iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** III **Month of publication:** March 2022

DOI: https://doi.org/10.22214/ijraset.2022.40905

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue III Mar 2022- Available at www.ijraset.com

Smartphone User Behaviour Predication Using AI

Mayur Ramesh Chavan[1], Akshay Avadhut Kulkarni[2], Mohammad Kaif Shakil Mulla[3], Ashish Hanmant Mahadik[4], Omkar Jagnnath Waghmare[5], Dr. S V Balshetwar[6]
[1, 2]*Dr. Daulatrao Aher College of Engineering Karad*

Abstract: ***There are lots of Smartphone users data floating around which is not efficiently used for improving user experience and which can be used to provide a better user experience or enhance the current one. Enhancing user experience is a challenge as there are multiple competitors. A persons time spend on their Smartphone is an vast amount of time and everyone is trying to reduce this time by implementing efficient ways of android user experience. Starting with our work, which will focus on this user floating data? There are important segments of this user data one of them is facial data because humans are used to taking in non verbal cues from facial emotions. And also we are focusing on factors like user surrounding sound, user's locations and patterns of application used history.***

I. INTRODUCTION

As in the 21st century Electronics devices are conquering the whole world and use of Smartphone is increasing day by day in which most of the time spent on smart phone is less productive, whereas it leads to wastage of time. So while studying an average Smartphone user we found that the Smartphone can cause two different problem, where first one shows a negative and second one shows positive impact of Smartphone . Coming to the first problem shows us the deficiency.

So now we will discuss the first problem and further continue to explain second problem. There are lots of Smartphone user's data floating around which is not efficiently use for improving user experience and which can be used to provide a better user experience or enhance the current one. Enhancing user experience is a challenge as there are multiple competitors. A persons time spend on their Smartphone is an vast amount of time and everyone is trying to reduce this time by implementing efficient ways of android user experience. Overusing pattern of Smartphone involves a tendency to check notifications all the time. Such behavior pattern can induce "reassurance seeking" pathway which broadly includes symptoms such as loneliness, low self-esteem, depression, and anxiety. Excessive use of Smartphone may also affect sleep patterns by reducing rapid eye movement sleep, slow-wave sleep and consequently causing sleep.

II. LITERATURE REVIEW

Coming to the first problem discussed above that is the overusing pattern of Smartphone involves a tendency to check notifications all the time. Such behaviour pattern can induce many health problems. After studying these problems we found that there can be a single solution, which will be focusing on prediction of an average Smartphone user behaviour. As this can be a challenging task because there are varieties of peoples from different age group, different background, etc.

So we decided to focus on a specific group of people which are "Students". As student are the most suffering from Smartphone addiction as they are in there early years of education life. Student may feel overwhelmed, curious, lonely, bored, stressed, depressed or even anxious about something. Once they enter in virtual world of Smartphone applications, they might feel to forget worries and feel better. But this can further lead to addiction, as student can make Smartphone as comfort zone and spend more and more time on Smartphone. Smartphone is a device that brings the world closer to us but excessive use of it can disturb real world connections.

As we have studied problems related to Smartphone user behaviour found some solutions and these solutions are highlighted are in our research. In [1] Ankita Kanhangadand and et.al.in there paper had taken the data from the sensor like orientation sensor, accelerometer sensor and gyroscope sensor which are built-in sensors. And from these dataset taken from the various sensors they are going to only predict the human behaviour. The analysis of human behaviour has been proven to be effective in various applications including biometricbased user authentication, smart spaces, human-machine interactions, physical activity recognition and surveillance. The advantage of this thing is human behaviour is captured unobtrusively without requiring a conscious effort on the part of user. This study will help us to explore techniques that can be used to predict human behaviour.

As per [2] Subrata Tikadar and Samit Bhattacharya are it is very important to know user behaviour to design and built effective interaction system, tools or application.

©IJRASET: All Rights are Reserved

The behavioural study not only helps to assure the success of any design or product but also helps other researchers from various related areas. They have systematically collected and analyzed the behavioural data for Smartphone usage by 1711 students of 188 academic institutions throughout India.

