ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

Feature Extraction Techniques for Video Processing in MATLAB

Ashwini B, Verina, Dr.Yuvaraju B N

Associate Professor, Dept. of ISE, NMAMIT, Nitte, Udupi, Karnataka, India

PG Scholar, Dept. of ISE, NMAMIT, Nitte, Udupi, Karnataka, India

Professor, Dept. of CSE, NIE, Mysore, Karnataka, India

ABSTRACT: Feature extraction plays a key role in image processing. It is very important to know the required features and extract the required features for further assessment. In this paper we discuss about the various feature extraction method such as SURF, BRISK, FAST and HOG extraction method. Further these methods are applied on the images to get the desired results. By knowing these features we can classify the objects and find their parameters for further evaluation.

KEYWORDS: Feature extraction, SURF, BRISK, HOG, FAST

I. INTRODUCTION

Feature represents a pattern or distinct structure of an image. This feature differs from its surroundings by texture, colour or intensity .blobs, corners and edge pixels are the features of an image. These features are used for reconstruction of the images and for detection and classification of the images. Visual feature extraction algorithm consist of a detector used for identifying key points in an image and a descriptor which gives brief representation of the image bounding these key points. Feature extraction s related to dimensionality reduction. Large data cannot be processed by the algorithm they are converted to reduced set of features known as feature vectors. Transformation of the data into feature vectors is termed as feature extraction.

II. RELATED WORK

In the paper 'A Review on Image Feature Extraction and Representation Techniques' [1] author focuses on the latest methods of feature extraction and does a survey o image feature representation technique. An analysis is done in automatic image annotation and content based image retrieval. In review on different feature extraction algorithms [2], author says in visual sensor networks, energy conservation is the challenging issue in transmitting large data. The traditional "Compress-Then-Analyse" (CTA) is replaces with "Analyse –Then-Compress" (ATC). An overview of different compression techniques such as SIFT, SURF, BRIEF, BRISK and Bin Boost is shown and also coding technique in WSN is described. In [3] study of SURF and BRISK characteristics and descriptors are done. Results showed high variability in the density, special distribution and in the octave layer distribution o the interest points .results also concluded that if prior information is available about the image, the top-m interest points in the selection, camera node processing, interest point detection based on area, can decrease the load of transmission and have better balance in processing among the network nodes. In Feature extraction using surf algorithm for object recognition [4], the accuracy for surveillance and detecting moving objects is improved. Objects are efficiently detected from the query image s. The features are then extracted from these frames and are matched with the image features stored in the database using Surf algorithm. [5]An extreme point of scale space extraction method for binary multiscale and rotation invariant local feature descriptor is studied in this paper in order to obtain a robust and fast method for local image feature descriptor. This paper presents a dual multiscale FAST algorithm, it does not need to build the image pyramid, but can extract feature points of scale extreme quickly. Feature points extracted by proposed method have the characteristic of multiscale and rotation Invariant and are fit to construct the local feature descriptor. In paper, Automatic Traffic Surveillance System for Vehicle Tracking and Classification [6] showcase an automatic traffic surveillance system and finds out important traffic parameters. This paper introduces a new linearity feature. The

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

shadow problem is also solved to an extent by using line based shadow algorithm. An optimal classifier is designed for vehicle classification. The proposed method proves to be more robust and accurate. In Vision Based Data Extraction of Vehicles in Traffic [7]a system is proposed for monitoring and storing information of real time traffic. The author uses HOG features for classification. SVM classifier is used and the training is done based on artificial neural network (ANN).vehicle specifications are stored in a database. A GUI is designed using VB.Net

III. FEATURE EXTRACTION

[a] SURF (Speeded Up Robust Features)

Surf features are used of object recognition, classification and 3D-reconstruction.it is said to be inspired by SIFT features But is proved to be more robust and faster than SIFT. Integer approximation of the determinant of Hessian blob detector is used to detect the interest points in SURF. Its feature descriptor is based on the sum of the Haar wavelet response around the point of interest.

Syntax and description

- points = detectSURFFeatures (I)

Input image is I. The detectSURFFeatures function implements the Speeded-Up Robust Features (SURF) algorithm to find blob features.

- points = detectSURFFeatures (I,Name,Value)

An additional option is specified by one or more Name, Value pair arguments

[b] BRISK (Binary Robust Invariant Scalable Keypoints)

BRISK has dramatically lower computational complexity assembly of bit-string vector.It makes use of Hamming distance instead of Euclidean distance .It is faster than SIFT/SURF and has comparable performance .It is especially suited for real time requirements and low power devices.

