



SURVEY ON RECENT CONTENT BASE IMAGE RETRIEVAL BASED ON SIFT ALGORITHM

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Abstract: Content-Based Image-Retrieval (CBIR) is a challenging task. Clustering is defining as assign a set of objects into groups called clustering. The CBIR techniques are based on three main comparison features, colour-based, texture-based and shape-based. One of the most useful techniques for shape-based image retrieval is Scale Invariant Feature Transform (SIFT) algorithm. In this survey paper we represent a type of clustering techniques in data mining and survey on CBIR by SIFT algorithm. Describe Sift Algorithm. Common Approaches use only low-level features. Not with standing, such CBIR solutions failed on capturing some local features representing the details and color of scenes. Many techniques in image processing and computer vision can capture these scene semantics. Among them, the Scale-Invariant Features-Transform (SIFT) has been widely used in a lot of applications. This approach relies on the choice of several parameters which directly impact its effectiveness when applied to retrieve images and tries to uncover suitable application areas for the algorithm.

Index Terms: Scale Invariant Features Transform (SIFT), Content-Based Image Retrieval (CBIR), clustering techniques, NNS (Nearest Neighbors Search), QOM (Quality of Match), K-means.

I. INTRODUCTION:

SIFT is an image processing algorithm which can be used to detect distinct features in an image, Once feature have been detected for two different image one can use these feature to answer question like “Given an object in the first image, is it present in the second image?” And “are the two images taken of the same object?”

A "clustering" is essentially a set of such clusters, usually containing all objects in the data set. Additionally, it may specify the relationship of the clusters to each other, for example a hierarchy of clusters embedded in each other. Data Clustering is one of the challenging mining techniques exploited in the knowledge discovery process. Clustering huge amounts of data is a difficult task since the goal is to find a suitable partition in a unsupervised way (i.e. without any prior knowledge) trying to maximize the similarity of objects belonging to the same cluster and minimizing the similarity among objects in different clusters. Here the “Cluster-model” is a Key to Understanding the Differences b/w Various Algorithm.

Including such Cluster Model: Connectivity models, Distribution Model, Density Model, Subspace Model, Group Model Also Graph based Model (clustering).

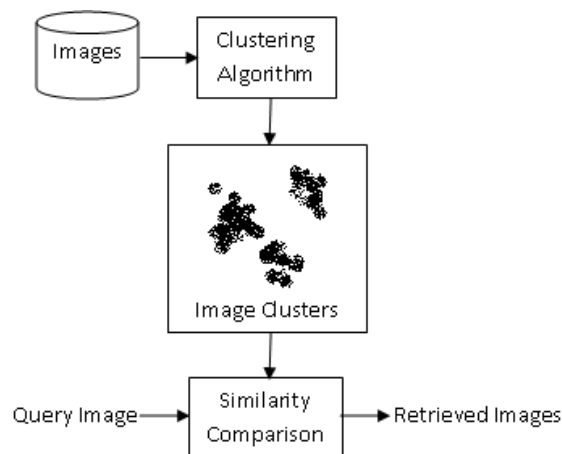


Figure 1: CBIR by Clustering

Many Different Clustering technique have been Defined in Order to solve the problem from different Perspective, i.e. Density based clustering, Hierarchical method, Grid based, Partition based clustering, content based image retrieval by clustering etc. In this paper we represent a survey of Clustering Techniques and Content based image Retrieval by Clustering Based on Sift Algorithm.

II. THE SIFT ALGORITHM

SIFT has four computational (reckon or calculate) Phases perform by SIFT, computations are expensive. Extracting the key-point is minimized by the use of cascading approach. The output of the SIFT algorithm is a set of key-point descriptors. Once such descriptor have generated for more than one image. The image matching or object matching is not only a part of SIFT algorithm. For matching we use a nearest neighbor search (NNS).

