An Approach for Identification of Objects from Object-Based Images using CBIR

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Abstract— In the field of Image Processing, identification of the multi-objects in a single image is one of the challenging task to provide the suitable solution. The challenges come across this type of detection are accurate distinguishing of one object from another and providing solution to objects oriented in multiple views in different images. Cluttering is also one of the drawbacks in the identification of the object based images. As a solution to that, Content Based Information Retrieval [CBIR] will helps in detecting multiple objects in their multiple angular view. One of the advantages of CBIR is that it could analyze the images by doing segmentation. It will extract the unique surface features from each object like colour, shape, size and position of the object. Based on this information, it’s going to identify different objects from the same image. In proposal model, it is going to provide a novel solution for multi viewed, multi object identification in the retrieved images is going to be provided with the help of Content based Image Retrieval (CBIR).

Key words: Content Based Image Retrieval, Feature Extraction and Object Identification

I. INTRODUCTION

In recent years, we have seen the successful development of several novel content-based retrieval (CBR) systems. CBR systems allow users to query a media database using item content as opposed to text-based information. Such text based query mechanisms frequently lack the descriptive power provided by a content-based approach. A survey of the state of the art in CBIR can be found in (1). Moreover, several CBR systems have had great success by focusing on domain-specific media. By having a narrow focus domain-specific features can be extracted from the imagery and used for retrieval; samples of geospatial imagery retrieval systems include those in the literature survey papers. CBR systems provide one mechanism for identifying nearest neighbours in some feature space or within multiple feature spaces—as will be discussed in this paper.

In various computer vision applications widely used is the process of retrieving desired images from a large collection on the basis of features that can be automatically extracted from the images themselves. These systems called CBIR (Content- Based Image Retrieval) have received intensive attention in the literature of image information retrieval since this area was started years ago, and consequently a broad range of techniques has been proposed. The extraction task transforms rich content of images into various content features. Feature extraction is the process of generating features to be used in the selection and classification tasks. Feature selection reduces the number of features provided to the classification task. Those features which are likely to assist in discrimination are selected and used in the classification task. Features which are not selected are discarded.

These three activities, feature extraction is most critical because the particular features made available for discrimination directly influence the efficacy of the classification task. The end result of the extraction task is a set of features, commonly called a feature vector, which constitutes a representation of the image. Many people have started to work with different applications in the multimedia field, generating huge databases of multimedia information (such as images, videos, etc). This information needs to be accessed by other applications or users. To support this issue, new fields of research have appeared. For instance, the one that involves access to static images in databases is known as image retrieval. Image retrieval systems are defined as those systems that find all images in a given database depicting scenes of some specified type. This type is usually given (pre-selected) by a supervisor or user. These user specifications are known as queries.

The task of finding correspondences between two images of the same scene or Object in (3), is part of many computer vision applications. Camera calibration, 3D reconstruction, image registration, and object recognition are just a few. The search for discrete image correspondences—the goal of this work—can be divided into three main steps. First, ‘interest points’ are selected at distinctive locations in the image, such as corners, blobs, and T-junctions. The most valuable property of an interest point detector is its repeatability, i.e. whether it reliably finds the same interest points under different viewing conditions. Next, the neighbourhood of every interest point is represented by a feature vector. This descriptor has to be distinctive and, at the same time, robust to noise, detection errors, and geometric and photometric deformations. Finally, the descriptor vectors are matched between different images. The matching is often based on a distance between the vectors.

The remainder of this paper is organized as follows: Section 2 discusses related work, whereas Section 3 illustrates our tag suppression mechanism. Section 4 Object identification techniques and in Section 5, it is mainly deals with the Image retrieval system, whereas performance results are reported and discussed in Section 6. Section 7 concludes the paper and outlines future research directions.

II. RELATED WORK

An important step in content-based image retrieval is finding an interesting object within an image. (1) propose a method for extracting an interesting object from a complex background. Interesting objects are generally located near the centre of the image and contain regions with significant colour distribution. The significant colour is the more frequently co-occurred colour near the centre of the image.
than at the background of the image. A core object region is selected as a region a lot of pixels of which have the significant colour, and then it is grown by iteratively merging its neighbour regions and ignoring background regions. The final merging result called a central object may include different colour-characterized regions and/or two or more connected objects of interest. The central objects automatically extracted with our method matched well with significant objects chosen manually.

The goal of the (2) is to create image retrieval system based on image objects. In the context of Rough Set Theory we introduce an accurate Object-Based Image Retrieval (OBIR) system that can handle image-based queries, and presents an efficient algorithm to retrieve images from large databases, by defining novel image feature called Object Similarity Ratio used in the proposed system. In [3], present a novel scale- and rotation-invariant interest point detector and descriptor, coined SURF (Speeded Up Robust Features). It approximates or even outperforms previously proposed schemes with respect to repeatability, distinctiveness, and robustness, yet can be computed and compared much faster.

