# HUMAN ACTIVITY RECOGNITION USING DNN CLASSIFIER AND FEATURE ANALYSIS

**Mrs. G. Sangeetha[#1], Shantha Kumar S[#2], Harshavardhan S[#3], Varun D[#4]**

[1] Assistant Professor, [2,3,4] UG students Department of Computer Science and Engineering,

SRM Valliammai Engineering College

, Chennai, Tamil Nadu, India

**Abstract—** The project displays the recognition of human activity from the body using DNN-classifier and feature analysis. By connecting facial expressions to a set of fundamental emotions, automatic BODY human behaviour has dominated psychology and plays a significant part in HCI systems for assessing people's behavior (i.e., disgust, angry, fear, sadness, happiness and surprise). Body human behaviour, feature extracting and selecting and classifying are all process of the recognition system. These characteristics aid the DNN classifier and the ability to recognize the greatest number of data accurately.

*Keywords*—**Deep Neural Network, Human Computer Interaction, Machine Learning.**

## I. INTRODUCTION

Our aspirations increased dramatically with the development of contemporary technology, which knows no limitations. A lot of research is being done today in the area of digital images and image processing. The rate of development has been exponential and is constantly rising. In the modern world, image processing research spans a wide range of disciplines and has several applications. Signal processing in the area of image processing uses images as both input and output signals. Facial expression identification is one of the most crucial uses of image processing. The expressions on our BODY show the emotion we are experiencing. In interpersonal communication, facial expressions are crucial.

The goal of this project is to create an human activity pattern prediction system that can recognize and categorize human facial photos performing different activities into different expression classes.

## II. RELATED WORKS

Previous studies have tried to accurately and objectively capture readers' cognitive processing when reading scientific materials because critical reading is crucial for learning science. This research suggested and assessed an automatic method for eye movement analytics that uses the K-means++ clustering technique. 64 undergraduate and graduate students participated in this research by reading a lengthy popular science book while having their eye movements monitored. Three reading patterns were found by the cluster analysis' findings, and they were similar to and consistent with those of earlier research using self-reported measures and post-analysis analytics. [1].

One of the crucial areas of computer vision study that is currently undergoing a lot of research is human activity recognition (HAR). This Systematic Literature Review (SLR)'s main goal is to compile summarising the current literature on video-based human activity recognition. and evaluate contemporary deep learning architectures in light of various methodologies, difficulties, and problems. [2] In this article, we present two learning strategies for training a common 3D CNN that operates on RGB frames and replicates the motion stream, avoiding calculation of the flow at test time. First, we show that the network accurately replicates the motion stream. accuracy by minimizing a feature-

based loss in comparison to the Flow stream. Second, When training, we combine the feature-based loss and the common cross-entropy loss for action recognition in order to successfully use both appearance and motion information. [3].

In this study, a 3D deep neural network has been employed to identify human actions from video frames. (3D DNN). Our recognition method is applied under various recording conditions from a security camera to categorize human actions. We taught our 3D DNN using the Caffe_GoogLeNet framework and various training epoch values. (TEs). Three distinct datasets—KTH, Weizmann, and UCF101 with gray- and color-scale resolutions—were then used to assess the experiments. [4]

## III.    Materials and Methods

**A.**      There are various libraries that are developed to help machine learning models. Some models used                 to develop machine learning models and some analyzing and visualizing data.

1) *Mediapipe*: This is an open-source library created by Google. It gives a great ML solutions     that are ready to use for computer vision workloads.
2) *OpenCV*: For computer vision in artificial intelligence, machine learning, facial recognition, etc., OpenCV is a Python open-source library. To comprehend the content of the images is the goal of computer vision. It takes the description of the images—which may be of an object, a text description, a three-dimensional model, etc.—and extracts it from the images. Cars, for instance, can be equipped with computer vision technology that can recognize various roadside items, such as pedestrians, traffic signs, and traffic lights, and respond appropriately..

3) *Scikit-learn*: A high level framework for supervised and unsupervised machine learning algorithms is called scikit-learn. It is a part of the Python scientific environment and is based on the NumPy and SciPy libraries, which are individually in charge of more basic data science operations.