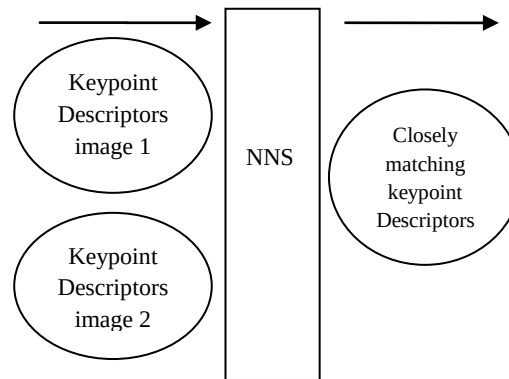


Figure 2: when we check for an image match, the two sets of keypoint descriptors are given as I/P to a Nearest Neighbor Search algorithm. The O/P of this algorithm is a set of keypoint descriptors found to be very similar.

A. Keypoints and keypoint Descriptors:

As already mentioned, the SIFT algorithm produces key-point descriptors. A keypoint is an image feature which is so distinct that image scaling, noise or rotation does not distort the keypoint. That's given a keypoint in an image, if one scales the image to half of or double of the size, keypoint would still be identifiable. The same for Image-rotation and noise. For an example we rotate image clockwise, the keypoint would still persist.

A keypoint descriptor is a 128-dimensional vector that describes a keypoint. The reason for this high dimension is that each keypoint descriptor contains a lot of information about the point it describes. We look keypoint descriptor what information hold when we have discuss four phases of SIFT. Term keypoint what it is actually. Let us have a look at a image where keypoint descriptors have been detected in fig. 3. The reason for the small amount of key-points is the quality of the image. Since the some blurry image and simple image is very out of focus, SIFT cannot find too many points in the image that are resistant to scale, rotation and distortion. Correspond to figure the resolution are 160*240, 80*120, 40*60 for 2 (a), (b), and (c), respectively, that three picture is only half the size of blurry image, "SIFT identified ~4.6 times more key-points".

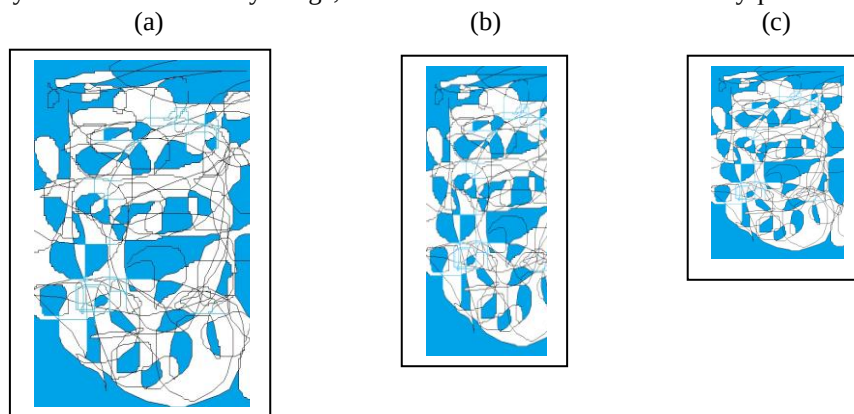


Figure 3: Exam of the difference in keypoint detected by SIFT when an image is scaled.

Keypoints have abbreviated k p.

SIFT identified substantial more key-points for the three later images because they are in focus, and thus have greater contrast. When these conditional phases are present in an image, SIFT also able to identify similar amount of key-points. 'SIFT have four computational phases for its key -point descriptors, and matching for finding result'.

III. Four Computational Phases

Since we want to determine whether SIFT is a suitable algorithm to use as part of a CBIR service, we should know that how algorithm works. A better understanding of the behavior of the algorithm should lead us toward a better understanding of the algorithm, besides, it will make us able to analyze the result in the next section in greater detail. The following discussion will be based on, and sometime directly copied from paper.

Phase 1: scale-space Extrema detection

The first phase of the computation seeks to identify potential interest points. It will searches over all scales and image locations. The computation is accomplished by using a difference-of-Gaussian (DOG) function. The resulting interest points are invariant to scale and rotation, meaning that they are persistent across image scales and rotation.

Phase 2: keypoint localization

For interest point found in phase 1, a detailed model is created to determine location and scale. Keypoint are selected based on their stability, and a stable keypoint is thus a keypoint resistant to image distortion.

