IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Machine Learning Analysis To Personalize The Study Habits Analysis

Manjula K
Assistant Professor
SJC Institute of Technology
Chickballapur, Karnataka, India

Sneha Latha N L
Dept of Electronics and Communication
SJC Institute of Technology
Chickballapur, Karnataka, India

Udaya Priya S
Dept of Electronics and Communication
SJC Institute of Technology
Chickballapur, Karnataka, India

Varshini S
Dept of Electronics and Communication
SJC Institute of Technology
Chickballapur, Karnataka, India

***Abstract*—** To optimize study habits and enhance concentration, it is imperative to mitigate the array of distractions and interruptions pervasive in daily life. The proposed "study smarter" system aims to identify and mitigate detrimental habits that impede focus, offering actionable insights to boost learning efficacy and velocity, while minimizing extraneous behaviors. Leveraging a noise sensor to detect nearby disturbances and utilizing camera capture technology to relay real-time alerts to a mobile device, the system facilitates prompt identification and resolution of disruptive factors, thereby elevating the quality of study sessions. By seamlessly integrating sensory feedback and instant notifications via display or smartphone, the "study smarter" system streamlines the process of recognizing and addressing distractions, ultimately refining the efficiency and effectiveness of study.

***Keywords*—** Study smarter, Array of distractions, Study habit, Concentration

I. INTRODUCTION

There are many distracting elements in our lives today, which are disruptive when it comes to studying or working when a high level of focus is needed. It is quite challenging to objectively recognize these elements and exclude them from one's environment during these mentally taxing sessions. Poor behaviors are much easier to change once we become aware of them, by making study time more productive. the solution employee an algorithm that recognize noise that are distracting during studying. It recognizes speech, notification and other potentially disruptive stimuli in your area. Study smarter system notifies you of the pattern.

One can correct these disruptive habits in subsequent sessions. Once we become aware of bad habits, it is much easier to fix them to make study effective. In proposed work, notification through machine learning has three different classes: Effective, Notification and Speech. In the realm of personalized study habit analysis, machine learning serves as a powerful tool to decipher intricate patterns within a student's learning journey. By assimilating vast datasets encompassing study hours, resource utilization, and performance metrics, algorithms can discern nuanced correlations and trends.

This data-driven approach allows for the identification learning style, strengths, and areas of improvement, ultimately guiding the formulation of tailored study plans. As technology continues to advance, the energy between machine learning and education promises a more insightful and adaptive framework for optimizing the learning experience.

Personalizing study habits through machine learning involves tailoring learning experiences to individual preferences and needs. By analyzing data on learning styles, strengths, weaknesses, and progress, ML algorithms can recommend personalized study schedules, materials, and techniques. This approach optimizes learning outcomes by adopting to each learner unique characteristics and optimizing engagement and retention. By harnessing the power of data-driven insights, educators can empower students to optimize their study routines, ultimately fostering a more effective and enjoyable learning experience.

II. LITERATURE REVIEW

Elise M. Walck Shannon et.al presents a study focusing on students self reported study habits and their correlation with exam performance, while controlling for potential confounding factors. It emphasizes the importance of understanding how students study outside of class and impact it has on their academic success. First, we found that, on average, students used approximately four active strategies to study and that they spent about half of their study times using active strategies. In addition, both the number of active strategies and the proportion of their study time using active strategies positively predicted exam performance[1]

Anastasia Buyalskaya et.al presents a machine learning technique to characterize habit formation in two large panel data sets with objective measures of 1) gym attendance and 2) hospital handwashing. Our Predicting Context Sensitivity (PCS) approach identifies context variables that best predict

behavior for each individual. These time series predictability values are used to trace a habit formation curve for each individual, operationalizing the time of habit formation as the asymptotic limit of when behavior becomes highly predictable[2]

Oladapo Oyebode et.al analyzed research trends on personalized learning by bibliometric analysis method through the study. The following issues are investigated: 1) Development scale, growth trajectory and geographical distribution of the research; 2) Outstanding authors and works on Personalized Learning; 3) Outstanding magazines and books on the topic; 4) Key themes found in these documents, and 5) Prominent methods used for personalized learning[3].

Thalia Richter et.al addresses the psychiatric diagnostic procedure is currently based on self-reports that are subject to personal biases. Therefore, the diagnostic process would benefit greatly from data-driven tools that can enhance accuracy and specificity. In recent years, many studies have achieved promising results in detecting and diagnosing depression based on machine learning (ML) analysis. [4]

III. Proposed System Architecture

The system configuration includes the following components: an Arduino Nano 33 BLE, a Microphone, a Proximity sensor, a Camera and a Node MCU.

