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Sketch Based Shopping (SBS)

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Abstract – *The content based image retrieval (CBIR) is one of the most popular, rising researchareas of the digital image processing. . The goal of CBIR is to extract visual contentof an image automatically, like color, texture, or shape.With the help of theexisting methods, describe a possible solution how to design and implement a taskspecific descriptor, which can handle the informational gap between a sketch and acolored image, making an opportunity for the efficient search hereby .We investigatethe problem of fine-grained sketch-based image retrieval (SBIR), where free-handhuman sketches are used as queries to perform instance-level retrieval of images.In this work, a novel index structure and the corresponding raw contour-basedmatching algorithm are proposed to calculate the similarity between a sketch queryand natural images, and make sketch-based image retrieval scalable to millions ofimages.We have studied EHD, HOG and SIFT. Overall, the results show that thesketch based system allows users an intuitive access to The SBIR technology can beused in several applications such as digital libraries, crime prevention, photo sharingsites. Such a system has great value in apprehending suspects and identifying victimsin forensics query picture intensified recently, which demands on the quite widemethodology spectrum on the area of the image processing.*

Keywords-*Object detection, Image retrieval, Gradient field histogram of oriented graph, Image feature extraction, Machine learning, Edge indexing*

I . INTRODUCTION

These days online shopping has become the most easy option for the public in terms of shopping,since no efforts need to be to taken.All the the options are available ona click on your devices online.But here the issue arises of a particular choice. Inthe current system there exists a number of filters in case they simplify the activity of shopping.But this method of applying filters also becomes a difficult task since alarge no of options are still available even after applying filters.It becomes very timeconsuming to find a particular choice.Therefore in an effort to have a solution overit,an idea of sketch based online shopping was thought of.In this the user is provided with a paint panel.Where the user sketches his/her requirement.Then only the productsthat match with the sketch to a maximum are then filtered under accuracy basedpriority.The number of filters available in the current system are not sufficient to makethe searching process on online shopping sights easier. An image retrieval idea fromsketches existed in other system .An thought to combine these to ideas and makingthe searching system efficient came.

II. LITERATURE SURVEY

Sketch based image retrieval (SBIR) is a relevant means of querying large image databases.The Sketch based image retrieval (SBIR) is technique mainly based on Content Based Image Retrieval (CBIR).

Ying Zheng[1].In this paper, we present a framework of converting human actions to commendable sketches and discovering distinctive action sketches.Primitive sketches are prepared according to the structured forests based fast edge detection.Lack of effectiveness.

Prasad Mahale[2].In these supplies,images are manually annotated forth keywords and then retrieved using text- based search methods.The system intuitively interact the SURF using to find out the clear image from your database with standard

deviation.Unfortunately,extracting the semantic information in an image efficiently and accurately is still a question.

Mathias Eitz[3].The necessary data is acquired in a controlled user study where subjects rate how well given sketch/image pairs match.The benchmark allows us to show that they better model humans perceptual metric between outline sketches and images.Humans rank the likeness of sketches and images consistently would have to be limited to the sub sample we have actually analyzed, if a significant part of relevant pairs was missing.

Yang Cao[4].In this , a novel index structure and the corresponding raw contour- based matching algorithm are proposed to calculate the similarity between a sketch query and natural images, and make sketch - based image retrieval scalable to millions of images.Effectiveand efficient technique for sketch-based image search technique could enable many useful applications,such as enhancing traditional keywordbased image search, and enlightening children/designers drawing.To build a largescalesketchbased image search engine, we need to overcome the following two challenges, i.e. matching and indexing.

Jose M. Saavedra[5].In this work, we propose a novel local approach for SBIR based on detecting simple shapes which are named keyshapes.Structural representation allows methods to represent objects on a higher semanticlevel which is reflected in the increment of the retrieval effectiveness.Structural representation allows methods to represent objects on a higher semanticlevel which is reflected in the increment of the retrieval effectiveness.Structural representation allows methods to represent objects on a higher semanticlevel which is reflected in the increment of the retrieval effectiveness.Keyshape based approach exploits different features from those exploited by the BoF approach which allow us to get a feasible combination.

P. Pozsegovics[6].This paper aims to introduce the problems and challenges concerned with the design and the creation of CBIR systems, which is based on a free hand sketch (Sketch based image retrieval SBIR).Bridges the information gap between the drawing and thepicture, which is helped by own preprocessing transformationprocess. Problem was encountered during the development and testing. Since own handdrawn images are retrieved, an information gap arises between retrieved sketch and color images of database.

