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Optimized Analysis and Storing of Images-QR Code Driven Approach

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Abstract

This Research paper gives a method of storing images and efficient searching method for it using QR Codes [1-3]. QR codes are easily readable by the machines which enables fast response from machines, efficiently giving the desired output. This storage method optimally manages the space required to store an image without any loss of data and it also focuses on the Privacy Specialization for more insight of an image which in turn is an advantage in many fields like crime, archaeology, medical etc., where images are used to reveal useful information for their domain [4-8]. Using image mining the machine can find the relationship between the data of images. It can extract the keen knowledge about the images with the help of image mining we can classify, aggregate, and store the images. In image comparison it compares the details of an image with a large set of images to find the required one quickly and accurately [9-10]. Image mining is an efficient way to access an image and searching the stored images [11].

Keywords: *Image Mining, Image Segmentation, Privacy Specialization, Splitting of Images, Retrieval, Quick Response (QR) Codes, Image Strips, Indices, Pre-process.*

Introduction

Image mining works on the extracting patterns, knowledge and information from large set of images. In today's data driven era images play a pivotal role in diverse domains like healthcare, surveillance, entertainment, scientific research etc., which uses images for X-rays, MRI's, endoscopy, License plate recognition, CCTV footages etc. The immensity and complexity in image datasets create challenges in efficient retrieval, storing, analysis and interpretation of images. The main goal of image mining is to uncover the hidden patterns, information and get insight of images. Despite of advancements in image mining field which uses latest techniques which utilizes computer vision, machine learning, to mine the images, there are still some challenges faced in this field when it comes for storing, retrieval and maintaining the security of images.

This paper contributes a technique of image mining which carries out the mining process efficiently and accurately. The technique employs QR codes for the efficient searching process. These quick response codes are used because it is easily readable by machines and can store vast amount of information in a 2-D space, it is also acting as an encrypted form of an information which enhances the security of information. This technique uses the mapping concept in set theory where we check whether elements of one set is mapped to

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the codomain set. The same mapping concept is used here, where an image is checked in the dataset whether it is present or not with the help of QR codes. In this approach, the images are segmented into 360 pieces and then stored. By this splitting of images, we can reduce the space of storage, especially in scenarios where storage resources are limited or need to be used efficiently and concentrate on specific elements within the image.

In inference, the exploration of Optimizing Storage and Analysis of images – QR driven approach gives an efficient technique to this approach, which employs the method of splitting the images and then searching it with the help of QR codes. The use of the proposed technique can be mainly used in "Privacy Specialization", which means to focus on a particular area of an image to gain more insight knowledge of that area which is going to provide the main content of the image provided for analysis. The fore coming sections delves into the topic and gives the method and ideas on what basis it is working and its novelty in this domain.

Algorithm

Step 1: Import the necessary Python modules.

Step 2: Creating a GUI for the user to select the necessary images for Preprocessing (Input images for searching and also input for searching)

Step 3: Preprocessing is done – The selected images and split into 360 pieces by considering the vertical and horizontal size.

Step 4: Creating an empty list for accessing the strips later in the same program, also it creates an empty folder to store the split image strips/parts.

Step 5: Adding the split image strips into the list and the folder created.

Step 6: Randomly select 20 pieces (it can be changeable) indices from the input pieces.

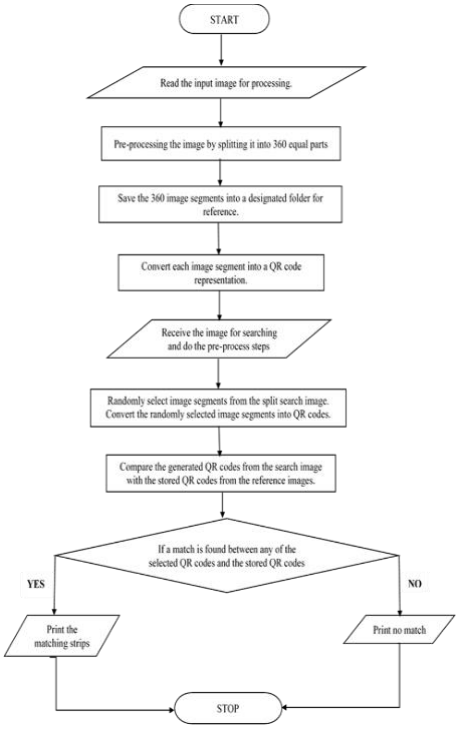
Step 7: For the selected random 20 pieces convert it into QR code and compare the same corresponding piece's QR code.