Syntax and description

- points = detectBRISKFeatures (I)

Input image is I. The detectBRISKFeatures function detects multiscale corner features.

- points = detectBRISKFeatures(I,Name,Value)

Additional options specified by one or more Name, Value pair arguments.

[c] FAST (Features from accelerated segment test)

Features from accelerated segment test (FAST)method detects corner features used for tracking and mapping objects. The computation rate is faster than other extraction techniques. this method can be used for real-time video processing due to its high speed performance.

Syntax and description

- points = detectFASTFeatures (I)

Input image in I. The detectFASTFeatures function finds feature points.

- points = detectFASTFeatures (I,Name,Value)

Uses additional options specified by one or more Name, Value pair

[d] HOG (histogram of oriented gradients)

The histogram of oriented gradients (HOG) is used object detection. The technique in this method the gradient orientation occurrences in an image are counted. The accuracy is improved by using normalization method on the dense grid of uniformly spaces cells.

Syntax and description

- features = extractHOGFeatures(I)

Input image is I. The returned features encode local shape information from regions within an image. You can use this information for many tasks including classification, detection, and tracking.

- [features ,validPoints] = extractHOGFeatures (I,points)
- [___, visualization] = extractHOGFeatures (I,___)

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

IV. PSEUDO CODE

The frames are extracted from the video and then converted to frames first before the features are extracted.
Step 1: Read input Images from the video
Step 2: Detect the Feature Points from each frame
Step 3: Extract Feature Descriptors from the required image
Step4: display the strongest points of the extracted feature

V. SIMULATION RESULTS

Four different feature extraction methods is applied on the video frames to extract the feature points in the image.

[a] Feature Extraction Using Surf

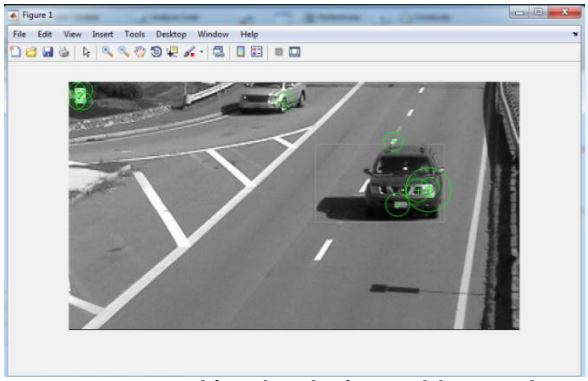

Figure 1: SURF feature points are extracted from the video frame and the required ten strongest SURF points are extracted marked and displayed as the output.

[b] Feature Extraction Using Brisk

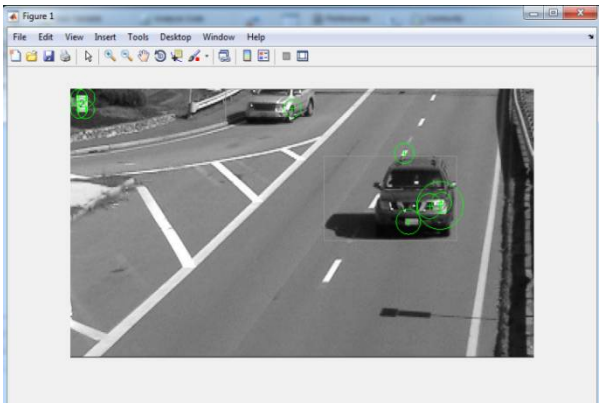

Figure 2: BRISK feature points are extracted from the video frame and the required ten strongest BRISK points are extracted marked and displayed as the output.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

[c] Feature Extraction Using Fast

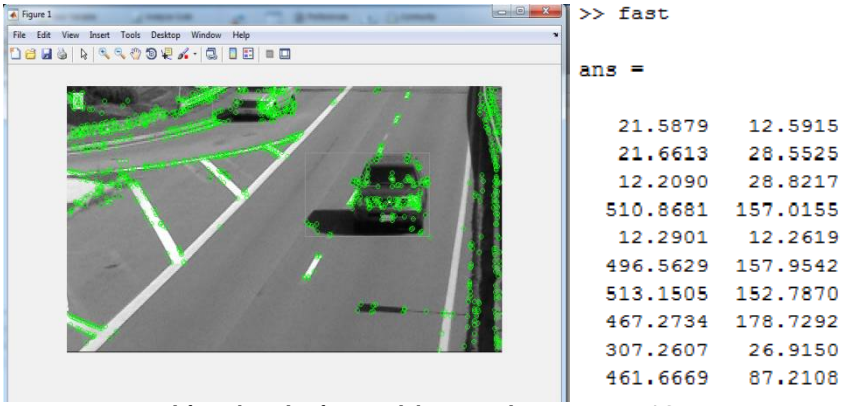

Figure 3: FAST feature points are extracted from the video frame and the required ten strongest FAST points are extracted marked and displayed as the output.