4) *Pillow*: Every essential feature for image processing is included in the Pillow library. You can rotate, transform, and resize images. You can extract certain statistics from an image using the histogram technique of Pillow module, which can then be utilized for statistical analysis and automatic contrast amplification process.

5) *Tk ()*: The default Python interface for the Tk GUI toolkit is the tkinter module (also known as the "Tk interface"). Most Unix platforms, as well as Windows computers, support Tk and tkinter. In a Python program, Tk widgets can be used to create buttons, menus, data fields, etc. These graphic components can be connected to or interact with features, functionality, processes, data, or even other widgets once they have been made.

6) *Python-time*: The time() method in Python returns the duration of time since the .For the Unix system, January 1, 1970, 00:00:00 at UTC is epoch. In the example above, we obtained the current time in seconds since the epoch using the time.time() function before printing the result.

**B. ALGORITHMS:**

*1) DNN*

A deep neural network (DNN) is an ANN with many hidden levels between the input and output layers. (DNN). Similar to shallow ANNs, DNNs may depict complex non-linear interactions. The basic operation of a neural network is to take in a set of inputs, process those inputs using more intricate calculations, and then output the findings to deal with practical problems like categorization. We are restricted to feed-forward neural networks. Neural networks are commonly used in supervised learning and reinforcement learning tasks. These networks are constructed from a series of linked levels.
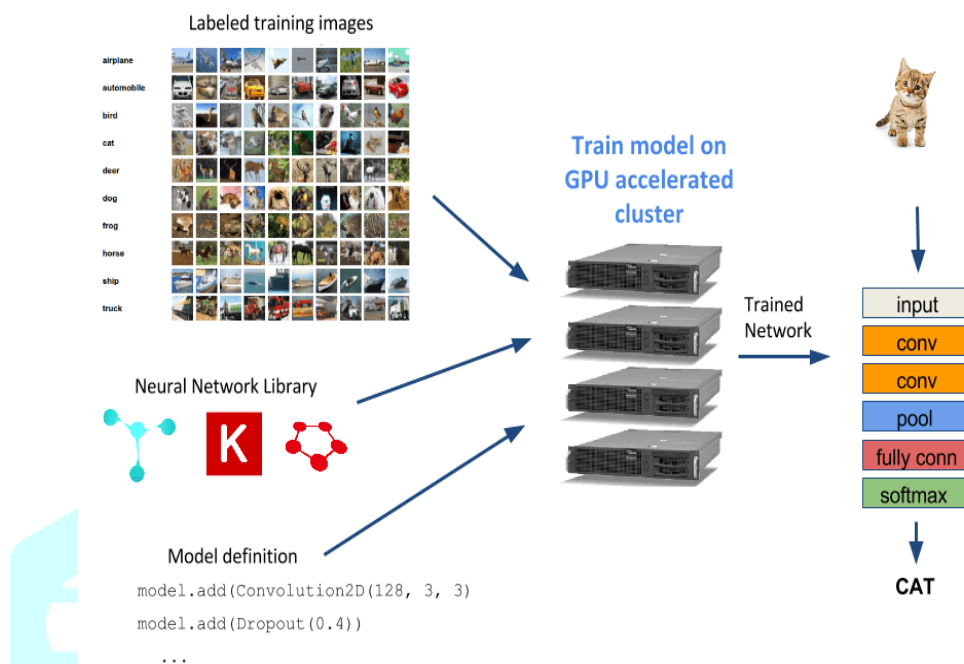


Fig :- 3.1 DNN working

*2) Random Forest Classifier:*

The random forest is a classification method composed of numerous decision trees. By using bagging and feature randomness to create each individual tree, it aims to create an uncorrelated forest of trees whose forecast by committee is more precise than that of any individual tree. It can perform jobs involving classification and regression.