Prachi A. Gaidhani[7].In these systems, input keywords are used to search for name or tags of images in a database.Another is using a query from image features such as GazoPa.SBIR are becoming obvious with the development of touchscreen devices such as smart phones,tablets.Generation of special query is the main problem of content based image retrieval.

ASMITA A. DESAI[8].This technology extracts visual image features automatically by machine such as color, texture, shape, object location and mutual relations,match the images of the database and sample images in the feature space.In Sketch Based Image Retrieval (SBIR) system, we get the required images using other image.Humans are highly expressed that including a parts based model with a greater degree of local spatial invariance.

YOSHIKI KUBOTA[9].The idea behind built up content based image retrieval system is to retrieve the image using sketches in often used database.Detection of similar pattern of users sketch from a target image is easy.Lack of effectiveness.

Hechao Yang[10].The paper addresses and analyses challenges and issues of CBIR techniques systems, evolved during recent years covering various methods for segmentation edge, boundary, region, color, texture, and shape based feature extraction.Approximate matching technique, combining computer vision, image processing, image understanding and databases.A major problem is that it still needs to improve the image feature extraction, expression, similarity measure in image processing and pattern recognition.

III. PROBLEM DEFINITION

A user can draw some strokes to represent the contours of an object(s) or a sceneand our system will return the best matched images to the user.Our purpose is to develop a content based image retrieval system, which can retrieve using sketches in frequently used databases.The user has a drawingarea where he can draw those sketches, which are the base of the retrievalmethod. To be an efficient method for detecting simple shapes on an image. This strategycould be applied for other applications requiring a reduction of the imagecomplexity.

IV. PROPOSED SYSTEM WORK

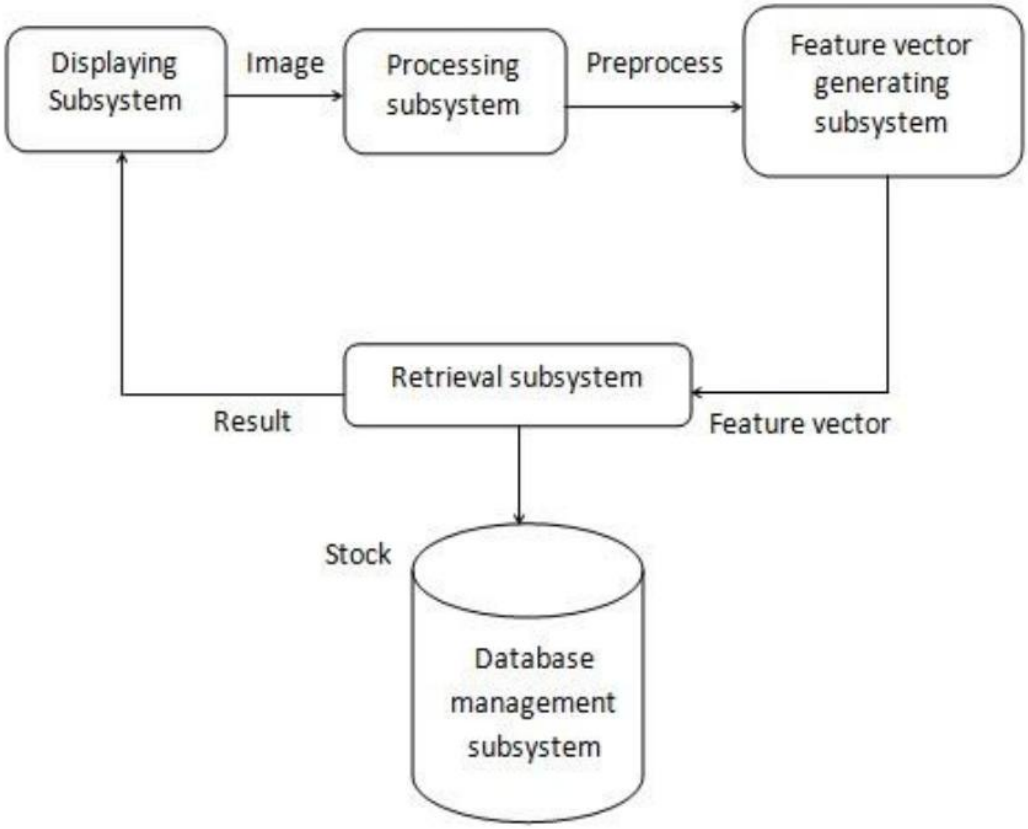


Figure illustrates the Sketch Base architecture. Even though the measure of research in sketch-based image retrieval increases, there is no widely used SBIR system. Our goal is to develop a content-based associative search engine, which databases are available for anyone looking back to freehand drawing. The user has a drawing area, where he can draw all shapes and moments, which are expected to occur in the given location and with a given size. The retrieval results are grouped by color for better clarity. Our most important task is to bridge the information gap between the drawing and the picture, which is helped by own preprocessing transformation process. In our system the iteration of the utilization process is possible, by the current results looking again, thus increasing the precision.

