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 2, February 2016

A Survey on Activity Recognition Using Multiple Machine Learning Algorithms

Anju Kumari[1], Nandini V. Dhole[2]

M.E. Dept. of E & TC., R.M.D. Sinhgad School of Engineering, SPPU, Pune, Maharashtra, India[1]

Asst. Professor, Dept. of E & TC., R.M.D. Sinhgad School of Engineering, SPPU, Pune, Maharashtra, India[2]

ABSTRACT: The activity recognition means to determine the actions and the various gait movements of humans. Activity of Daily Living (ADL) are important to recognize the change in physical and general behaviour of people specially elders and patients having severe diseases. To recognize the activities we will be using accelerometer sensors, which will sense the acceleration in the body and after that system will classify that data using various classifying algorithms, to arrive at conclusion (which activity happened) results from these classification will be compared and activity which gets maximum votes will be selected. By using multiple algorithms the accuracy of the system will increase.

KEYWORDS: Activity Recognition; Accelerometer; Classification; Machine Learning; Gait Movement;

I. INTRODUCTION

From past few years the physical fitness has become a matter of great concern. People are becoming more health conscious. Everybody wants to be fit and keep their body free from any kind of diseases. With increasing use of computers and other electronic gadgets the lifestyle of people has become more sedentary and less active. Due to the less mobility of the body, it becomes home for loads of diseases. So, it is very important to monitor and keep regular record of our daily activities. For doing this, the proposed activity recognition system comes as a boon.

Automatic recognition of human activities is one of the important research area in pervasive computing: first, due to its potential in providing personal support for different applications such as smart environments and surveillance and second, due to its connection to many different fields of studies such as life care and healthcare. Human-activity recognition requires a reliable technique that can be used in the conditions of daily living.

In the previous approaches, the authors have used mostly single algorithm for the classification of data, but here we are proposing a new activity recognition system using accelerometer, which will use different algorithms to accurately recognize the activity.

II. LITERATURE SURVEY

In [1] the authors have discussed about the activity recognition using a tri-axial accelerometer which can be worn on waist. The algorithm uses the accelerometer data to classify the various body movements into transitional events such as walking, sitting, run, jump etc. The relevant and robust features were selected thereby reducing the size of data. They showed that by selecting the features the data size is reduced and accuracy is increased. The data was taken from different individuals with different time and orientation then also the accuracy was high. It lays foundation to make a system that will require minimum training data and less error due to positioning offsets.

In [2] Louis Atallah, Benny Lo, Rachel King, and Guang-Zhong Yang worked on the positioning of the accelerometer at the perfect position. The authors have worked on wearable sensor placement at different body positions and it aims to provide a framework that can answer the following questions: What is the ideal sensor location for a given group of activities and the different relevant features which could be extracted. It showed that selecting large number of features

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 2, February 2016

leads to high computational cost and less accuracy. The results of this work give an indication of sensor positioning with respect to activity-group discrimination but practical issues have to be considered for long-term deployment.

In [3] the authors have explained about the automatic classification of daily activities. The aim of the study was to find out how to recognize activities, which sensors are useful and which type of signal processing and classification is required. The three classification algorithms were used custom decision tree, automatically generated decision tree, artificial neural network. With witty selection and placement of sensors, several daily activities can be automatically recognized with good accuracy by using feature extraction and classification algorithms.

Peter H. Veltink**,** Hans B. J. Bussmann, Wiebe de Vries, Wim L. J. Martens, and Rob C. Van Lummel [4] have described about the activity recognition through uni-axial accelerometer. This deals with the classification of static and dynamic activities. They have also shown that accelerometer is sensitive to the inclination changes. This should be taken into account if static or dynamic activities are to be distinguished on the basis of relatively small mean angle differences of body segments.

