Automatic Image Annotation

SYNOPSIS

Of

MAJOR PROJECT-II

Submitted by:

Supervisor: Dr. Richa Gupta

Eshan Gaur (14102235)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA

INTRODUCTION

Automatic Image Annotation is one of the most challenging problems in Computer Vision today. The manual annotation of images is not only expensive, but also time consuming and sometimes inaccurate as well. One of the biggest applications of Automatic Image annotation is in the field of image search and retrieval. Some of the biggest search engine Google Image Search rely heavily on the textual information that accompanies an image while performing an image. Search engines like Google and DuckDuckGo therefore do not really identify the 'content' of the image while performing a search. Therefore, looking at manual annotations while performing an image search can sometimes yield spurious results.

Nowadays, there is a huge urge in the Computer Vision community today to find ways to automatically annotate images and it is with this motivation that I propose a novel approach to the problem of automatic image annotation in this project. My approach uses a series of Support Vector Machines (SVMs) trained independently. The output from this SVM is then mapped to annotation keywords and are then ranked according to their corresponding magnitude at the output of the SVM.

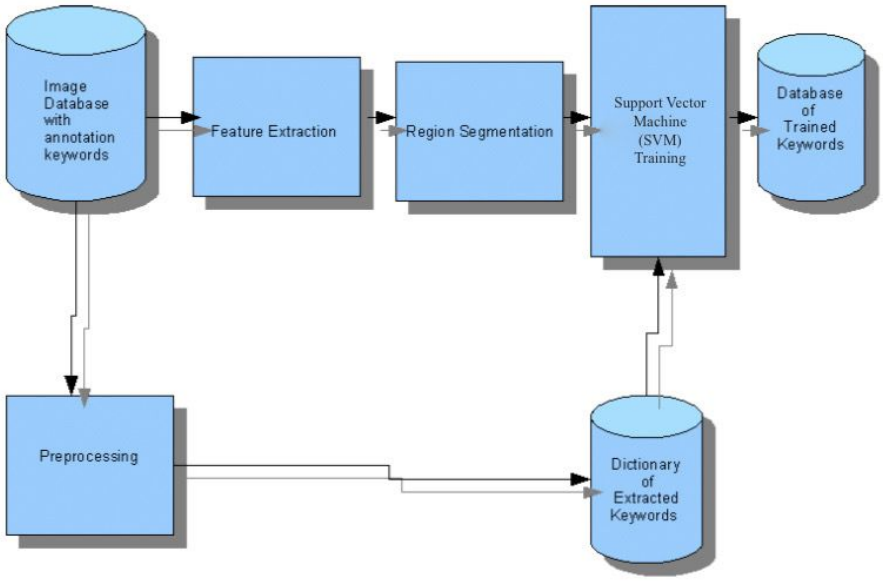

Fig.1. The Training Process

The scope of the entire project is justified within the use of MATLAB , its libraries and the toolbars.

Work done in Major Project:

- Successful initialisation of image of any format into grayscale format.
- Implementation of SURF[6] feature detector.
- Implementation of Features detected on the host image.
- Comparison between various feature detectors namely SURF, FAST, Harris and MSER with SURF being the preferred choice in the scope of this project[6].
- Implementation of K-Means Clustering algorithm
- Finally, the joint implementation of SURF features and K- Means clustering.
- Preprocessing of the Image Database.
- Preparing the SVMs.
- Implementation of the SVM.
- Implementation of the whole database on the SVM
- Evaluating the performance of the algorithm
- Comparing performance of different classes of categories within the dataset.
- Implementation of the quantitative analysis methods namely Precision, Recall and Fmeasure.

Regarding the future scope of the the project, multiple classifiers of Machine Learning like SVMs along with Convolutional Neural Network (CNNs) can be incorporated side-by-side to improve the efficiency. Also to further improve the accuracy of the process of detection and validation of features of an image dataset, Mean Shift Algorithm for segmentation can be used instead of K-Means clustering algorithm.

REFERENCES:

[1].T. Shukla, N. Mishra and S. Sharma, "Automatic Image Annotation using SURF Features",*Proceedings of the International Journal of Computer Applications (0975 – 8887)*, Volume 68– No.4, April 2013.

[2].Jia Li and James Z. Wang, "Real-time Computerized Annotation of Pictures" *Proceedings of the ACM Multimedia Conference*, pp. 911-920, ACM, Santa Barbara, CA, October 2006.

[3].R. Datta, J. Li, and J. Z. Wang, "Content-based image retrieval - Approaches and trends of the new age," In *Proc. Int. Workshop on Multimedia Information Retrieval*, pp. 253–262, 2005.

[4].J. Li and J. Z. Wang, "Automatic Linguistic Indexing of Pictures by a Statistical Modeling Approach", *IEEE Trans. Pattern Analysis and Machine Intelligence*, pp. 1075–1088, 2003.

[5].M. Oujaoura, B. Minaoui, M. Fakir, "A semantic Approach for Automatic Image Annotation", *Proceeding of Intelligent Systems: Theories and Applications (SITA), 2013 8th International Conference, Rabat, Morocco, 8-9 May 2013,* pp. 1-8 2013.

[6]F. Ali, S. Ullah Khan, M. Zarrar Mahmudi, R. Ullah, "A Comparison of FAST, SURF, Eigen, Harris, and MSER Features", *Proceedings of International Journal of Computer Engineering and Information Technology,vol.8, no.6*, pp.100-105, June 2016.