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Calculation of Human Productivity

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***Abstract*—Smartphones nowadays have become indispensable personal gadgets to support our activities in almost every aspect of our life. Because of technological advancements, many mobile apps have been created and used, thanks to a wide range usage, data logs are generated and ambience context is recorded forming a rich data source of smartphone user's behaviour. To help enhance their personal productivity, by providing effective feedback and recommendation, we're deploying a self-monitoring system that captures not only their mobile app usage but also their personal computer's usage patterns and derives the productivity. We will be building a web app and an android application which will be synchronized and the results will be displayed on both the devices. Synchronization will enable seamless operation on both mobile and PC. Hence, the system has been designed keeping in mind its various usage scenarios and the relevant parameters have been handled by different components to provide an efficient solution to the defined problem.**

I. Introduction

A. Motivation

Often times it is observed that people are not able to use their time effectively and efficiently. These problems are faced by students as well as working professionals and they are unable to understand how productive they are. Our application provides a solution to such problems.

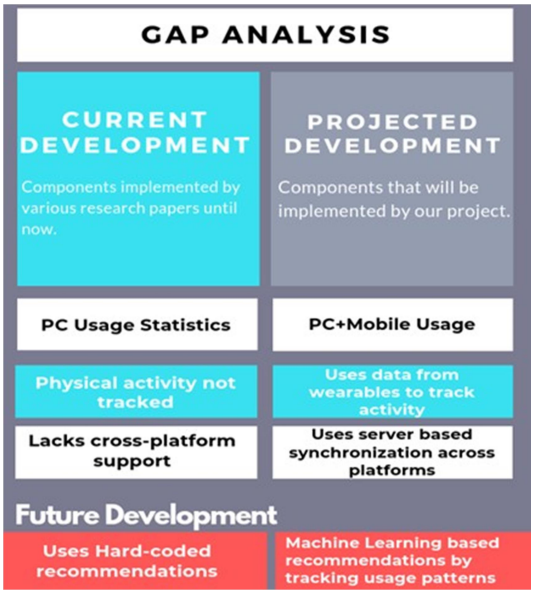
B. Problem Definition

This project utilizes Data Mining to gather data from various devices.For example: Mobile Devices(screen time data, app usage statistics),Wearable Devices(fitness tracker data and statistics) and PC(usage statistics).These statistics are collected and calculated throughout the day, aggregating the mined data to calculate productivity of the user.

II. Literature Survey

Reference	Paper	Purpose	Technology	Advantages	Disadvantages
Dr. Gayle R. Jesse	Smart-phone and App usage among college students	Using Smartphones effectively for social and Educational Needs	Moodle Learning Management System SurveyMonkey, Microsoft Excel	Observations regarding multitasking in classes by students. Cellphones and their excessive usage influence specimens and their behaviours.	Disadvantages Include cost, size of life and Usability.
Hong Cao Miao Lin	Mining smart-phone data for app usage prediction	Discovering smartphone usage pattern and recommend necessary app	Latent Dirichlet Allocation (Python) , WSN, Naïve Bayes implementation.	Recommendations according to usage patterns. Exploration and Ideation of new concepts to fuel innovative applications.	Privacy preservation while data sharing and transmission.
Pammer, V., & Bratic, M.	Activity Log based time analytics for time management	Usefulness of time analytics based on activity log data created by activity tracking on PC.	PC usagetracker Tool, GNOME Zeitgeist Slife	Gain insights with the regard to time management and get help to set goals.	Did not help to change time management practices.

III. Gap Analysis



Currently we are working on PC along with mobile and we are also going to incorporate wearables which includes fitness tracker. Data from all these three devices will be used to track activity. As of now, physical activity has not been tracked and the current projects lack cross platform support as opposed to that our project will make use of a server based synchronization which will be platform independent. The synchronization features clubbed with data collection from wearables is a novel addition in our system. Other projects use hard coded recommendations. On the other hand, we are looking at machine learning based algorithms to provide recommendations by tracking user patterns.