The system building blocks include a preprocessing subsystem, which eliminates the problems caused by the diversity of images. Using the feature vector generating subsystem our image can be represented by numbers considering a given property. The database management subsystem provides an interface between the database and the program. Based on the feature vectors and the sample image the retrieval subsystem provides the response list for the user using the displaying subsystem (GUI). First the user draws a sketch or loads an image. When the drawing has been finished or the appropriate

representative has been loaded, the retrieval process is started. The retrieved image first is preprocessed. After that the feature vector is generated, then using the retrieval subsystem a search is executed in the previously indexed database. As a result of searching a result set is raised, which appears in the user interface on a systematic form. Based on the result set we can again retrieve using another descriptor with different nature. This represents one using loop.

V. MATHEMATICAL EXPRESSION

Edge detection:-

Edge detection in itself includes a variety of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities.

$$f(x) = \frac{I_r - I_l}{2}\left(\operatorname{erf}\left(\frac{x}{\sqrt{2}\sigma}\right) + 1\right) + I_l.$$

The left sides edge intensity is given by subordinating terms $I_l = \lim_{x \to -\infty} f(x)$, and right of the edge intensity is given by the term $I_r = \lim_{x \to \infty} f(x)$. The scale parameter sigma is called the blur scale of the edge. Ideally this scale parameter should be adjusted based on the quality of image to avoid destroying true edges of the image

Blob detection:

In computer vision, blob detection methods are aimed at detecting regions in a digital image that differ in properties, such as brightness or color, compared to surrounding regions.

One of the first and also most common blob detectors is based on the Laplacian of the Gaussian (LoG). Given an input image {\displaystyle f(x,y)}, this image is convolved by a Gaussian kernel.

$$g(x, y, t) = \frac{1}{2\pi t^2} e^{-\frac{x^2+y^2}{2t^2}}$$

at a certain scale t to give a scale space representation L(x,y;t)\ =g(x,y,t)*f(x,y). Then, the result of applying the Laplacian operator.

$$\nabla^2 L = L_{xx} + L_{yy}$$

is computed, which usually results in strong positive responses for dark blobs of radius r=t{sqrt {2}} and strong negative responses for bright blobs of similar size. A main problem when applying this operator at a single scale, however, is that the operator response is strongly dependent on the relationship between the size of the blob structures in the image domain and the size of the Gaussian kernel used for pre-smoothing. In order to automatically capture blobs of different (unknown) size in the image domain, a multi-scale approach is therefore necessary.

Speeded Up Robust Feature (SURF):

Mainly there are two stages in the SURF descriptor or algorithm, first detecting SURF point and then is the extraction of the descriptor at the SURF point.The detection of SURF point makes use of scale space theory. This SURF point detection the Fast Hessian matrix.

The determinant of Hessian matrix is used for deciding whether a point can be chosen as an interest point or not. In an image I, the Hessian matrix at point X and scale of σ , is defined b. Lxx(X, σ) is the convolution of Gaussian second order derivative with the image at point with coordinates (x, y).

$$H(X,\sigma) = \begin{bmatrix} L_{xx}(X,\sigma)\ L_{xy}(X,\sigma) \\ L_{yx}(X,\sigma)\ L_{yy}(X,\sigma) \end{bmatrix}$$