They have also observed students behaviour on Smartphone usages both inside and outside the classroom. They have also found dissimilarities and are also expecting that the findings of the study will help many researchers from various fields including HCI, Mobile HCI, Behavioural Science, Psychology, and Education. This study will help us to know importance of prediction of human behaviour and explore its depth knowledge.

As per [3] authors have here presented the article, which present the frameworks for mobile audience measurements, for collecting data at the point of convergence - devices.

This paper compares the presented framework to alternative methods of mobile user research, and identifies the unique advantages of on-device measurements along with the key weaknesses. This study shows us that there are various techniques of mobile audience measurement from various aspects through a Smartphone.

In[4] Ruxia hong has focused on the research of mobile user behaviour based on big data and it has become one of the hotspot in the field of internet, Every internet user leave their footprints.

It is based on the analysis of the characteristics of mobile user's big data and hadoop system, an analysis model of mobile user's behaviour pattern based on big data is constructed, it includes data acquisition module, data pre-processing module, user behaviour analysis module, application of mobile user behaviour model and data visualization module, and the function of each module is explained in detail. This study shows us that big data can play a measure role to analyse data sets and also that internet can be a vast plays to explore Smartphone user data.

As per [5] author has given the model of machine learning for activity recognition and authentication of Smartphone user.

As per Authors technological advancements have made Smartphone’s to provide wide range of applications that enable users to perform many of their tasks easily and conveniently, anytime and anywhere. As per their study many users are tend to store their private data in their smart phones.

Since conventional methods for security of Smartphone’s, such as passwords, personal identification numbers, and pattern locks are prone to many attacks, this research paper proposes a novel method for authenticating Smartphone users based on performing seven different daily physical activity as behavioural biometrics, using Smartphone embedded sensor data. This authentication scheme builds a machine learning model which recognizes users by performing those daily activities. This study shows us that Smartphone sensors can be combined and used for user identification to increase security measures.

As per [6] Balaji Balasubramanian and Pranshu Diwan et. al. signify in their paper that human beings relay a lot on non-verbal communication and facial emotion in large. In this Paper they cover the dataset and algorithm that are used for Facial Emotion Recognation(FER). And the algorithms range from simple Support Vector Machines (SVM) to complex Convolutional Neural Network (CNN). This paper shows us importance of facial emotion and how it can play a measure role in our work since they have also represented various techniques for recognising it.

As per [7] Richard Han, Mahnaz Roshanaei and Shivakant Mishra all authors present in this paper have formed a group of 20 peoples for a research that put in the picture how every individual from the group reacts in different scenario that relates with respect to their Smartphone. They experimented most of the possible scenarios and prepared data sets to be tested with machine learning algorithms for the better accuracy to knowing their behaviour.

As per [8] Natasha Jaques, Sara Taylor, Asaph Azaria and et.al. focused in this paper that an average teenagers happiness depends on some of their close things that also includes there Smartphone’s and other things like sleep. These things can affect measure things in their life and can also result in their personal losses and they also found 70% accurate module that shows this behaviour. This study can help us with our research to know about this factors and there consequences.

As per [9] mobile phones are equipped multiple sensors from which there are new opportunities to analysis user’s daily behaviours and also how truly intelligent personal devices are.

They have proposed a MAST (movement, action & Situation over Time) model to explore along this direction and identify key technology required. And also they have found an idea of reducing power consumption for mobile phones with the help of phone-cloud collaboration model. This study shows us a new model known as MAST and it can be very valuable in our survey.

As per [10] Smartphone have lots of resources that can be utilized to enhance user behaviour analysis. Study shows that how Psychological Science can be used to study user behaviour, it gives an idea about various opportunities for analysing Smartphone and it can be helpful in our work.