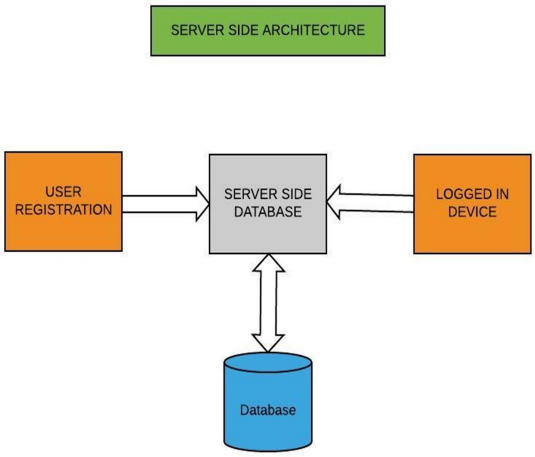
IV. Proposed Work

Our system takes into account the the limitations of the previously implemented solutions and expands upon the work by introducing newer features.

The system provides support for cross-platform operation by synchronisation with a centralized server. It also has a wider variety of sources for gathering information by tracking PC, Mobile and Physical activity. This diversification of information sources provides a better resolution to the data and has a better chance at improving the accuracy of the system.

Thus, our system will run simultaneously on multiple devices, constantly providing data which can be analysed effectively to calculate productivity on a larger scale

V. System Architecture

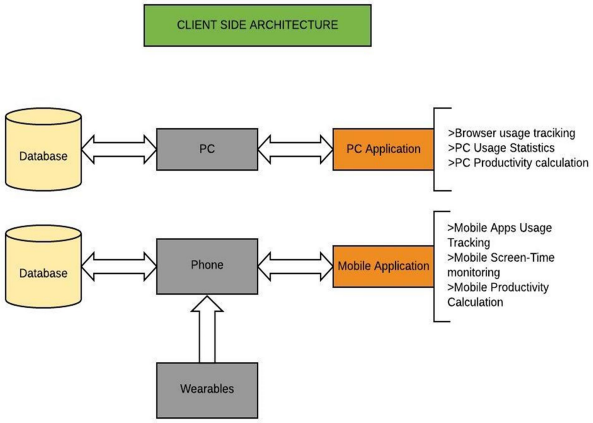


In the server side architecture initially the user has to register by entering his relevant credentials through our interface. The credentials could be name, height, weight, age and so on. If the user has already registered in our application then the user will have to log in using his or her credentials.

Users will have to connect the devices which may include his or her smartphone, laptop or computer and a wearable device(fitness tracker)

All the profile information of the user will be saved in the server side database along with his or her archived reports

All devices running the application will be synchronised through the server



In the client side architecture, the application will be present on mobile as well as PC .On the PC application ,PC usage stats will be calculated in no of units of time .The browser usage will also be tracked to help in calculating the productivity score .This productive score will be used for determining leisure time and optimize efficiency with respect to physical well being as well as mental

health. On the mobile application, mobile app usage stats will be fetched along with screen time stats so that they can facilitate in Analysing the data by creating a productivity score which is similar to the score calculated on the PC app. Both the scores will be aggregated to calculate an overall productivity

This will be further used for visualisation will be easier to understand and help in making quicker decisions to maintain the work life balance and improve wellness.

VI. MATH MODEL

Positive Framing	Negative Framing
Productive duration $= t_{prod} + 0.5 \times t_{ntr}$	**Distracted duration** $= t_{dst} + 0.5 \times t_{ntr}$
Productive rate $= \frac{\text{Productive duration}}{t_{total}}$	**Distractive rate** $= \frac{\text{Productive duration}}{t_{total}}$

$t_{\{productive,neutraldistractive\}}$:total duration labelled as {productive, neutral, distractive}
t_{total} : total computer usage duration. Equals to $t_{prd} + t_{ntr} + t_{dst}$

VII. CONCLUSIONS AND FUTURE WORK

Thus the described approach and design will help us in full implementation of the chosen problem statement. Our application aims to solve a pervasive problem by materializing a simple solution and provides tangible results. With the help of advance methodologies like Machine Learning and Data Analysis, the future module of our project focuses on providing user-specific recommendations by archiving and analyzing the results generated over a period of time.

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