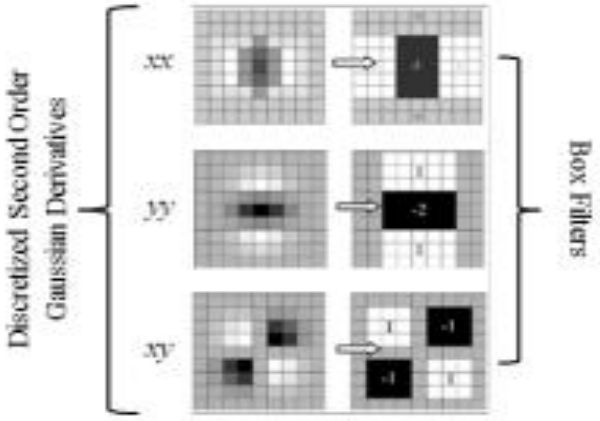


fig. Approximation for second order Gaussian derivatives by box filters

Gaussian second order derivative used in Lxx(X, σ) is given as follows

$$\left.\begin{aligned} &\frac{\partial^2}{\partial x^2} g(\sigma) \\ \text{where,}\quad &g(\sigma) = \frac{1}{2\pi\sigma^2} e^{\frac{-(x^2+y^2)}{2\sigma^2}} \end{aligned}\right\}$$

Similarly second order Gaussian derivatives for Lyy(X, σ) and Lxy(X, σ) are also found as

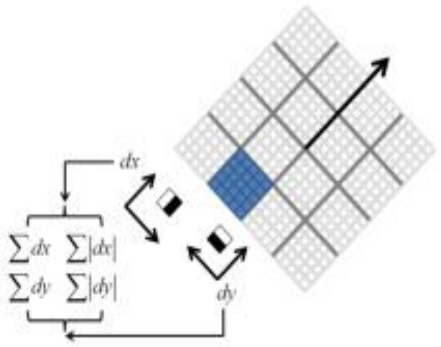
$$\frac{\partial^2}{\partial y^2} g(\sigma) \quad \text{and} \quad \frac{\partial^2}{\partial x \partial y} g(\sigma).$$

The Gaussian second order derivative needs to be discretized before performing convolution with the image. An approximation of this discretized Gaussian partial derivative with a box filter was proposed by Herbert.Thisapproximation provides us with almost similar results as in the previous case while making it less computationally complex. Dxx ,Dyy and Dxy represent the convolution of box filters with the image. These approximated second order Gaussian derivative calculations is made fast by using integral images A pictorial representation of the discretized Gaussian partial derivative filters and their corresponding box filters approximation is given in above fig.The determinant of approximated Hessian matrix is given by below equation.

$$det(H_{approx}) = D_{xx}D_{yy} - (0.9D_{xy})^2$$

Analyzing the scale space of the image is done by changing the size of box filter. The Box filter is generally started with a default size of 9×9 which corresponds to Gaussian derivative with σ = 1.2. The filters size is then at a later stage up scaled to sizes of 15×15, 21×21, 27×27 etc. The approximated determinant of Hessian matrix is calculated at each scale and the non-maximum suppression in 3×3×3 neighborhood is applied to find the maxima. The SURF points location and scale, s is obtained with the maxima values.

Orientation for the obtained SURF point is assigned using Haar-wavelet response. In the neighborhood of SURF point i.e. within a radius 6s, Haar-wavelet.



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response is calculated in both x and y directions. Using these responses, a dominant orientation direction is determined. In the direction of dominant orientation, a square of size 20s centered at the SURF point is constructed. This is divided into 4×4 sub regions. In each of these sub regions, horizontal and vertical Haar wavelet responses dx and dy are calculated at 5×5 regularly placed sample points as shown in. These responses are summed up in a particular interval to get Σdx, Σdy. Also the absolute values of these responses are summed up in a particular interval which gives Σ|dx|, Σ|dy|. Using these values, a 4 dimensional feature vector

V = Σdx, Σdy, Σ|dx|, Σ|dy| is constructed for each sub region. Thus, each extracted SURF point is associated with a 4×(4×4) descriptor, which is a 64 dimensional descriptor. This 64 dimensional descriptor is used for performing the matching operation.

VI. FUTURE SCOPE

The bounds on the input depend on the user itself i.e. how accurately user is ableto design the product he wants.More the accuracy more relevant products will besearched.The sketch should fit into the sketch window.It should completely definethe object in order to search the desired product.The input is valid until the categoryand the sketch are of same type eg.if you select the shoes category and sketch a shirtno matches will be found.
The user can also provide an image of the object.Most relevant product would besearched.

VII. CONCLUSION

Among the objectives of this paper performed to design, implement and test a sketchbased image retrieval system. There are two main aspects that are taken into account. The image retrieval process has to be unconventional and highly interactive. The robustness of the method is essential in some degree of noise, which might also be in case of simpleimages given by the users. The drawn image without modification can not be compared with color image, or its edge representation it needs to be

modified. Alternatively a distance transform step was introduced. The simple smoothing and edge detection based method was improved,which had a similar importance as the previous step.

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