Below Table1.1 shows comparison of different techniques used to analyse Smartphone user behaviour

Table 1. Comparison Table

Sr. No.	Paper Name	Publisher	Techniques	Merits	Demerits
1	Smartphone usage contexts and sensible patterns as predictors of future sedentary behaviours	Qian He, Emmanuel O. Agu	Here logistic Regression technique is used	1.With the help of logistic Regression they are able to classify user context variable such as location, time and app usage. 2.The paper also shows that users are very sedentary or not, means in other words how much user is spending time as seated.	The paper is only limited to students and student age group only.
2	Smartphone app usage as a predictor of perceived stress levels as workspace.	Raihana Ferdous, Venet osmani, Oscar Mayora	Here predicting a stress level of user based on smartphone app usage technique is used	1. By understanding the patterns of app usage and investigating relationship of these pattern the perceived stress level within the workspace context. 2. The result they have achieved is average of accuracy of 75% and precision of 85.7% can be used as an indicator of over all stress level in work environment.	This paper only show smartphone user stress levels and it is not enough to predict it next move.

3	Machine Learning models for activity recognition and authentication of smartphone users.	S. Sareh Ahmadi, Sherif Rashad, Heba Elgazzer	Here normal technique for security of smartphone and conventional method for same is used.	1. This paper tend to provide a better way to increase security of users data. 2.With the help of seven different physical activities like behaviour biometrics, using smartphone embedded sensor data security is provided in the sense of passwords, personal identification numbers, and pattern locks etc.	The proposed way of security requires 7 daily activates and it leads to more time consumption.
4	Artificial Intelligence and Mobile Phone Sensing based User Activity Recognition	Chia-Liang Chen, Fu-Ming Huang, Yu-Hsin Liu, DaiEn Wu	Here four supervised machine learning technique is used and various classification models are made	1. With the help of logistics regression, and support vector machine automatic activity classification model is created. 2. They have evaluated the prediction performance and the results of these experiments shows that under specific acceptance of accuracy and minimum model training time, the decision tree algorithm creates the best model.	This paper only show the best algorithm for User Activity Recognition but not tend to give an patter or prediction.
5	Identifying smartphone users based on how they interact with their phones	Mohammed A. Alqarni, Sajjad Hussain Chauhdary, Maryam Naseer Malik	Here also they had used the technique of machine learning various algorithms, Gesture recognition and behavioural	1. The maturity in sensor chips and machine learning algorithms provides a better solution for authentication problems based on behavioural biometrics, which aims to identify the behavioural traits that a user possesses,	This paper tends to use more physical activities than use of smartphone itself.

			biometric is also used.	such as hand movements and waving patterns etc. 2. Their research study aims to provide a solution for passive and continuous authentication of smartphone users by analysing their activity patterns when interacting with their phones.	
6	Is Smartphone usage is truly smart? A Qualitative investigation of IT addictive behaviour	Liette Lapointe, Camille Boudreau-Pinnsonneault, issac vaghefi	Here they have used a grounded theory to report the result of addictive smartphone usage.	1. As per the investigation i.e. the 11 depth interviews and answers to 183 exploratory questions they have revealed out of four smartphone user profiles two of these are exhibiting addictive behaviour.	The paper show the study that show if a person is addicted to smartphone or not but it does not specifies it types or any further details.
7	A Smartphone user activity prediction framework utilizing partial repetitive and landmark behaviours	Peng Dai, Shen Shying ho	Here they have made their own technique/algorithm to find a repetitive behaviour of smartphone user.	1. With the help of Activity Prediction Framework they are giving prediction of next day behaviour of same user based on weighted sum of most similar behaviour vectors related to landmark behavour of next day behaviour. 2. With the help of arbitrary call activity, voice call activity, short message activity, media consumption and app usage datatypes, extensive experiment are carried out using nokia mobile data challenge (MDC) dataset to demonstrate the	The study conducted through this paper is based on old datasets that will not be useful that much.
				feasibility of their proposed approach.	