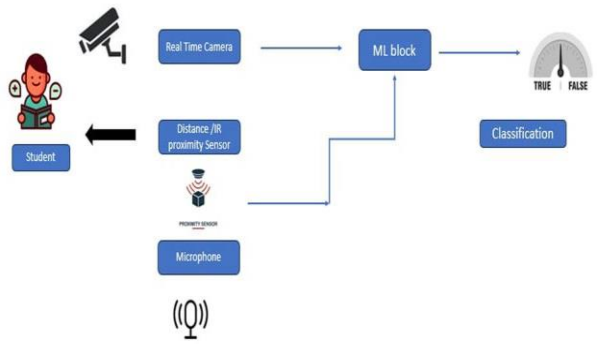

Fig. 1. Proposed system for monitoring study system

The system consists of a Arduino Nano 33 BLE, Bluetooth Low Device and the camera is connected as shown in the circuit. The BLE is having a integrated different sensor in that we make use of the proximity sensor which is used to know the distance. The microphone is also integrated in it, it is used to recognize the voice of the user. Firstly, the user starts the monitoring using the android app. When the session is started, the app collects data about the session through the BLE and send the message through the display. Node MCU is used to push data to cloud.

The data from the user is collected and transferred to the Arduino, which has a microphone to collect noise. If noise is detected, it will display a message saying, "Noise detected, please go back to studying." The proximity sensor measures the user's distance, with values of -0 for close, -255 for far, and -1 for error. If the proximity value exceeds the threshold, it sends the message "Person detected studying"; otherwise, it sends "Person not detected, not studying.

IV. Hardware & Software Requirements

A. *Hardware Components*

1) **Arduino Nano 33 BLE**

The Arduino Nano 33 BLE is a compact development board based on the nRF52840 microcontroller from Nordic semiconductor. It is part of the Arduino Nano series and is specifically designed for Bluetooth Low Energy (BLE) applications. Here are some key features and specifications of the Arduino Nano 33 BLE. The CPU used in it is ARM Cortex- M4F.Analog input pins consists of 8 (12-bit ADC).

2) **Proximity Sensor**

The Proximity Sensor is also integrated in the Arduino Nano 33 BLE. It is used to detects the presence of nearby objects without any physical contact. This can be done using the electromagnetic radiation beam or field or return signal changes in the event of the presence of any object in its surrounding.

3) **Microphone**

A Microphone is also integrated in Arduino Nano 33 BLE. It is a sensor or transducer which converts sound to electrical signals.

4) **Camera**

The Camera can provide advanced features such as image archiving, motion sensing, custom coding. The built-in noise-reducing mic makes sure the our voice comes across clearly up to 1.5 meters away, even if we are in busy surrounding the screen size is 2 inches. The megapixels are very small dots of color that makes a visual image with more megapixel.

5) **Node MCU**

Node MCU is an opensource firmware for which open source prototyping board designs are available. The name "Node MCU" combines "node" and "MCU" (micro-controller unit). Strictly speaking, the term "Node MCU" refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. The firmware is built on the Non-OS SDK for ESP8266. It uses many opensource
projects, due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

B. *Software Components*

1) **Open CV**

A popular open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of Objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. It has C++, Python, Java and MATLAB interfaces and supports Windows, Linux,

Android and Mac OS. OpenCV is written natively in C++ and has a templated interface that works seamlessly with STL containers. It provides various functions for image and video processing, including object detection, feature extraction, and image manipulation. It's widely used in applications ranging from robotics to augmented reality.

2) **Arduino IDE**

Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. Arduino IDE is an open-source tool that makes it possible for users to write as well as upload code to a work environment in real-time. Since the written code will be moved to the cloud, it's frequently used by those who need an additional level of redundancy. Arduino IDE offers full compatibility to any Arduino-based software board. The software can easily be deployed in any Linux, Mac, or Windows operating systems. Most of its parts are written within JavaScript for seamless compilation and editing. While the tool's main aim is based on code writing, it offers several noteworthy functionalities. For instance, Arduino IDE lets users share important project information to company stakeholders. Users are given the freedom to make internal layouts and schematic modifications when needed. Comprehensive guides are available for those who need help in the installation process.

3) **Google Media pipe**

Google Media Pipe is an open-source framework for building cross-platform multimodal applied machine learning pipelines. It offers pre-built solutions and customizable components for tasks like object detection, face detection, hand tracking, pose estimation, and more. Developers can use it to build real-time perception pipelines for various applications like augmented reality, gesture recognition, and image processing. is a powerful framework designed for building real-time, multimodal machine learning pipelines. Its modular, graph-based architecture, extensive platform support, and pre-built solutions for tasks like hand tracking, face detection, and pose estimation make it a versatile tool for developers. Media Pipe's integration capabilities with machine learning frameworks and support for custom graph configurations provide flexibility for a wide range of applications, from augmented reality to health and fitness, and interactive applications.