Step 8: If both QR codes matches, print that the input image matches all original images.

Step 9: Display the matching pieces (both image and QR code).

Step 10: End

Flowchart



Output

```
for original_image_path in original_image_paths:
    original_image = Image.open(original_image_path)
    original_piece_width = original_image.width // cols
    original_piece_height = original_image.height // rows
    image_name = os.path.splitext(os.path.basename(original_image_path))[0]
```

Figure 1: Code for Splitting the Images

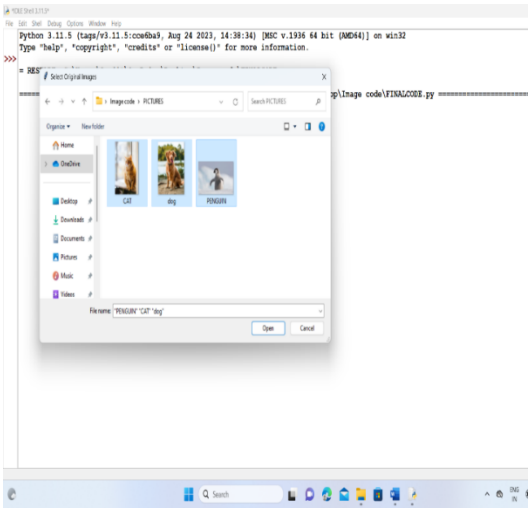


Figure 2: Selecting the Images to Save in Folder

Figure 3: Original Image Before Code Processing - Penguin

Figure 4: Original Image Before Code Processing – Cat

Figure 5: Original Image Before Code Processing – Dog

Fig 1 is the lines of code that splits the images into 360 pieces. Here, it splits the images horizontally and vertically, then stores the images. Fig 2 indicates the images that are selected to be stored in the dataset, here three images Fig 3 Penguin, Fig 4 Cat, Fig 5 Dog are selected to be split and stored in the dataset. These images will be split into 360 pieces by the code shown in fig 1 and then will be stored in a separate folder.

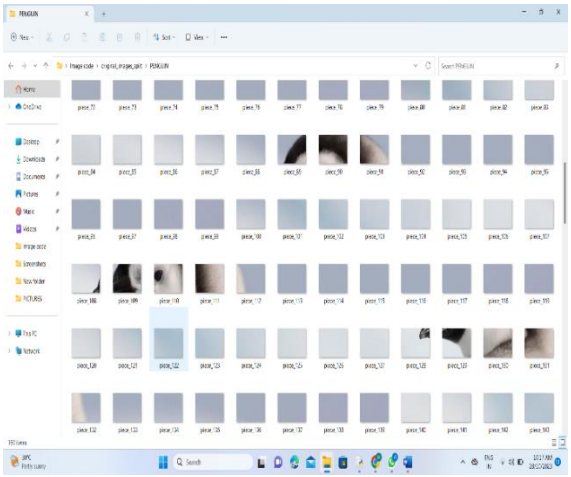


Figure 6: Output of the Sliced Images in Specific Folder (Penguin)

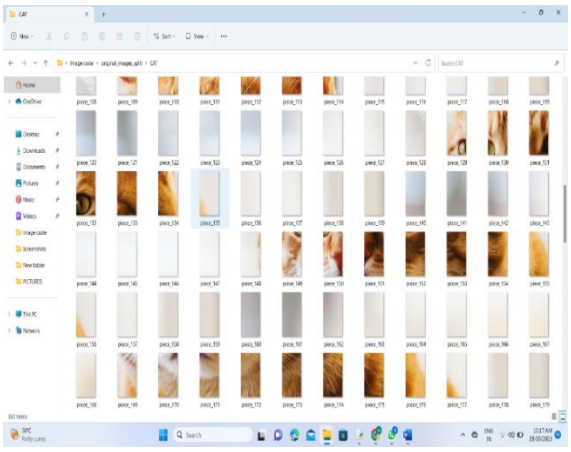


Figure 7: Output of the Sliced Images in Specific Folder (Cat)