Phase 3: orientation assignment

For each of the keypoints identified in phase2, SIFT computes the direction of gradients around. One or more orientations are assigned to each keypoint based on local image gradient directions.

Phase 4: keypoint descriptor

The local image gradients are measured in the region around each keypoint. These are transformed into a representation that allows for significant levels of local shape distortion and change in illumination.

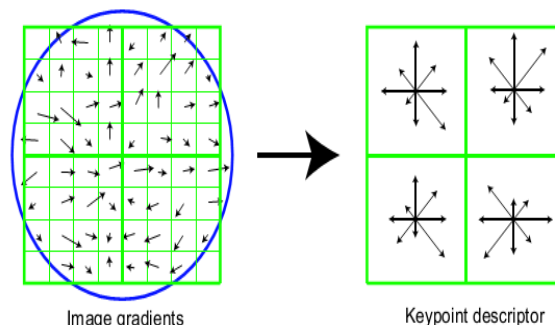


Figure: 4 keypoint descriptor.

There are nine parameters one can assign to adjust what criteria SIFT used on its four-step way to identify keypoints. However, some will only evaluated the performance of a SIFT implementation, and not looked into exactly how these parameter affect keypoint generation. The parameters used are the ones lows set fourth optimal, and his recommendations are based on empirical studies.

It is now time to present image matching, and also getting some result obtained when testing for object recognition in image.

Running Time:

We have to measure the running time of Keypoint Generation and Keypoint Matching.

Keypoint Generation and Keypoint Matching:

Keypoint Generation time is almost a linear function, had be perform even more tests. It also like that we could drive a linear function for the Keypoint generation. The running time of Keypoint Generation is only dependent of the no. of Keypoint detected, not the resolution of image. A large image with long running time and sift uses more keypoint detected. Here the running time same compare to $\frac{1}{4}$ image like blurry take same time. Why the running time of keypoint generation is not affected by the image size is because of four phases of SIFT. On the first phasing time, all point in an image need to pass some initial test, which is very cheap in term of complexity

to perform. The blurry image have very few point and it not to follow the law of first phase but a sharp very small and clear contrasted image take several time. The Keypoint matching time in fig.5 is to compare their keypoint descriptors. This is accomplished by NNS in k-d tree. Comparison is done from source image to compared image. To select a node from the keypoint of the source image, and the procedure is like that.

(1) Select an node from the set of all nodes not yet selected.

(2) Mark this node as selected.

(3) Locate the two 'nearest neighbors' of the selected node.

(4) If the distance b/w two neighbors is less than or equal to a given distance, than we have match, mark the keypoint as match.

(5) Do steps 1-4 for all nodes in source image.

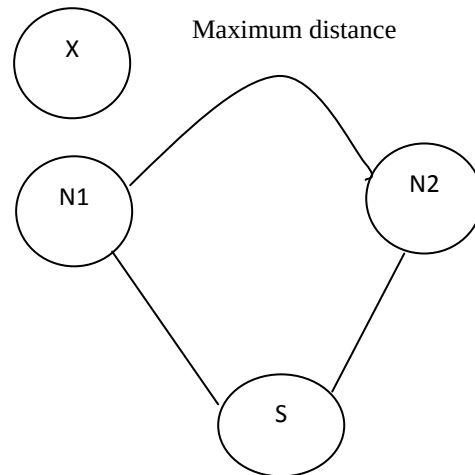


Figure 5: The image matching algorithm verifies the distance b/w the two closest neighbors of source node and distance is within a given boundary.

K-means concept using in CBIR:

K-Means is a clustering method based on the optimization of an overall measure of clustering quality is known for its efficiency in producing accurate results in image retrieval. Since each cluster obtained is a unique set of similar images, the user can select an image set of his choice and further refine the search by applying K-Means technique.

IV. CONCLUSION:

SIFT does what it is designed to do, and it does it well. First of all take image database then make-up there keypoint then make cluster. After that search source image and got target image with their approximation result. The most obvious drawback with SIFT is the time it takes to compare two images. The running time of an NNS search is so large that it effectively renders SIFT useless for a system like M2S. However, with modifications like quality of match and the utilization of other metadata, SIFT could be an extremely robust resource for object detection and image matching.

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