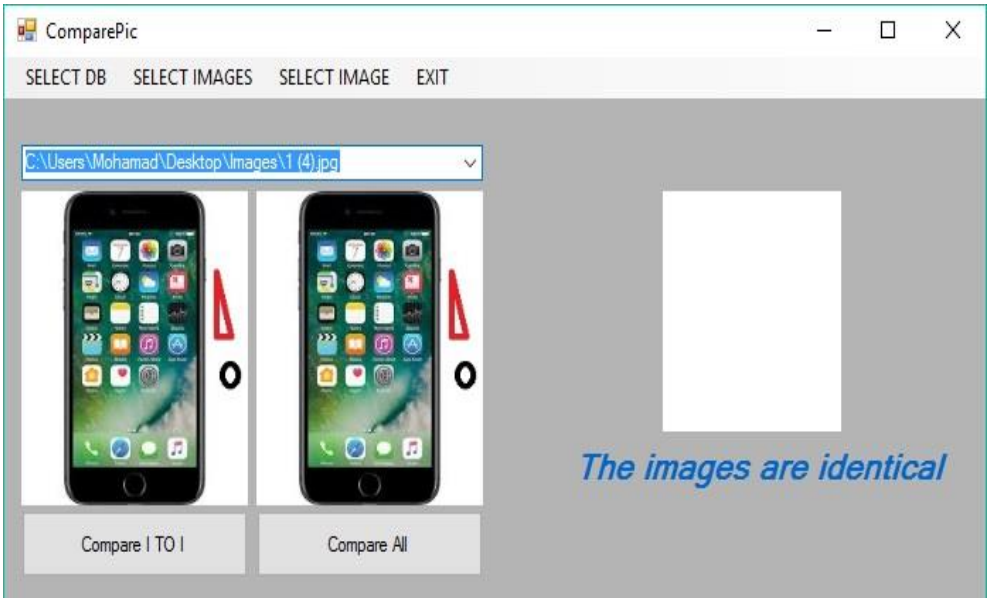


Fig. 7: Compare I to I identical.

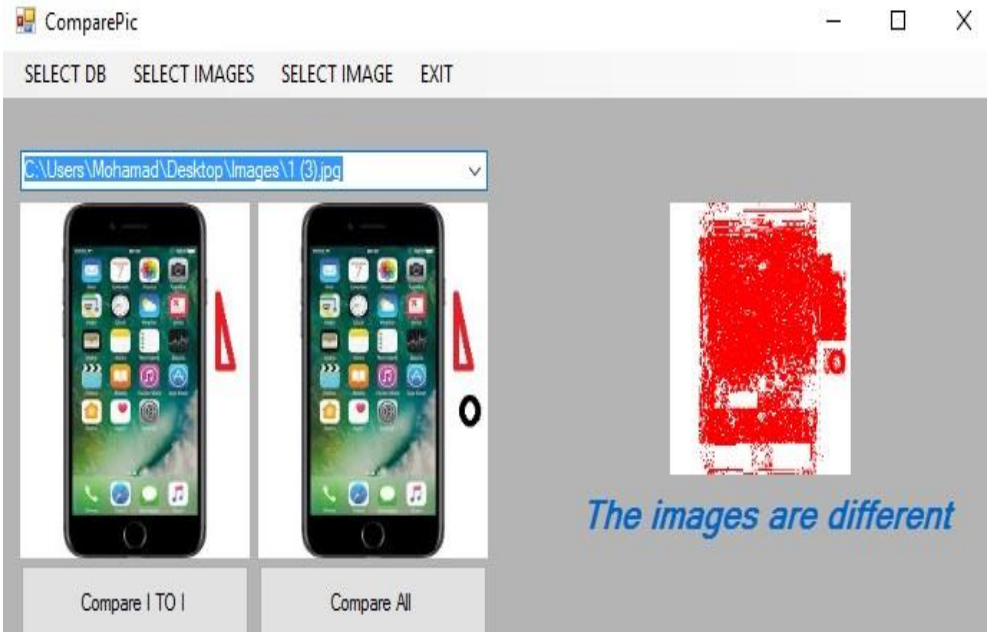


Fig. 8: Compare Colour Different.

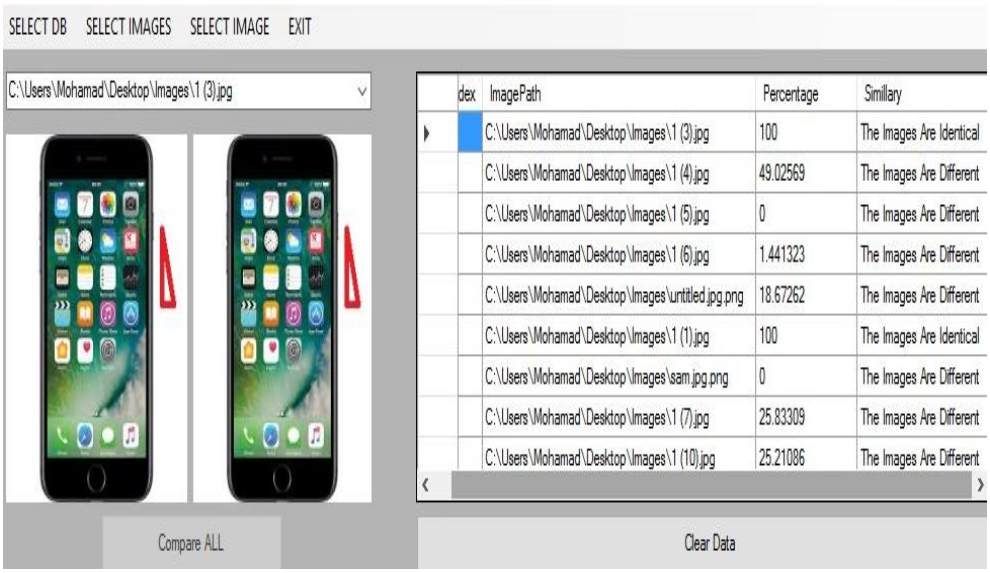


Fig. 9: Compare All.

We can select the database or a folder of images, then an image that he wants Compare and we tap on the Compare All button, this comparison is done automatically and displays the percentage of difference between two images and whether if the images are Identical or not (Fig. 9).

5. Conclusion

In this paper, the problem of identifying a single object with different designs like the bulb is solved. Working with non-complete objects and objects to index and retrieve objects using human cognitive learning was a new concept of indexing and image retrieval; other methods extract features, but store images, while we extract features and images indexed based on these features.

We are still far from cloning exactly all the features with the smallest details. Another advantage is the ability of this method to learn by indexing the desired sample in the mesh for future use; the more we search for using this algorithm, the larger the database, which allows us to give more accurate results over time.

The method is a comparison between-pixel images on any image width and languor, finally we get a result for comparison if these images are identical or not.

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