[d] Feature Extraction Using HoG

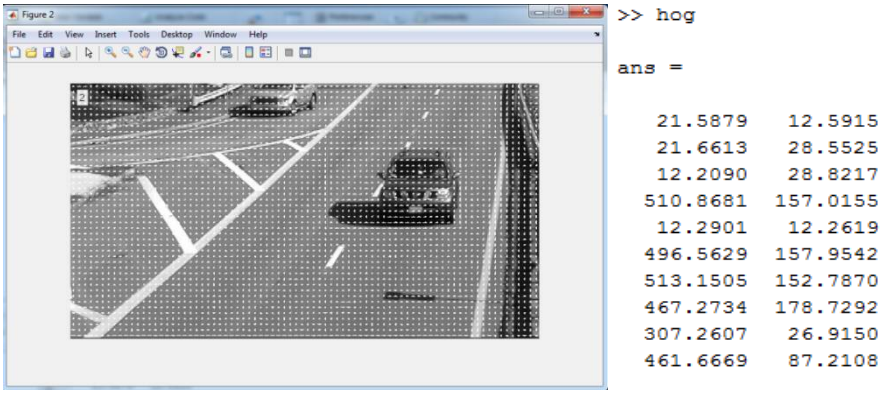

Figure 4: HoG feature points are extracted from the video frame and the required ten strongest HoG points are extracted marked and displayed as the output

VI. CONCLUSION AND FUTURE WORK

A comparative analysis is made using different features extraction method for various images and the desired result is obtained. The strongest feature points are displayed. The feature descriptors are further used for classification of the images. The image feature can be further processed for various image processing application.

REFERENCES

1. A Review on Image Feature Extraction and Representation Techniques ,Dong ping Tian, International Journal of Multimedia and Ubiquitous Engineering Vol. 8, No. 4, July, 2013.
2. Review on different feature extraction algorithms Shilpa G. Sonone, Dr. Mahadev Kokate, International Journal of Engineering Applied Sciences and Technology, 2016 Vol. 1, Issue 4, ISSN No. 2455-2143, Pages 36-38
3. Characterization of SURF and BRISK Interest Point Distribution for DistributedFeature Extraction in Visual Sensor Networks,Gy¨orgy D´an, Muhammad Altamash Khan, Viktoria Fodor, http://dx.doi.org/10.1109/TMM.2015.2406574 2015 IEEE.
4. Feature extraction using surf algorithm for object recognition,Bhosale Swapnali B, Kayastha Vijay S, HarpaleVarsha K. International Journal of Technical Research and Applications e-ISSN: 2320-8163, www.ijtra.com Volume 2, Issue 4 (July-Aug 2014), PP. 197-199
5. Research on feature points extraction method for binary multiscale and rotation invariant local feature descriptor Hongwei Ying1, Jiatao Song1, Jinhe Wang1, Xuena Qiu1, Wang Wei1 and Zhongxiu Yang1, ICTACT journal on image and video processing: special issue on video processing for multimedia systems, august 2014, volume: 05, issue: 01
6. Automatic Traffic Surveillance System for Vehicle Tracking and ClassificationJun-Wei Hsieh, Member, IEEE, Shih-Hao Yu, Yung-Sheng Chen, Member, IEEE, and Wen-Fong Hu, ieee transactions on intelligent transportation systems, vol. 7, no. 2, june 2006

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 4, April 2016

7. Vision Based Data Extraction of Vehicles in Traffic, Dipankar Mudoi, Parismita A. Kashyap, 2014 International conference on signal processing and Integrated networks(SPIN)
8. Application of Edge Detection for Vehicle Detection in Traffic Surveillance System, Ashwini. B, Yuvaraju B N, Ph.D., International Journal of Computer Applications (0975 – 8887)Volume 115 – No. 15, April 2015

.

BIOGRAPHY

Ashwini B received the B.E and M.Tech in computer science and engineering from NMAMIT, Nitte in 2004 and 2010.She is currently pursuing her Ph.D in the area of computer vision.

Verina received B.E in Information Science and engineering from VCET, Puttur in 2013 and currently pursuing her M.Tech in computer network engineering from NMAMIT, Nitte.

Dr.Yuvaraju B N received his Ph.D degree from VTU in the year 2010.He is currently working as a professor in NIE, Mysore. His area of interest is Adhoc Networks and Data mining.