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HAR using K-NN Algorithm

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Abstract: ***These days, everybody has cell phones and everybody is turning out to be wellbeing cognizant. Cell phones have inserted sensors. One of those sensors is the accelerometer, which gives readings in every one of the 3 measurements and these qualities can be utilized to perceive the movement being carried out. We apply AI to dataset of speeding up readings & preparing the classifier so that it can perceive exercises in the anndroid based cell phones. We utilize KNN calculation for grouping by which we get accuracy upto ninety four percent on a test set and we use one more algorithm Clustered KNN that is used for online-based classification of data. We are planning an ongoing, activity acknowledgment framework for Android. This task centers around building classifiers which precisely distinguishes the exercises being carried out by people utilizing their cell phone sensor information. We audit the execution of the models, and then make recommendations which would help in improving future precision. Exploratory information investigation and perception procedures are utilized to increase a superior comprehension of the manner in which clients carry on and how exercises from each other.***

Keywords: Health, Monitor Activity, Save Time

I. INTRODUCTION

Cell phones have gotten worldwide. They also have different sensor encircled in like the proximity sensors, sensors of light, gyroscope, accelerometer, etc. The readings from the accelerometer are then utilized to spot action being done by the client. The accelerometer readings for various exercises show a particular shape. We then have prepared a classifier to distinguish the various shapes. We also have utilized KNN (K-Nearest Neighbors) Algorithmm utilizing three closest neighbors. We are right now identifying jumping, sleeping, walking, standing and sitting with an exactness of 94%. We can prepare the model then to perceive more activities. As of late, expanding interest has been appeared in examining human step utilizing wearable sensors, termed as Human Activty Recognition (HAR). HAR with programmed acknowledgment of physical exercises is progressively fact considered and also applied in Human-Computerr Interaction (HCI), prevalent and mobile computing. One off targets of HAR iss to provide stuff that empowers computer systems to adequately help clients in their day to day activities. A couple of sensible applications which can be utilized with HAR that advances the administration are on-demand information frameworks, shadowing and nursing arrangement of smart houses, imparting interfaces for portable offices and clinical consideration administration applications for both casualty treatments and inpatients. Also, different applications incorporate shared connections focused to promoting, engaging, games, and media origination direction. Normally, human day by day exercises are separated into three classes, explicitly, signs, low-level exercises and significant level exercises. Signs include straightforward exercises, for example, the opening-shutting of hands and curving of arms.

The low-level exercises are sitting, standing, strolling, and running. Various examiners have found machine vision frameworks in movement and sign acknowledgment from still pictures and audiovisuals in different settings. Advancement in development of sensors in sensors which are on body wearable and cell phones have empowered them to be utilized effectively for HAR frameworks. In any case, the contrast between telephone based HAR frameworks and on-body wearable sensor-based HAR frameworks is that, cell phones have a couple of incorporated sensors that are set up to give a wide fluctuation of choices embedded into one bound together gadget. Also, cell phones have figuring capacity, in spite of the fact that not as cultivated as the sharp units of control of wearable-sensor frameworks.

What's more, cell phones have become a basic gadget in human's day by day life and the utilization of a cell phones essentially outperforms that of on-body wearable sensor-based frameworks. Consequently, cell phones have now become protuberant device for beneficial and in supporting the patients experiencing wellbeing rebuilding and treatment, movement observing of day by day living and eats less carbs, and for various other medical problems. One of the perilous issues in HAR is the association of the disparate exercises performed by clients.

The investigations directed in past tell us that algorithms which are machine learning for example, Naiv Bayes tree (NBTREE), Decision Tree (C4.5), Neural Networks (NN), k-Near Neighbors(k-NN) and Support Vectors Machine (SVM) are utilized for order holding cell phone information. As of late, Collaborative learning and expanding methods are found to improve on the precision of classifiers. Collective learning has also been successfully tried and approved adequately on different datasets. Methods are presented in which labels the results and conversation.

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II. LITERATURE SURVEY

A. Umut Uladag, Kemal Atlundag, F Esgin, Nur Muhammad, Naciye Celeni Kamile

"An Unconstrained Activity Recognition Method Using Smartphones"**,** 2018

The author has implemented human action acknowledgment execution rates, utilizing accelerometer and signals from gyroscopes obtained utilizing cell phones. Covering the seven essential activities which are strolling, running, bouncing, standing, descending steps, ascending steps and sitting down and standing up as a single activity and a complicated activity getting in out of a vehicle, with in excess of hundred subjects in the data-archieve gathered in various conditions. K-stars calculation is utilized by six classifier that gives ninety eight percent precision for an action acknowledgment.