4) **IoT Remote**

IoT (Internet of Things) remote controls refer to devices and systems that allow users to control and manage IoT devices remotely. These remote controls can be physical devices, mobile applications, or web-based interfaces that enable users to interact with IoT-enabled appliances, sensors, and systems. It provide an efficient and user-friendly way to manage and interact with IoT devices. They offer real-time monitoring, automation, interoperability, and security, making them essential for smart home, industrial, healthcare, agriculture, and transportation applications.

V. Result Analysis

The subject reading habits are analysed based on the eye sight, proximity, proximity level, object distraction and the noise level. The detailed result analysis is presented

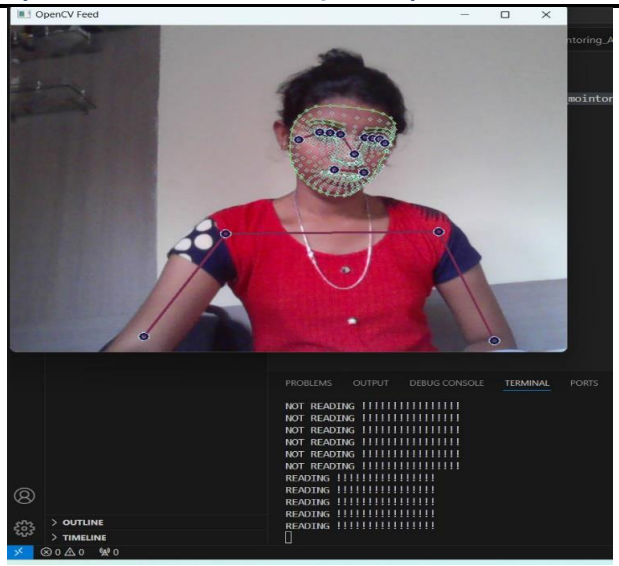

Fig. 2. Face Recognized

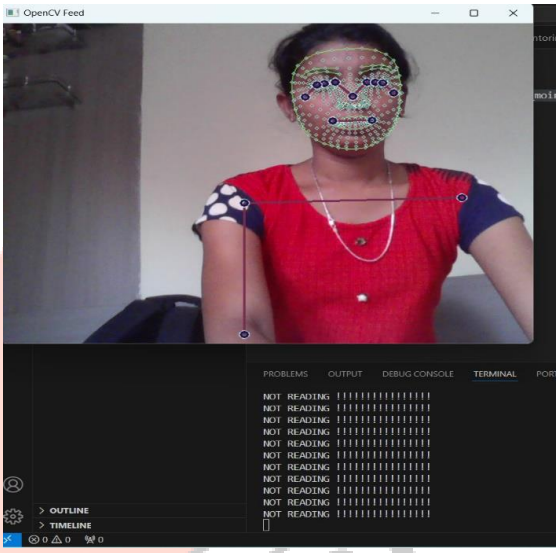

Fig. 3. Based on eye identified result is Not reading

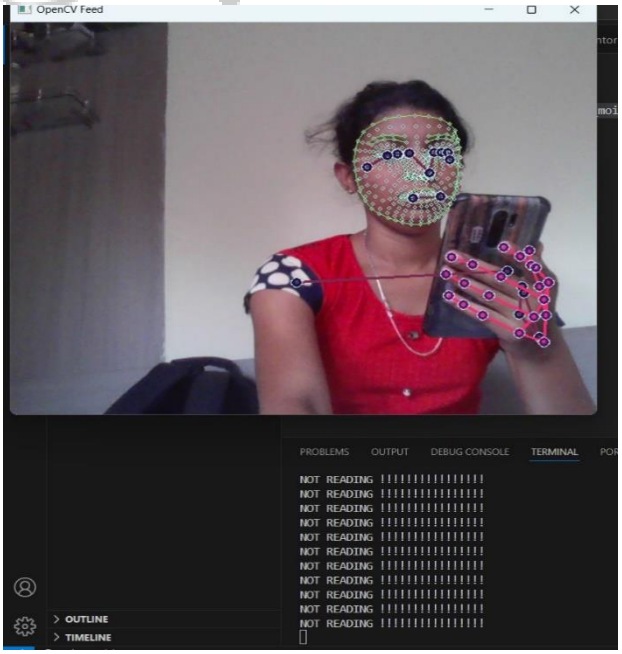

Fig. 4. The subjected is diverted to other object

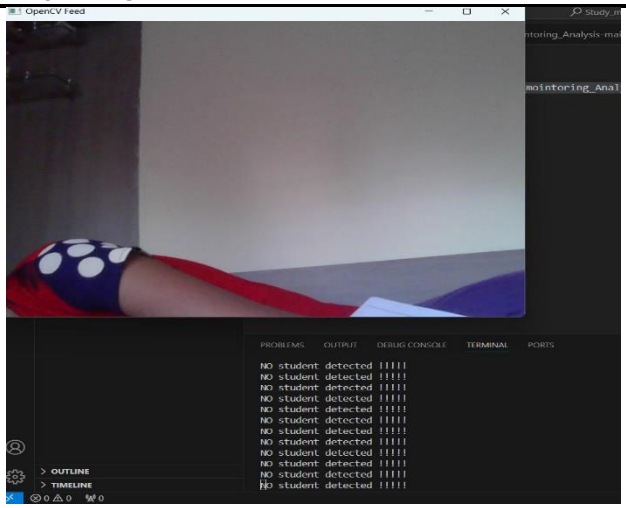