The [5] is intended as initial exploration of continuous activity recognition using on-body sensing. This work focuses on the recognition of activities that are characterized by a hand motion and an accompanying sound. Some suitable activities can be found in assembly and maintenance work. This study needs to worked upon algorithmic improvements, use of different sensors combination to get more accurate results and last one is to apply them to real life scenarios.

III. PROPOSED WORK

In the proposed system, we will be building an activity recognition system to recognize the activities of daily living of the human beings. For activity recognition system, the data of the various activities performed by the user will be taken in the form of analog signals by the wearable sensor. Now this data will be sent to the server with the help wireless transmitter. After sending the data to the server the processing of data will be done. For processing of the data, the data will be classified to precisely recognize the activity. This classification of data is used to classify the various activities performed by the user at any instant of time or during the period the user wants to know its activities.

Previously the mechanisms used for activity classification were using mostly single classification algorithm. But here, multiple algorithms for one data set will be used. The voting between all the algorithms will be done, the activity which will get majority votes will be classified as correct activity. By using several algorithms the accuracy of the system will be increased, which inspires us to use this concept in our proposed system. The increased accuracy will provide the good results for the activity recognition.

The proposed system will consist of different steps for the accomplishment of this whole system. Following important steps will be involved for the activity monitoring system:

1. Data Collection - First of all data would be collected using the wearable accelerometer device of the user whose activity is to be recognised.

2. Transferring data – This collected data has to be sent to the server for the classification and various other processing.

3. Data processing and analysis-The processing of data will be done by first training the machine, after that classification of activities would be done using the various machine learning algorithms.

4. Data presentation- The result of activity recognition will be displayed in the GUI (Graphical User Interface). This GUI will provide user multiple options to analyse data. Also from GUI user will be able to re-train the system. The test data will be, activity position walking, sitting, running etc.

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 2, February 2016

IV. CONCLUSION AND FUTURE WORK

This system can be used for analyzing the activities accurately. The activities recognized can be used for a lot of purposes such as patient's health monitoring, daily routine analysis etc. The future work needs to be done on reducing the size of the data. Feature selection in continuous data should be worked upon so that it would require less and relevant data, which will help in increasing its efficiency further.

REFERENCES

1. Piyush Gupta and Tim Dallas, "Feature Selection and Activity Recognition System Using a Single Triaxial Accelerometer", IEEE Transactions On Biomedical Engineering, Vol. 61, No. 6, Page 1780-1786, 2014.
2. Louis Atallah, Benny Lo, Rachel King, and Guang-Zhong Yang, "Sensor Positioning for Activity Recognition Using Wearable Accelerometers", IEEE Transactions On Biomedical Circuits And Systems, VOL. 5, NO. 4, Page 320-329, 2011.
3. Juha Parkka, Miikka Ermes, Panu Korpipaa, Jani Mantyjarvi, Johannes Peltola, and Ilkka Korhonen, "Activity Classification Using Realistic Data From Wearable Sensors", IEEE Transactions On Information Technology In Biomedicine, Vol. 10, No. 1, Page 119-128, 2006.
4. Peter H. Veltink, Hans B. J. Bussmann, Wiebe de Vries, Wim L. J. Martens, and Rob C. Van Lummel, "Detection of Static and Dynamic Activities Using Uni-axial Accelerometers", IEEE Transactions On Rehabilitation Engineering, Vol. 4, No. 4, Page 375-385, 1996.
5. Jamie A. Ward, Paul Lukowicz, Gerhard Troster, and Thad E. Starner, "Activity Recognition of Assembly Tasks Using Body-Worn Microphone and Accelerometers", IEEE Transactions on Pattern Analysis and Machine Intelligence, VOL.28 , No. 10, Page 1553-1567, 2006.

BIOGRAPHY

Anju Kumari[1] is a M.E. Student in the Department of Electronics and Telecommunication, R.M.D Sinhgad School of Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India.

Nandini V. Dhole[2] is an Assistant Professor in the Department of Electronics and Telecommunication, R.M.D Sinhgad School of Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India.