A random forest produces understandable predictions that are true. Large datasets can be successfully handled. The random forest algorithm provides a higher degree of outcome prediction accuracy in comparison to the decision tree method.
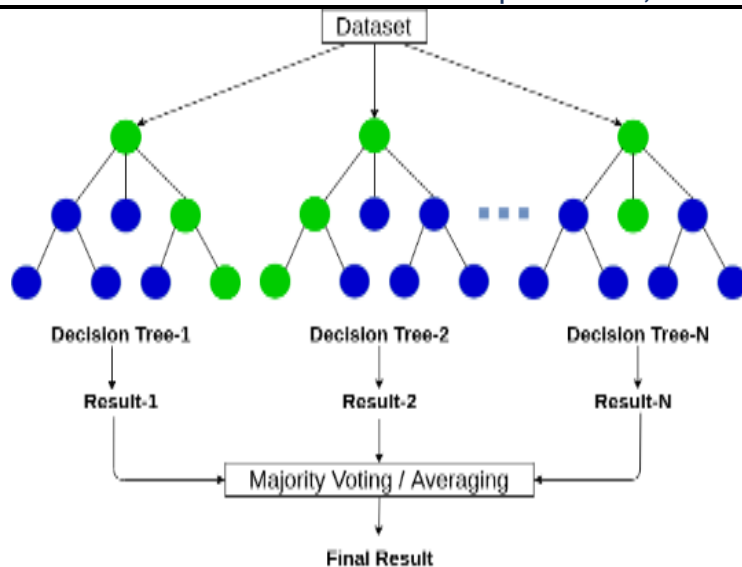
Fig :- 3.2 Random forest classifier

## 3) GLCM:

Gray level co-occurrence matrix utilises the idea of texture classification. The homogeneity value is used to categorise the concept of texture. Every pixel that makes up the image has its homogeneity value determined. A values matrix is produced after the homogeneity values have been computed. If there is a change in the homogeneity value of the given pixel, then the GLCM value is calculated. The X-ray tumour portion of the grey mass in the brain is distinct from the rest of it. In contrast to the texture of the tumour, the grey mass has a different texture.
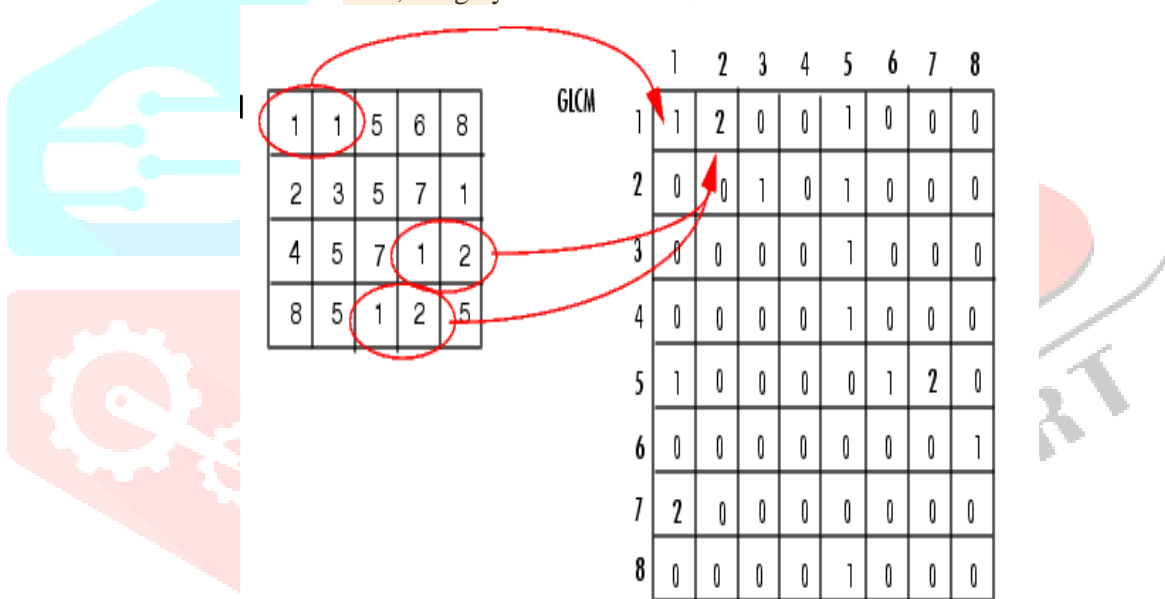