Fig. 5. No subject is detected state

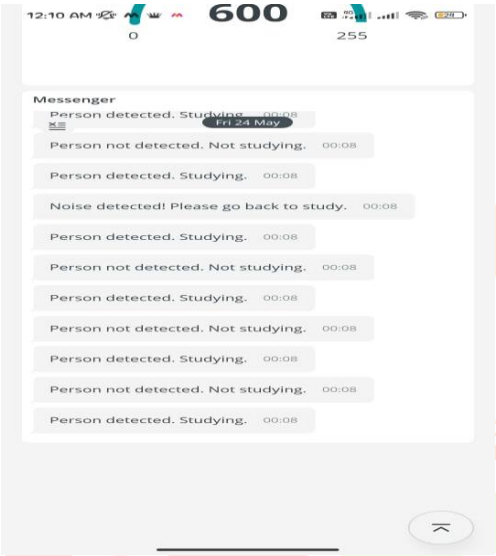

Fig. 6. The personalised messages about the study status

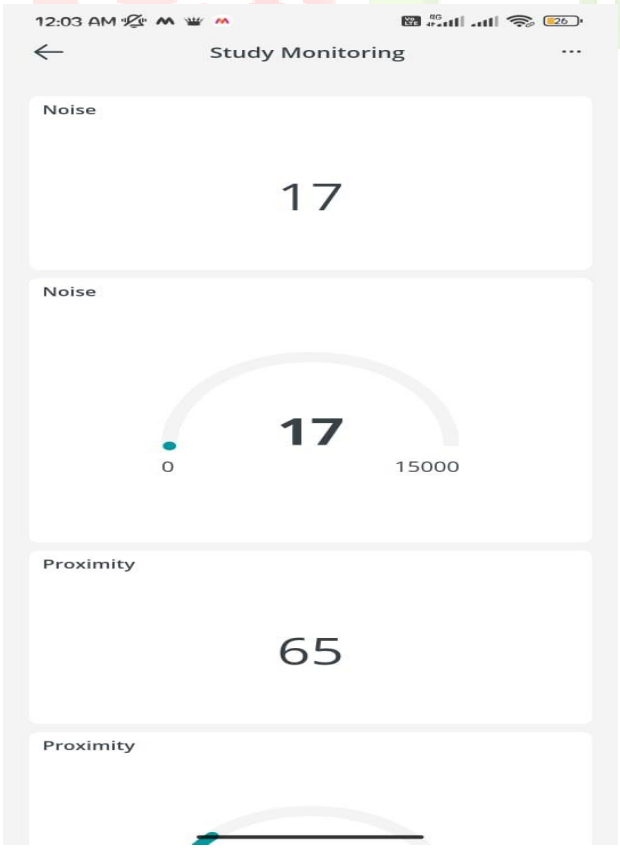

Fig. 7. Proposed system Analysis of the noise and proximity levels

CONCLUSION

The proposed work represents the overview of the monitoring study habits by using Arduino and ML, where distractions are the major cause for distraction from studies or work. This system keeps in track of the study habits or any other important work of one's where this system will avoid the distractions and improves concentration on work which will be more effective. It especially listens for speech, notification and other potentially disruptive stimuli in your area. The proposed system notifies the pattern it has found at the conclusion of your session. One can correct these disruptive habits in subsequent session. One can correct these disruptive habits in subsequent sessions based on the advice received. So, this system makes studying habits more effective.

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