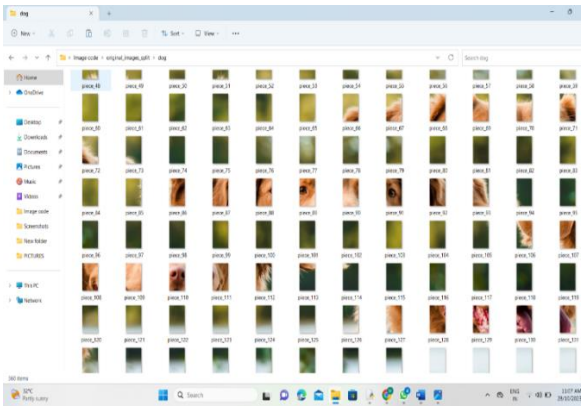


Figure 8: Output of the Sliced Images in Specific Folder (Dog)

Fig 6, Fig 7, Fig 8 are the split pieces of the input images (Fig 3, Fig 4, Fig 5). The images are split into 360 pieces and are named with numbers from 0-359, for later accessing of the pieces to get more insight about the image.

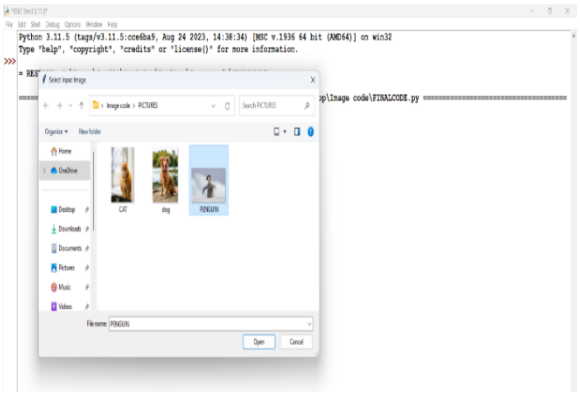


Figure 9: Selecting A Particular Image for Searching -Penguin

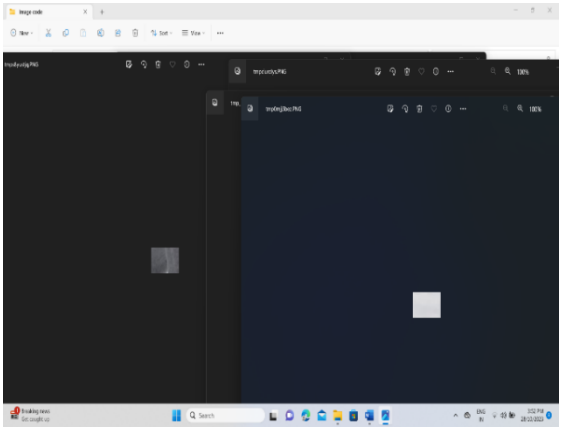


Figure 10: Output 1- Images Matching in the Dataset are Shown

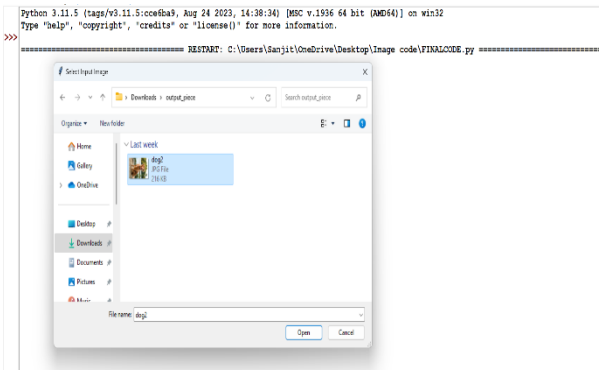


Figure 11: Selecting Another Image for Searching-Dog (Roatated)