Fig :- 3.3 GLCM extraction

## 4) FP-growth:

Due to the FP-Growth Algorithm's success and effectiveness, numerous research have suggested modifications to enhance its performance. In order to find frequent item sets without employing candidate generations, the FP-Growth Algorithm is an alternate method that enhances performance. It employs a divide-and-conquer approach for a lot of things. The main component of this approach is the use of a unique data structure called a FP- tree (frequent-pattern tree), which saves the knowledge of the item set associations.
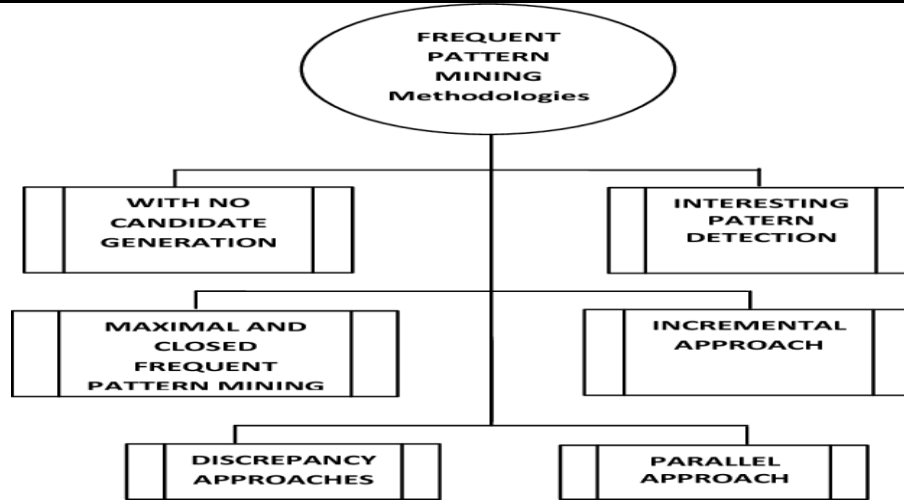
Fig :- 3.4 *FP-growth*

## IV. IMPLEMENTATION

The project is implemented as both as a web application and software. The web application is implemented through flask and the software uses JavaScript for the working. The model is trained through Jupyter, The Jupyter Notebook is the platform used to train the model. There are 50+ kernels running in the notebook, in which each contains visualization, performance metrics checking, and comparisons can be made. We are using the HAR dataset using for the problem.The outcome of this project is the human activity that the person performs. For the backend we are used the python flask. With Flask, a web application framework built on Werkzeug and Jinja, Python is used to build websites. There are various benefits to adopting the Flask framework, such as a built-in development server and a quick debugger.
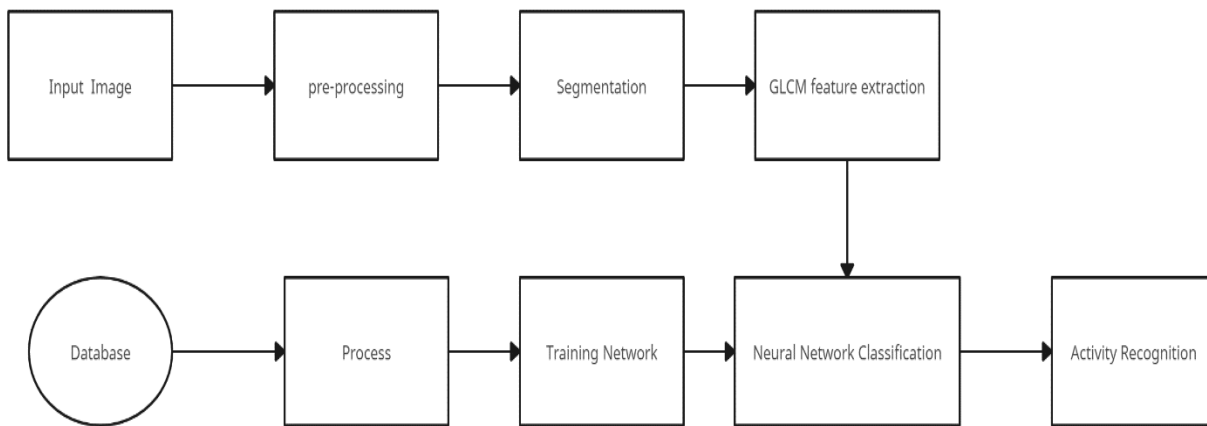


