International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 09 | Sep 2020 www.irjet.net p-ISSN: 2395-0072

Recognition of Human Activities using Machine Learning Algorithms

Prof Jayashree M Kudari[1], Abhilash Banerjee[2]

[1,2]Jain University

***Abstract*:** Human activity recognition via wearable devices has been actively investigated during a huge variety of applications. Most of them, however, either target easy activities whereby whole-body movement is concerned or need a range of sensors to spot daily activities. During this study, we have a tendency to propose a personality's activity recognition system that collects information from associate off-the-peg smartwatch and uses a man-made neural network for classification. The planned system is additional increased victimization location data. We consider 6 activities, including both simple and dynamic activities.

Keywords — Human activity recognition, machine learning

I. INTRODUCTION

Nowadays, smartphones became an essential tool for lifestyle, giving variety of options that transcend merely vocation or electronic communication capabilities. So as to let the user, perform totally different tasks, these mobile devices square measure equipped with several sensors that create them real sensing platforms able to extract relevant data. one in every of the foremost engaging eventualities during which such data are often exploited is act Recognition, wherever information captured by motion sensors, e.g., measuring device and rotating mechanism, are often analyzed to infer user's current physical activity. Detecting and recording become conceivable with these moveable sensors that facilitate to acknowledge the topics frequently. Activities may also be place away once monitored in their favored surroundings [1].

II. METHODOLOGY

A. Gathering Data

The dataset was gathered and prepared by observing the activities of 30 volunteers within an age of 19-48 years [6]. Each person performing six different kind of activities are listed below:

- WALKING
- WALKING_UPSTAIRS
- WALKING_DOWNSTAIRS
- SITTING
- STANDING
- LAYING

These data were gathered from UCI Machine learning library. The acquired dataset had been randomly dividing into two sets, where 70% of the volunteers were chosen for preparing information and 30% test information [7].

B. Feature Selection

Feature selection is a vital construct in machine learning that is applied as a part of the pipeline. It's the construct of mechanically or manually choosing a group of options that contribute to up the model and therefore the prediction output. This step is undertaken because it vastly impacts the performance of the model in terms of the build time moreover because the accuracy. Digressive options within the data set will negatively influence the training because it makes the model train on data that does not contribute to reaching the prophetic output.

C. Data Visualization

From this graph we can conclude that Nagpur

Fig 1 shows us different human activities and their distribution. From this graph below we can see that sitting and standing are the highest amount of activities done by most of us.

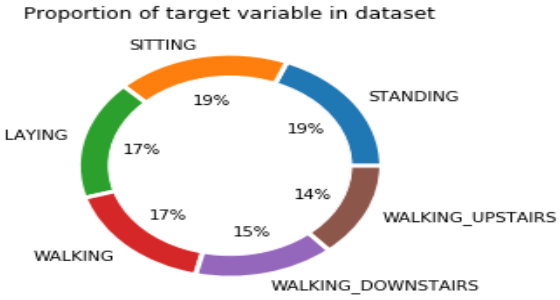

Fig 1. Different activity distribution

Fig 2 shows us the difference between the static and dynamic activities.

- Sitting, standing, laying can be considered as static activities were no motion is involved.

- Walking, walking downstairs, walking upstairs can be considered as dynamic activities with significant amount of motion involved.

From the figure below we can conclude that the static activities are significantly more than the dynamic activities.

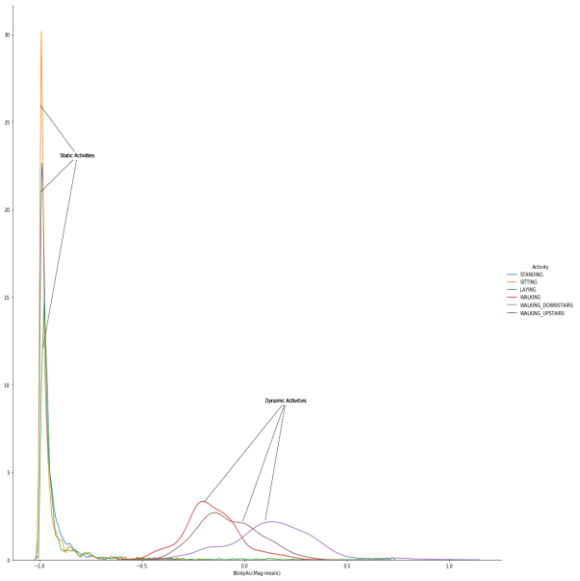

Fig 2. Static and dynamic activities

If we go further deep into various activity, we can see that from Fig 3 that activities that involves sitting and walking are the highest.