B. Charlene, V. Buenaentura, Nestor Michael, C. Tiglao, "Basic Human Activity Recognition Based on Sensor Fusion in Smartphones", 2016

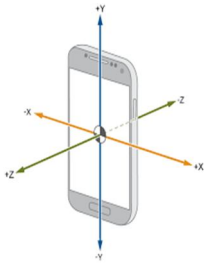
The writer has executed that acknowledgment execution of gyrator, accelerometers and also the magnetometer which when utilized independently and at the same time on an element level sensor combination is inspected to increase significant information that can be utilized in unique detecting and information assortment. Six mobile exercises, to be specific, strolling, sitting, running, standing, strolling up the stairs and strolling down the stairs, are deduced from the low-sensor information gathered from pants pocket on the right side of the subject and highlight choice is performed to additionally enhance asset use.

Relief f algorithm's prime use is feature extraction. Algorithms which are utilised for classifications are k nearest neighbour and decision tree. The article tells us that k nearest neighbor algorithm gives the best output when it is in comparison with the decision tree.

III. DESIGN AND IMPLEMENTATION METHOD

A. Hardware Requirements

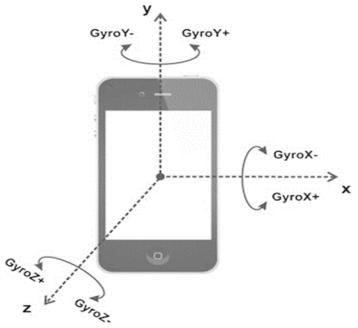
1) Accelerometer Sensor



To gauge forces of acceleration we use an electromechanical gadget known as an accelerometer. Such powers might be static, similar to the gravity's continuous force or, just like the case with numerous cell phones, dynamic to detect vibrations or movements. Acceleration can be defined as the estimation of speed or velocity in division by time.

Accelerometers which are multi and single axis can recognize both the extent and the course of acceleration which is proper, as a vector amount, and then could be utilized to detect orientation (reason being change in direction of mass), facilitate speeding up, vibration, falling and shock in a medium which is resistive. Accelerometers which have micromachined microelectromechanic frameworks (MEMS) are progressively found in convenient gadgets and game controllers of the computers, to identify changes in places of these gadgets.

2) Gyroscope Sensor



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Gyroscope sensor is a gadget which can quantify and keep up the angular velocity and orientation of a particular object. Angular Velocity Sensors or Angular Rate sensors are some other names given to Gyroscope sensors. The installation of the gyroscope sensors is done where object orientation is hard enough to be detected by humans.
Gyroscopes can be utilized in the inertial system of navigation like in the case of a Hubble Telescope, and also inside steel hull of submarine which is submerged. Because of their accuracy gyroscopes can be used in tha gyrotheodolites to keep direction in the mining of tunnels.

B. Implementation

In this Project we can used to react-native framework and flask server with mongo dB database. In first step we can create the UI in the application like login page, sign up page and home page.
Second step we can create a flask server and connect to the application UI before we can connect flask to mongo dB database. We can used connecting mongo dB to flask server is pymongo library.
Third step we can create a sign up method in flask to create a new user into the database and then we create a login method and give them authentication for the login session.
Fourth step when we successfully login then sensors data(accelerometer, gyroscope) get data and send to the server. Then server get that values and using machine learning k-nn method we can predicted the output
Fifth step this output and accelerometer value send to the application and show to the home page screen. we can also this data store in database and count users activity.
Sixth step if user can see their past activity then we can show them in graphical format (pie chart).
User can also see their activities in time slot also 12-3,3-7,7-10 etc.

C. K-NN Algorithm

K Nearest Neighbor (K-NN) is very simple, easy to understand, flexible and one of the best machine learning algorithms. K-NN is used in a variety of applications such as finance, health, political science, handwriting discovery, photo recognition and video recognition. In Credit Estimates, financial institutions will predict customer debt ratio. In repayment of mortgage loans, banking institutions will predict the loan is safe or risky. In political science, dividing those who may vote in two categories will vote or will not vote. The K-NN algorithm used for both classification and imaging problems.
For K-NN, K is the number of nearest neighbors. The number of neighbors is the determining factor. K is usually an odd number when the number of classes is 2. When K = 1, then the algorithm is known as the nearest algorithm.
The flowchart is shown as below:

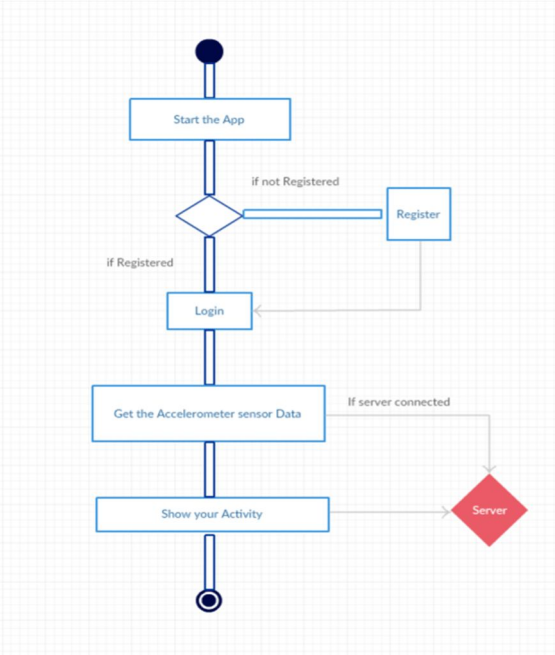

Figure 1: Flowchart of Application.

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IV. RESULT

This figure.2 is a Login page if user is a register then entered the valid email address and password. Then shows the dashboard page or When user enter invalid email and password then shows the error massage. if user is not registered then click the text (Don't have account?) and go to the page of signup.

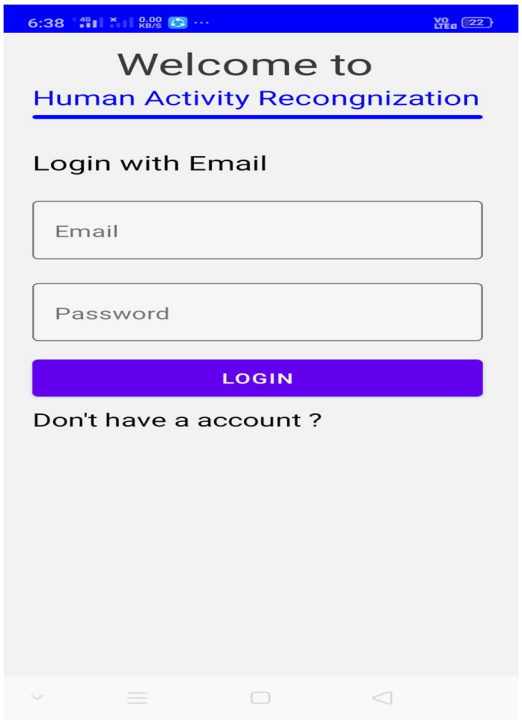

Figure 2: Login Page

In figure.3 is a signup page if user is not registered then enter the email and password and then this data store in our databased. When user successfully registered then click text(already have a account?)and go to login page.

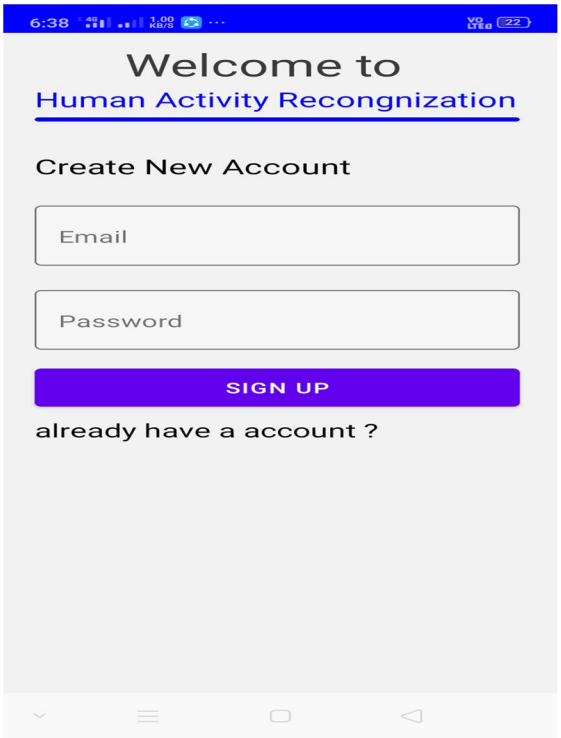

Figure 3: Signup Page

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In figure.4 when user standing then Accelerometer send the parameter to the server and according to this parameter server peredict the standing output.