The aim of (4) is the Content-Based Image Retrieval (CBIR) system, also known as Query by Image Content (QBIC), is to help users to retrieve relevant images based on their contents. CBIR technologies provide a method to find images in large databases by using unique descriptors from a trained image. The image descriptors include texture, colour, intensity and shape of the object inside an image. Several feature-extraction techniques viz., Average RGB, Colour Moments, Co-occurrence, Local Colour Histogram, Global Colour Histogram and Geometric Moment have been critically compared in this paper.

In (4) also propose an improvement in image retrieval performance by introducing the idea of Query modification through image cropping. It enables the user to identify a region of interest and modify the initial query to refine and personalize the image retrieval results.

In (5), CBIR (Content-Based Image Retrieval), visual features such as shape, colour and texture are extracted to characterize images. Each of the features is represented using one or more feature descriptors. During the retrieval, features and descriptors of the query are compared to those of the images in the database in order to rank each indexed image according to its distance to the query. In biometrics systems images used as patterns (e.g. fingerprint, iris, hand etc.) are also represented by feature vectors. The candidates patterns are then retrieved from database by comparing the distance of their feature vectors. The feature extraction methods for these applications are discussed.

In (6), it is mainly deals with Multimedia information retrieval systems continue to be an active research area in the world of huge and voluminous data. The paramount challenge is to translate or convert a visual query from a human and find similar images or videos in large digital collection. In this paper, a technique of region based image retrieval, a branch of Content Based Image Retrieval, is proposed. The proposed model does not need prior knowledge or full semantic understanding of image content. It identifies significant regions in an image based on feature-based attention model which mimic viewer’s attention. The Curvelet Transform in combination with colour descriptors are used to represent each significant region in an image. Experimental results are analysed and compared with the state-of-the-art Region Based Image Retrieval Technique.

III. OBJECT IDENTIFICATION

A significant aspect of object recognition is that of object constancy: the ability to recognize an object across varying viewing conditions. These varying conditions include object orientation, lighting, and object variability colour, surf features for the identification of the objects. At the same time the other features of the object such as the Shape, texture to extract a commonality in the object description across different viewpoints and the retinal descriptions. Several theories have been generated to provide insight on how object constancy is made.

Viewpoint-invariant theories suggest that object recognition is based on structural information, such as individual parts, allowing for recognition to take place regardless of the object’s viewpoint. these parts and mental rotation. Therefore, storage of multiple object viewpoints is not required in memory.

This theory proposes that object recognition lies on a viewpoint continuum where each viewpoint is recruited for different types of recognition. At one extreme of this continuum, viewpoint-dependent mechanisms are used for within-category discriminations, while at the other extreme, viewpoint-invariant mechanisms are used for the categorization of objects.

IV. SYSTEM ARCHITECTURE

Object recognition is the task (within computer vision) of finding and identifying objects in an image or video sequence. Humans recognize a multitude of objects in images with little effort, despite the fact that the image of the objects may vary somewhat in different viewpoints, in many different sizes and scales or even when they are translated or rotated. Objects can even be recognized when they are partially obstructed from view. This task is still a challenge for computer vision systems. Many approaches to the task have been implemented over multiple decades.

A. Feature Extraction

Computing distance measures based on colour similarity is achieved by computing a colour histogram for each image.
that identifies the proportion of pixels within an image holding specific values. Examining images based on the colours they contain is one of the most widely used techniques because it can be completed without regard to image size or orientation. However, research has also attempted to segment colour proportion by region and by spatial relationship among several colour regions.

Texture measures are useful for visual patterns in images and how they are spatially defined. Textures are represented by texels which are then placed into a number of sets, depending on how many textures are detected in the image. These sets not only define the texture, but also where in the image the texture is located. Texture is a difficult concept to represent. The identification of specific textures in an image is achieved primarily by modelling texture as a two-dimensional gray level variation. The relative brightness of pairs of pixels is computed such that degree of contrast, regularity, coarseness and directionality may be estimated.

Shape does not refer to the shape of an image but to the shape of a particular region that is being sought out. Shapes will often be determined first applying segmentation or edge detection to an image. Other methods use shape filters to identify given shapes of an image. Shape descriptors may also need to be invariant to translation, rotation, and scale.

V. USER SYSTEM MODULE

User interface means which covers the various functionalities that are available for the end user. It should be looking good and should be simple in look in the perspective of the end user. In our project it contains such various interactive user interfaces. Such functionalities means input query giving option from the user end. Through this functional option user can upload an multi-object based image for its identification. Once we uploaded the image means it will be fetched by the matlab processor and it will start extracting the image features such as shape, colour and texture.

VI. CONCLUSION

The current proposal introduces the feature-based approach for single object and multiple object based image detection based on segmented surfaces and their features, taking full advantage of CBIR technique. The approach can detect and estimate the multi-viewed poses of multiple objects up to 15 degrees of deviation from the original pose. As per testing, it’s clear that, designed project is very well efficient in identifying the objects in cluttered scene and even though if any small obstacle in the line of sight region, it’s efficient in identification.

The future enhancements that can be do regarding this project are as follows. Primarily, to consider the Object-class features, so that it can extend the identification of the general class objects. And then to consider the 3D views of an object, it will helps in efficient multi-view object identification. Finally, its very much needed to avoid the delay associated with the current project.

REFERENCE