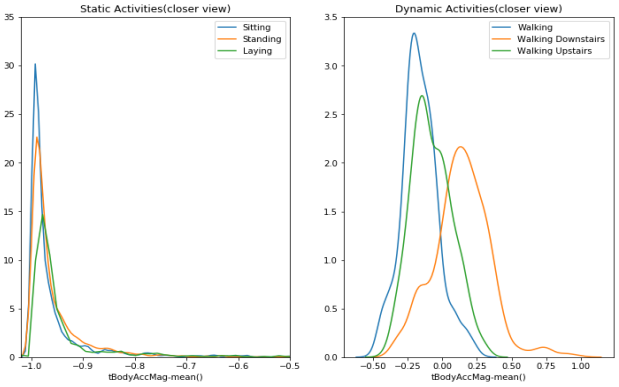

Fig 3. Each activity under static and dynamic categorization

From Fig 4 we can see that person 1 and 14 sleep very little.

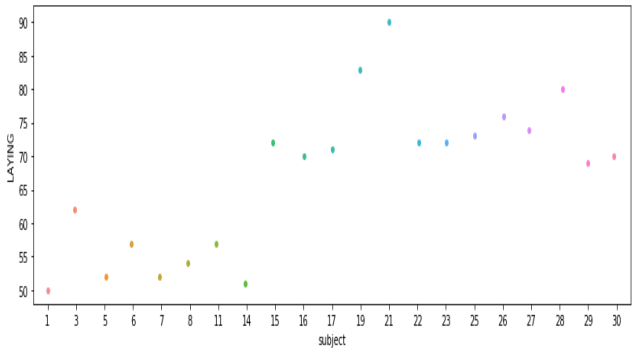

Fig 4

From Fig 5 we can see that person 1 and 25 are walking a lot.

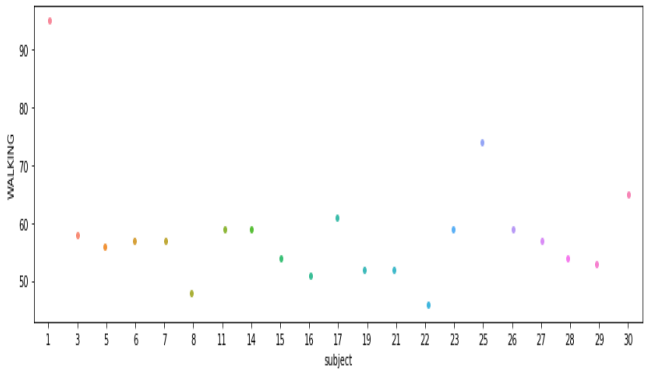

Fig 5

III. MACHINE LEARNING ALGORITHM

A. Random Forest

Random Forest is an outfit of unpruned demand or descends sort of a bootstrapping rule with numerous decision trees. Every tree depends upon the estimations of the vector picked erratically and severally. Random Forest faithfully provides associate degree vast improvement than the one tree classifier [2]. Algorithmic rule tree is fancied exploitation the rule.

