Human activity recognition with smartphones using machine learning Process

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Abstract - Human activity recognition requires to predict the action of a person based on sensor-generated data. It has attracted major interest in the past few years, thanks to the large number of applications enabled by modern ubiquitous computing devices. It classify data into activity like Walking, walking up stairs, walking down stairs, sitting, standing, laying are recognized. Sensor data generated using its accelerometer and gyroscope, the sensor signals (accelerometer and gyroscope) were per-processed by applying noise filters. The sensor acceleration signal, which has gravitational and body motion components, was separated using a Butter worth low-pass filter into body acceleration and gravity. The gravitational force is assumed to have only low frequency components. a vector of features was obtained by calculating variables from the time and frequency domain. The aim is to predict machine learning based techniques for Human Activity Recognition results in best accuracy. The analysis of data set by supervised machine learning technique(SMLT) to capture several information's like, variable identification, uni-variate analysis, bi-variate and multi-variate analysis, missing value treatments and analyze the data validation, data cleaning/preparing and data visualization will be done on the entire given dateset. To propose a machine learning-based method to accurately predict the stock price Index value by prediction results in the form of stock price increase or stable state best accuracy from comparing supervise classification machine learning algorithms. Additionally, to compare and discuss the performance of various machine learning algorithms from the given transport traffic department dateset with evaluation. dateset with evaluation classification report, identify the confusion matrix and to categorizing data from priority and the result shows that the effectiveness of the proposed machine learning algorithm technique can be compared with best accuracy with precision, Recall and F1 Score.

Keywords: Human Activity Recognition,Machine Learning, Smartphone sensors.

➢ INTRODUCTION

Human activity recognition (HAR) is a technique to recognize various human activities via surveillance cameras or normal cameras. In recent years, HAR has evoked significant interest among researchers in the areas of health care, social care, and life care services, since it allows automatic monitoring and understanding of activities of patients or residents in smart environments such as smart hospitals and smart homes. For instance, at smart home, a HAR system can automatically recognize residents' activities and create daily, monthly, and yearly activity logs. These life logs can provide residents' habitual patterns which medical doctors evaluate for further health care suggestions. Especially for elderly people, a HAR system can recognize their falls or unusual activity patterns. The basic methodology of activity recognition involves activity feature extraction, modeling, and recognition techniques. Video-based HAR is a challenging task as it has to consider whole body movement of a human and does not follow rigid syntax like hand gestures or sign languages. Hence, a complete representation of a full

human body is essential to characterize human movements properly in this regard. Though many researchers have been exploring video-based HAR systems due to their practical applications, accurate recognition of human activities still remains as a major challenge.

Human activity recognition, or HAR, is a challenging time series classification task. It involves predicting the movement of a person based on sensor data and traditionally involves deep domain expertise and methods from signal processing to correctly engineer features from the raw data in order to fit a machine learning model. Recently, deep learning methods such as convolutional neural networks and recurrent neural networks have shown capable and even achieve state-of-the-art results by automatically learning features from the raw sensor data. In this post, you will discover the problem of human activity recognition and the deep learning methods that are achieving state-of-the-art performance on this problem.

Activity classification is essentially a time series problem. Time-series classification is a type of supervised machine learning. It's used to predict future values from past data using statistical techniques, and it can be used for forecasting and offloading sensor data. As of today, neural networks have proven to be the most effective in performing activity recognition. In particular, two approaches, including Convolutional Neural Network Models and Recurrent Neural Network Models, are the most widely used for this task.

➢ PROBLEM STATEMENT

Now a days maximum of peoples are using smart phones, with the help of smartphone sensors like accelerometer and gyro, we can find the activities of the human, which is help to find out how The Activity people is in active like walking, running, sitting .Some people are not active in real life, those peoples are have obesity and some other health issues .We can use this also some security purpose and Transportation.