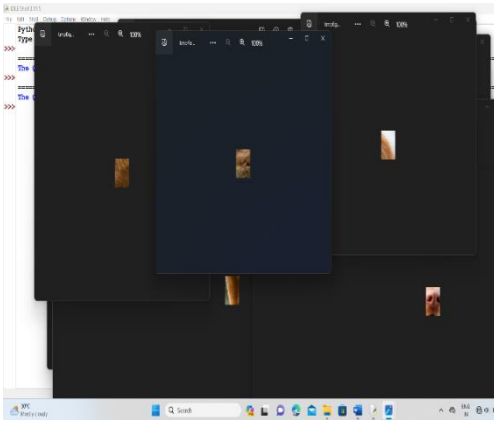


Figure 12: Output 2- Images Matching in the Dataset are Shown

Fig 9 and 11 shows that the images are selected for searching and checking whether it is present in the dataset or not. In the Fig 9 the same penguin image which is in the dataset is selected but, in Fig 11 the image selected is rotated towards left but the image in the dataset is in portrait way. In Fig 10 the matching pieces for the penguin is shown. Even though the image of the dog is rotated and is different from the image in the dataset it still matches with the QR code and displays the matching pieces. Thus, this technique serves as an optimal one for storing and retrieval of an image in the stored dataset and can serve various application in different domains of field.

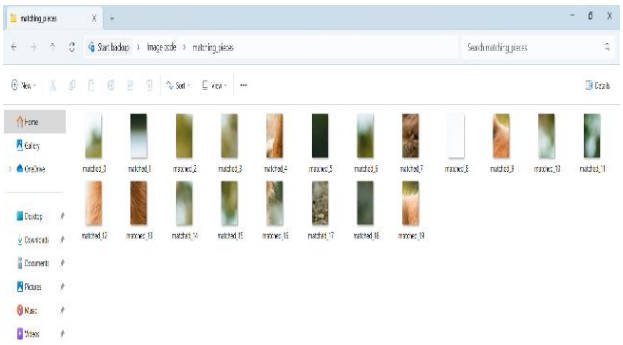


Figure 13: Matching Pieces in the Datset

Fig 13 shows the matching pieces in the dataset that matches the image given to search. These images provide an insight knowledge about the image and can be used for the analysis of the image.

Novelty

- Breaking down an image into smaller pieces facilitates a more in-depth analysis of particular required bits of data, enhancing the sharpness and clarity of individual elements.
- By isolating particular portions of given image, it is simpler to concentrate on certain elements, facilitating thorough inspection and analysis.
- Segmenting enables a focused search within discrete zones, simplifying the process of uncovering relevant data when looking for specific portion within an image.
- By dividing images into smaller pieces, parallel processing allows for the simultaneous analysis of numerous regions, which can greatly speed up the overall process.
- Different processing methods can be needed for various image segments. Splitting enables the use of particular algorithms designed for the properties of each sections.
- The conversion of images into QR codes enables most accurate comparison which yields results with full accuracy.

Future Works

- Images can differ depending on the resolution, and other elements. Even if the underlying material is similar, slight variations in these factors might result in prominently distinct aesthetic appearances. So, comparison by the sections of images may fail.
- To solve this issue, we have converted the sections into QR code for efficient image comparison. The random selection of 36-250 pieces of image and direct comparison between them may lead to false results.

Conclusion

In summary, our project has successfully used an original strategy for image analysis and recognition. We've tapped into the potential of data segmentation and encoding by slicing the photos into 360 pieces and turning each slice into a QR code. We have developed a special and effective system for image comparison and recognition using this technique. Additionally, our experiment demonstrates the potential uses of this method in a number of

industries, such as visual forensics, content identification, and data retrieval. The capacity to divide up photos into more manageable chunks and compare them at greater detail offers up new possibilities for image related technology. There is a lot of a chance for more study and methodological improvement as we go forward. Our picture searching system's accuracy and speed could be improved by experimenting with new algorithms, streamlining the matching process, and using machine learning strategies. Additionally, taking into account real-world applications and industry-specific use cases might assist in adjusting the technology to specific requirements.

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