B. Decision Tree Classifier

They are made during a top-down structure with the utilization of metrics like Gini impurity and data. It calculates the importance of every feature and uses it to separate the weather into homogenized subsets. The nodes represent the condition of the split and therefore the leaf nodes represent the choice or the anticipated output. The branches or the perimeters of the tree direct to 1 of the output variables. Call trees

square measure sculpturesque for each, classification and regression issues. Although the choice tree is straightforward to grasp it tends to overfit because it continues to separate on attributes and trains critically on the coaching knowledge. To avoid overfitting the choice tree is mostly cropped to prevent it from growing too deep.[3]

C. K-Nearest Neighbor

K-Nearest Neighbor may be a supervised learning rule that is standout amongst the foremost thought rule for pattern recognition. K-Nearest Neighbor rule utilizes neighborhood characterization evidently prediction.[4]

IV. Results

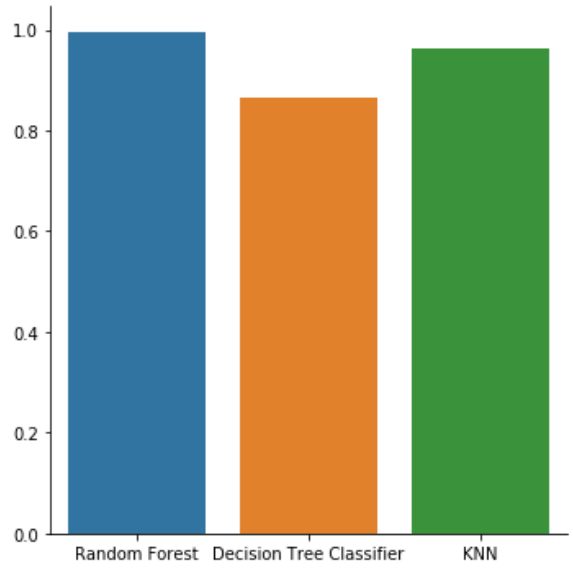

Fig 6. Different classification method

From the experiment we concluded that random forest provides better accuracy with the accuracy of 99%. The figure 3 shows the comparison of accuracy for different classifiers and figure 6 shows the comparison of random forest, decision tree classifier and k-nearest neighbor.

CONCLUSION

In this paper, a unique act recognition framework supported smartphone intrinsic measuring instrument and rotating mechanism sensors was presented. The characteristics of 6 activities were explored and visualized. The various classification technique is then applied to acknowledge the activity performed by the user [5]. Human action acknowledgment may be a center structure hinder behind these applications. It takes the crude sensor's studying as sources of information and predicts a client's movement action. The knowledge of assorted classifiers was used for assessing acknowledgment execution.

Future works

For HAR systems to achieve their full potential, additional analysis is needed. A typical public dataset would facilitate researchers benchmark their systems and evolve the system altogether. Activities recognized in existing systems are easy and atomic, that might be a locality of additional complicated composite behaviors. Recognition of composite activities will enrich context-awareness. We can extend the set of activities by together with some of times performed in lifestyle. Then it would be even more helpful so as to style a system that's able to acknowledge complicated activities composed of easy tasks, like those delineate during this paper [8].

REFERENCES:

[1] J.Goldman et al, "Participatory sensing: A citizen-powered approach to illuminating the patterns that shape our world", 2009.

[2] Sandeep Kumar Polu, "Human Activity Recognition on SmartPhones using Machine Learning Algorithms", Department of Information Technology, Acharya Nagarjuna University, International Journal for Innovative Research in Science & Technology, Volume 5, Issue 6, November 2018.

[3]https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=1677&context=etd_projects

[4]. K.P. Sanal Kumar and R. Bhavani, "Activity Recognition in Egocentric video using SVM, KNN and Combined SVM KNN Classifiers", IOP Conference Series: Materials Science and Engineering, 2017

[5] F. Concone, S. Gaglio, G. Lo Re, M. Morana Proceedings of AI*IA 2017 Advances in Artificial Intelligence: XVI International Conference of the Italian Association for Artificial Intelligence, Bari, Italy, 2017.

[6] Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. A Public Domain Dataset for Human Activity Recognition Using Smartphones. *21st European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN* 2013. Bruges, Belgium 24-26 April 2013.

[7] http://archive.ics.uci.edu/ml/datasets/Smartphone-Based+Recognition+of+Human+Activities+and+Postural+Transitions

[8] Agate, V., de Paola, A., Lo Re, G., Morana, M.: A simulation framework for evaluating distributed reputation management systems. Advances in Intelligent Systems and Computing 474, 247–254 (2016)