➢ PROPOSED SYSTEM

The process of human activities recognition is very similar to a general-purpose pattern recognition system and corresponds to a set of steps ranging from data collection to activities classification

- To overcome this method to implement machine learning approach by user interface of GUI application
- Multiple datasets from different sources would be combined to form a generalized dataset, and then different machine learning algorithms would be applied to extract patterns and to obtain results with maximum accuracy.

➢ SPECIFIC PREREQUISITES

● HARDWARE PREREQUISITES

- RAM : 4GB or above 4GB
- Processor of Frequency : 1.5GHz or above
- Processor : Intel Pentium 4 or higher

- **SOFTWARE PREREQUISITES**

  - Operating System : Windows 8 and above
  - Languages : Python
  - Tools used : Visual Studio Code, Jupyter Notebook

- **FUNCTIONAL REQUIREMENTS**

The software requirements specification is a technical specification of requirements for the software product. It is the first step in the requirements analysis process. It lists requirements of a particular software system. The following details to follow the special libraries like SK-learn, pandas, numpy, matplotlib and sea born.

- **NON-FUNCTIONAL REQUIREMENTS**

Process of functional steps,

1. Problem define
2. Preparing data
3. Evaluating algorithms
4. Improving results

Prediction the result

➢ **ARCHITECTURE**

The system architecture for the proposed system has been shown in the above figure. The video is taken from the camera. The video is sent to the trained model. The model detects the actions of the human. The action is returned as the output.

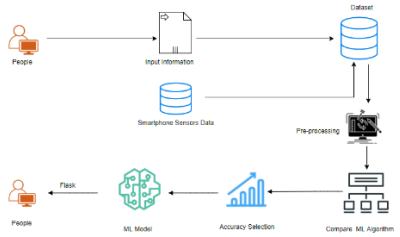
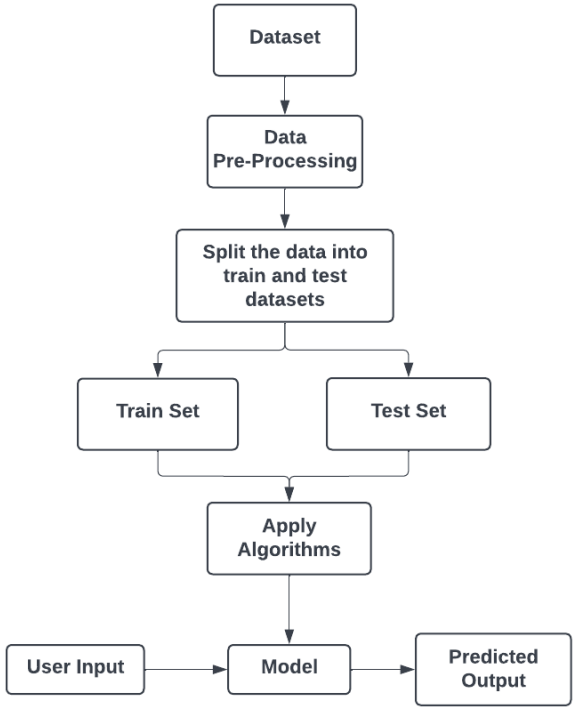


Fig.1 SYSTEM ARCHITECTURE



➢ CONCLUSION

Here we suggested a convolutional neural network (CNN) and long short-term memory (LSTM) method for human activity recognition. The above method hopes to enhance activity detection performance by making use of the former method's strong feature removal and the latter method's predicting future time sequence & categorization. Comparing the effectiveness of this CNN-LSTM network to that of other dl strategies that use raw sensor readings as input revealed that the latter is superior on both fronts. We tested our model on two different datasets, one private & one open (UCI HAR), and we found that it performed well in both areas. On the iSPL datasets in particular, it achieved better results than the competing models by a margin of over 1% in precision and almost 2% in Soft - max loss. The duration of time it required to execute the various systems and factor is determined was another parameter that was not assessed in this article but was evident in the trials. When contrasted to our method, the other algorithms took much longer to complete.

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