Figure 4: Standing output

In figure.5 when user sitting then Accelerometer send the parameter to the server and according to this parameter server peredict and give this sitting output.

Figure 5: Sitting output

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In figure.6 when user Walk_DownStairs then Accelerometer send the parameter to the server and according to this parameter server peredict and give this Walk_DownStairs output.

Figure 6: Walk Downstairs output

In figure.7 when user laying then Accelerometer send the parameter to the server and according to this parameter server peredict and give this output.

Figure 7: Laying output

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V. CONCLUSION

We did successfully create the health-care application that can detect your activities and showing you to your past activities also. Given the output in the user's past activity which is displayed in pie-charts separately.

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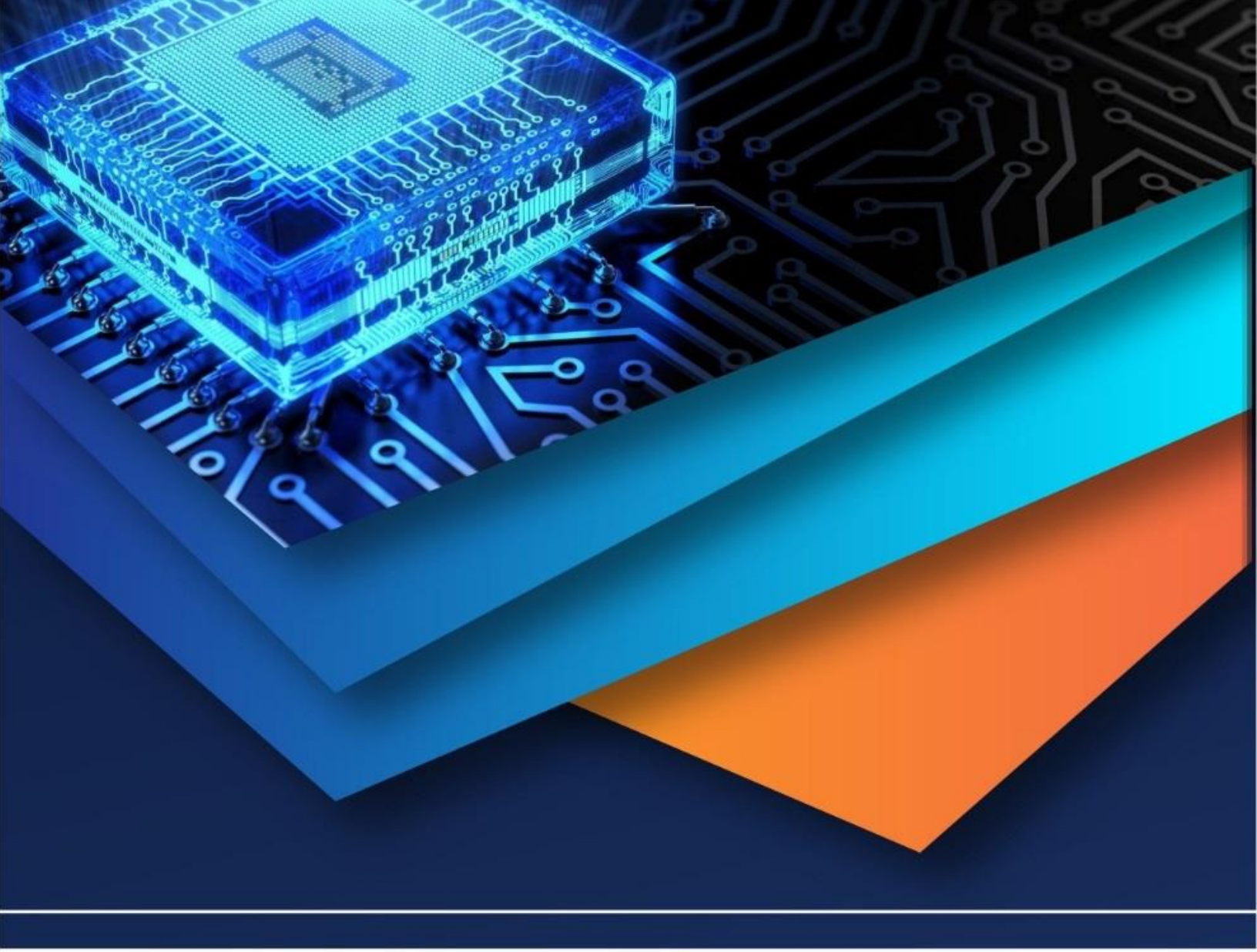

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