8	Usage Prediction and Effectiveness Verification of App Restriction Function for Smartphone Addiction	Katsuki Yasudomi, Toshitaka Hamamura, Masaru Honjo, Akio Yoneyama, Masato Uchida	This is the study paper which focuses on app restriction function.	1. They are focusing on app restriction function, which is one of the key features of digital medicines for smartphone addiction, and analyze the usage of the function and verify its effectiveness. 2. Their results showed significant differences in both psychological and behavioral aspects between those who used the app restriction function and those who did not. Specifically, they found that the app restriction function is more likely to be used by those who were more aware of their smartphone addiction.	The paper show study that only focuses on one method for smartphone addiction.
9	Human Behaviour Impact to Use of Smartphones with the Python Implementatio n Using Naive Bayesian	Iftakhar Mohammad Talha, Imrus Salehin, Susanta Chandra Debnath, Mohd. Saifuzzaman, Nazmun	Here they have used Naïve Bayes theorem to learn impact of hum an behaviour.	1. They have found out the major problem of the human behaviour's negative side and its different sources like mental imbalance, stress, depression, loneliness, etc. 2. With the help of naïve bayes theorem and classifier, support vector machine, special data set of human behavior, and probability are used to calculate accuracy.	The paper only focuses on the accuracy of the system and does not tends to give an specific output to human behaviour with respect to smartphone.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

10	Human Behaviour Analysis through Smartphones	Kostas Konsolakis, Hermie Hermens, Claudia Villalonga, Miriam VollenbroekHutten	This is also actually a survey paper which is addressing the huma n behaviour analysis.	1. This paper surveys the state-of-the-art in human behaviour analysis based on smartphones. 2. They have categorize prior works into four main sensing modalities related to physical, cognitive, emotional and social behaviour which will help the smartphone user to improve themselves.	The tends to only understand human behaviour and doesn't tends to use this analysis for Furter prediction proposed or else.

