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Dense region detectors for image search and fine grained classification

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Abstract:This proposed approach based on super pixels, edges, and a bank of Zernike filters which are used as detectors. The goal of our work is to explore fine image statistics and identify the discriminative image patches for recognition. Two ideas-discriminative feature mining and randomization are combined. First, it proposes strategies derived from standard interest point detectors (Harris, Hessian and DoG) to extract patches densely. Second, it show fitting an ellipse to show a region of interest extracted by blob detectors (MSER or super-pixels). Finally, this paper proposesZernike polynomials and descriptor-oriented filters to select the patch locations. The approach result in high accuracy and more performance level of dense region detectors for image search and fine grained classification also improved.

Keywords: Image retrieval, fine-grained classification, Zernike polynomials.

I. INTRODUCTION

Image Processing is a technique to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-today life for various applications.For performance evaluation, important system parameters are taken into consideration, which include region scene types, region descriptor types, region detector types, region overlap error, and transformation types.

The local image descriptors extracting local descriptors from an image consists of two steps. The detection step selects regions of interest and the description step produces a vector representation for each of the detected patches. The proposed strategies derived from standard interest point detectors (Harris, Hessian and DoG) to extract patches densely.Depart from the typical choice of fitting an ellipse to describe a region of interest extracted by blob detectors (MSER or super-pixels).Finally, propose Zernike polynomials and descriptor-oriented filters to select the patch locations as detectors.

The goal of this work is to explore fine image statistics and identify the discriminative image patches for recognition. The goal is achieved by combining two ideas-discriminative feature mining and randomization.

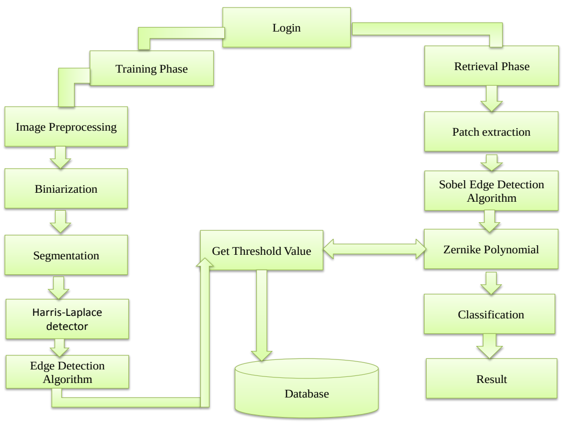
II. RELATED WORK

Achieve fast and performant interest point detection-description scheme which outperforms the current state-of-the art, both in speed and accuracy using SURF [1]. Image classification performance is improved using the Sampling Strategies for Bag-of-Features Image Classification [2].To learn the feature extraction by using Learning Local Feature Descriptors Using Convex Optimisation [3].

III. PROPOSED METHOD

Here a standard interest point is proposed detectors to extract patches densely, mainly focuses on the edges.The “dense interest points” in between localized sparse interest points and dense strategies to produce a large number of localized regions.It focus on accuracy in retrieval and fine-grained classification. The proposed methods provide a nice coverage of the depicted objects, while focusing on edges in addition to corners and blobs.

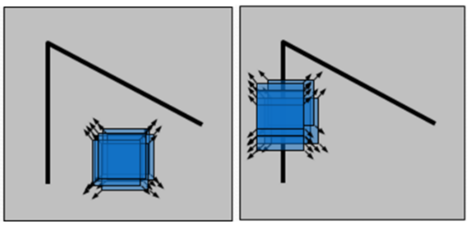
The block diagram of proposed system is



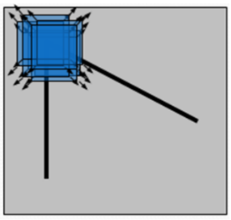
Proposed system minimize human errors and increase efficiency. Proposed system includes following techniques:

A. Harris-Laplace Detector

Harris-Laplace detector is designed to detect corners. To replace Harris-Laplace cornerness function with Frobenius norm in order to select other points in addition to corners.Easily recognize the point by looking through a small window.Shifting a window in any direction should give a large change in intensity.



"Flat" region:"edge":No change in all no change along Direction theedge direction



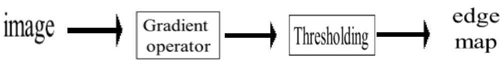
"Corner": significant change inall direction

B. Edge Detection

Edges characterize object boundaries and are useful features for segmentation, registration and object identification in scenes.Intuitively, edge corresponds to singularities in the image (i.e. where pixel value experiences abrupt change.

a. Gradient Operators

Motivation of gradient operators is to detect image changes.



$x(m,n)$ $g(m,n)$ $I(m,n)$

$$I(m,n)=\begin{cases}1 & |g(m,n)|>th\\ 0 & otherwise\end{cases}$$

Proposed system contains following phases:

A. Image Preprocessing

Browse the concerned image. Calculate the grayscale image of each picture element. Split the original uncompressed image in pixels. The image data is divided up into 8*8 blocks of pixels. From this point on each color component is processed independently, so a pixel means a single value, even in a color image. Perform one to one division and round off. Encode the resulting coefficients of image data.

B. Histogram Generation

For the generation of the histogram RGB color values of concerned image is considered. It is transformed into luminance. The color space transformation is performed on pixel by pixel basis. DCT coefficient calculated value can be plotted with the DCT coefficient frequency. The histogram of a gray-scale image consists of a discrete array of bins, each representing a certain gray-level range and storing the number of pixels in the image whose gray-level falls into that range.

C. Feature extraction

a. Zernike polynomials

Set of basis shapes or topographies of a surface Similar to modes of a circular drum head [5]. Real surface is constructed of linearcombination of basis shapes or modes Polynomials are a product of a radial and azimuthal part. Radial orders are positive, integers (n), 0, 1, 2, 3, 4 …Azimuthal indices (m) go from –n to +n with m – n even.

$$Z_n^m(\rho,\varphi)=R_n^m(\rho)\cos(m\varphi)$$

D. Image search

Visual content of images are extracted from images in the database and are described by multi-dimensional vectors. The feature vectors of the images in database form the feature database. To retrieve images, users provide the retrieval system with images. The system then converts them into internal representation of feature vectors. The similarities /distances between the feature vectors of the image provided and those of the images in the database are calculated and then retrieval is performed. The image is first processed in order to extract the features, which describe its contents. The processing involves filtering, normalization, segmentation, and object identification [4].

IV. EXPERIMENT AND DISCUSSION

Fig: 1

The above figures shows the feature extraction. The input image is first converted to gray scale image. Then detect the filtered values.

The above figure to detect the Zernike polynomials. The blue circles denoted the right side direction changes. The red circles indicated the left side direction changes.

Fig: 3

The fig: 3 shows the corner detection.

This corner detection performing using the detection algorithm.

V. CONCLUSION

Introduce a new detection method using Zernike filters, which provides dense, yet localized image patches. Also show that sampling patches on the borders of a region of interest performs better than the standard choice of fitting an ellipse and describing it by a single descriptor. Compared with the existing studies, Zernike patches encoded with a standard technique, such as Fisher vectors, appear to outperform state of the art approaches for some of the fine-grained classification datasets.

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