A THESIS REPORT

ON

Spatio Temporal Interest Keypoints and spatial distribution gradients based HAR

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIRNMENT FOR THE AWARD OF THE DEGREE OF

MASTER OF TECHNOLOGY

IN

SIGNAL PROCESSING AND DIGITAL DESIGN

SUBMITTED BY

JAYA GAUTAM

2K14/SPD/06

UNDER SUPERVISION OF

Dr. DINESH KUMAR VISHWAKARMA

ASSISTANT PROFESSOR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

DELHI TECHNOLOGICAL UNIVERSITY, DELHI (INDIA)

JUNE 2016

DECLARATION

I hereby declare that the work presented in this report, titled ""“**Spatio Temporal Interest Keypoints and spatial distribution gradients based HAR**”, in partial fulfillment for the award of the degree of M.Tech in Signal Processing and Digital Design, submitted in the Department of Electronics and Communication Engineering, Delhi Technological University, Delhi, is original and to the best of my knowledge and belief, it has not been submitted in part or full for the award of any other degree or diploma of any other university or institute, except where due acknowledgement has been made in the text.

Jaya Gautam

Roll No. 2K14/SPD/06

M.Tech Signal Processing and Digital Design

Date:

CERTIFICATE

This is to certify the research work embodied in this dissertation entitled "**Spatio Temporal Interest Keypoints and spatial distribution gradients based HAR**" submitted by Miss Jaya Gautam, Roll no. 2K14/SPD/06 student of Master of Technology in Signal Processing and Digital Design under Department of Electronics and Communication Engineering, Delhi Technological University, Delhi is a bonafide record of the candidate's own work carried out by her under my guidance. This work is original and has not been submitted in part or full for award of any other degree or diploma to any university or institute.

(Dr. Dinesh K. Vishwakarma)
Assistant Professor
Dept. of Electronics and Communication Engineering
Delhi Technological University, Delhi, India.

Date:

ACKNOWLEDGEMENT

I express my sincere thanks and deep sense of gratitude to my guide, **Dr. Dinesh Kumar Vishwakarma**, Assistant Professor, Department of Electronics & Communication Engineering, Delhi Technological University, whose encouragement, the initial to final level enabled me to develop an understanding of the subject. His suggestions and ways of summarizing the things made me go for independent studying and trying my best to get the maximum in my topic, this made my circle of knowledge very vast. I am highly thankful to him for guiding me in this project.

I am also grateful to Prof. Prem R. Chadha. HOD, Department of Electronics & Communication Engineering, Delhi Technological University for his immense support.

Finally, I take this opportunity to extend my deep appreciation to my family, for their endless support during the crucial times of the completion of my project.

Jaya Gautam

Roll No. 2K14/SPD/06

M.Tech Signal Processing and Digital Design

ABSTRACT

Human activity recognition is a formidable topic of machine learning and computer vision research. The aim of action recognition is to analyse the events occurring during the on-going activity from video data. A dependable HAR system is capable of recognizing human actions based upon the uniqueness of the activities and has several applications include video surveillance systems, human computer interaction which involves communication between humans and machine, content-based video annotation and retrieval, video summarization, biometrics and in health care domain.

In past decade, an expeditious proliferation of video cameras has resulted in an enormous outburst of video content. The area of analysing human activity from video data is growing faster and received rapid importance due to surveillance, security, entertainment and personal logging. The activity recognition is an area compiled with several challenges at each level of processing. The low level processing contains pre-processing challenges, robustness against errors. Mid level processing has space and time-invariant representations challenges whereas high level processing has semantic representation problems. In this work, a new hybrid technique is proposed for human action and activity recognition in video sequences. The work is demonstrated on widely used databases i.e. KTH, Weizmann, Ballet and a multi view dataset IXMAS to show the accuracy of the adopted method. The videos are segmented using texture based segmentation followed by calculating the average energy image (AEI). The extreme points are calculated from difference of Gaussians images to find the key points of AEI images. The vocabulary of these points is created using vector quantization which is unique for each class of dataset. Then spatial distribution gradients are calculated which are combined with key point descriptors to act as a unique feature vector. These features are classified using support vector machine (SVM) and hidden markov model (HMM) for accurate recognition.

Keywords— Human activity recognition, average energy image, spatial distribution gradients, spatio temporal interest points.

Table of Contents

LIST OF FIGURES

LIST OF TABLE