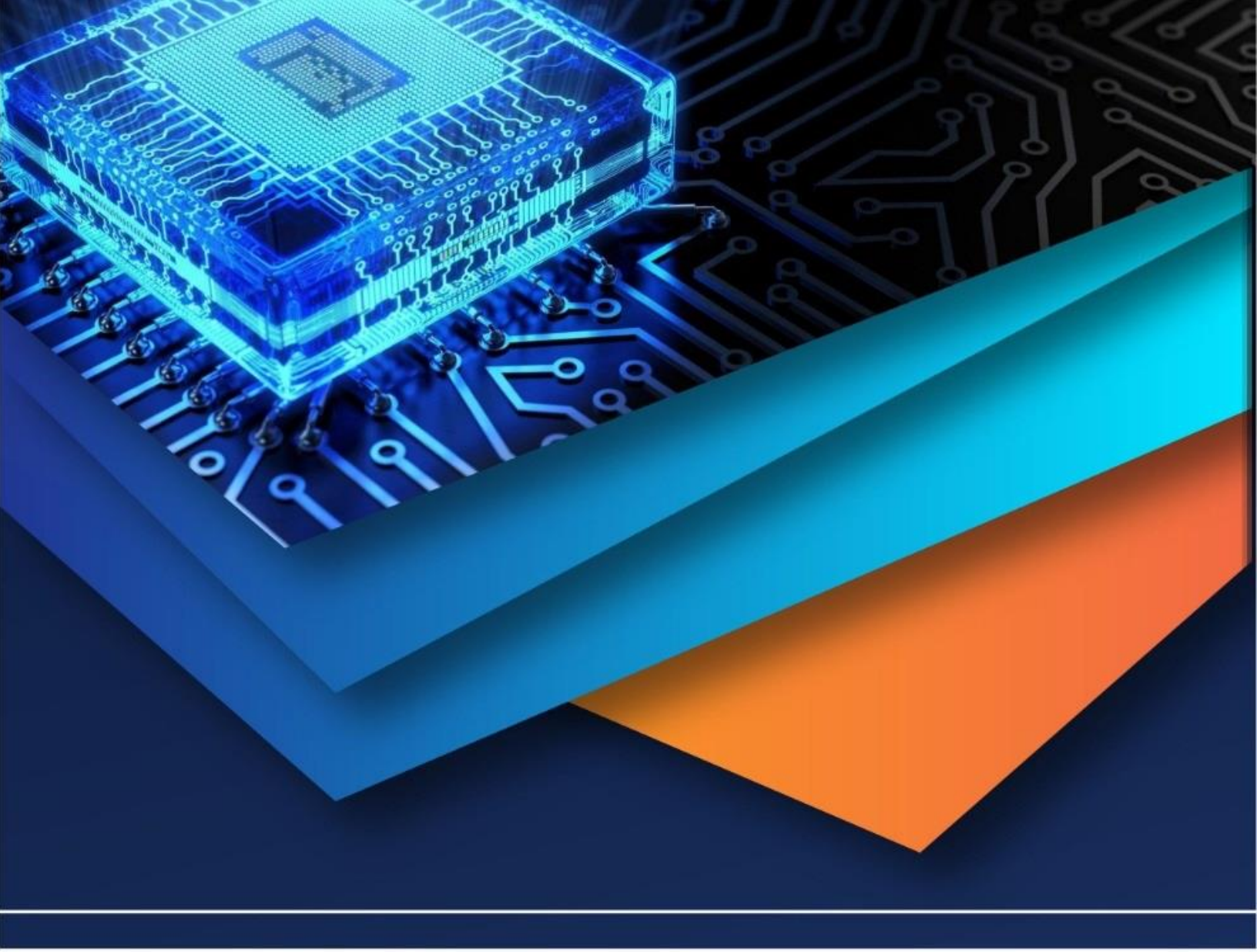
III. CONCLUSION

A. The task of manually performing every search, every navigations involves a quit amount of time and can be also frustrating task.

B. So this study shows us that a simple suggestions that follows the predictions done by the AI can make a difference in users smartphone experience.

REFERENCES

[1] Jain, Ankita Kanhangad, Vivek [Supervisor], "Human behavior analysis• using smartphone sensor data", Discipline of Electrical Engineering, IIT Indore, 8Mar-2019.
[2] Subrata Tikadar, Samit Bhattacharya, "How Do They Use Their• Smartphones: A Study on Smartphone Usage by Indian Students", IIT Guwahati - Indian Institute of Technology Guwahati, 2020.
[3] Hannu Verkasalo, "Analysis of Smartphone User Behavior", IEEE, 2010
[4] Ruxia Hong, "Research on Mobile User Behavior Mining Model Based on Big Data", IEEE, 2020.
[5] S. Sareh Ahmadi, Sherif Rashad, Heba Elgazzar, "Machine Learning Models for Activity Recognition and Authentication of Smartphone Users", IEEE, 2020.
[6] Balaji Balasubramanian, Pranshu Diwan, Rajeshwar Nadar, Anuradha Bhatia, "Analysis of Facial Emotion Recognition" IEEE, 2019.
[7] Mahnaz Roshanaei, Richard Han, Shivakant Mishra, "EmotionSensing: Predicting Mobile User Emotions", IEEE, 2017.
[8] Natasha Jaques, Sara Taylor, Asaph Azaria, Asma Ghandeharioun, Akane Sano, "Predicting students' happiness from physiology, phone, mobility, and behavioral data", IEEE, 2015.
[9] Jiqiang Song, Eugene Y. Tang, Leibo Liu, "User Behavior Pattern Analysis and Prediction Based on Mobile Phone Sensors", Intel Labs China, Beijing, China.
[10] Gabriella M. Harari, "Using Smartphones to Collect Behavioral Data in Psychological Science: Opportunities, Practical Considerations, and Challenges", Department of Psychology, The University of Texas at Austin. Smartphone Addiction - Lawrence Robinson, Melinda Smith, M.A., and Jeanne Segal, Ph.D. Teens and social media use: What's the impact? - Mayo Clinic Staff , How to Break a Bad Habit and Replace It With a Good One – JAMES CLEAR.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)