Fig:- 4.1 System Architecture Diagram

## V. DISCUSSION

The topic we explored in this paper is human activity pattern prediction using DNN. Human activity detection is a great tool to monitor both child and elderly patient. And also can monitor the abnormal movements of the individual. Since it is trained with huge amount of data of various patterns to provide result in better accuracy.
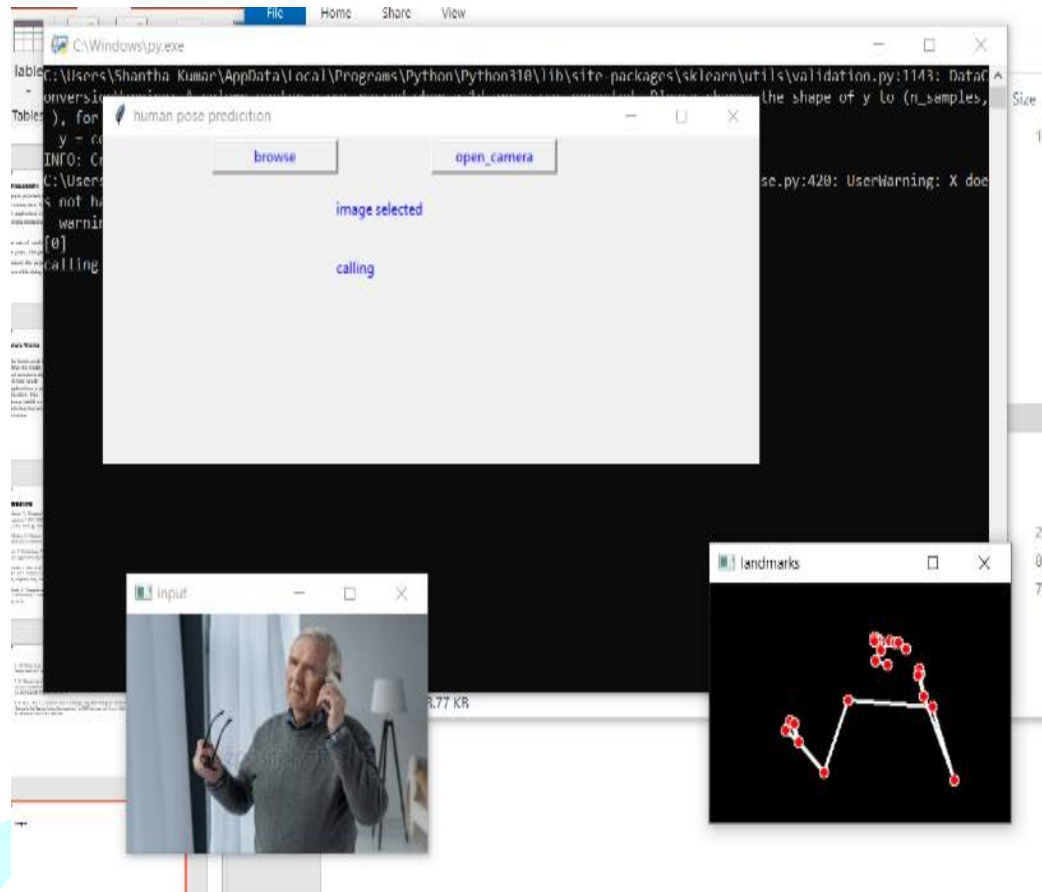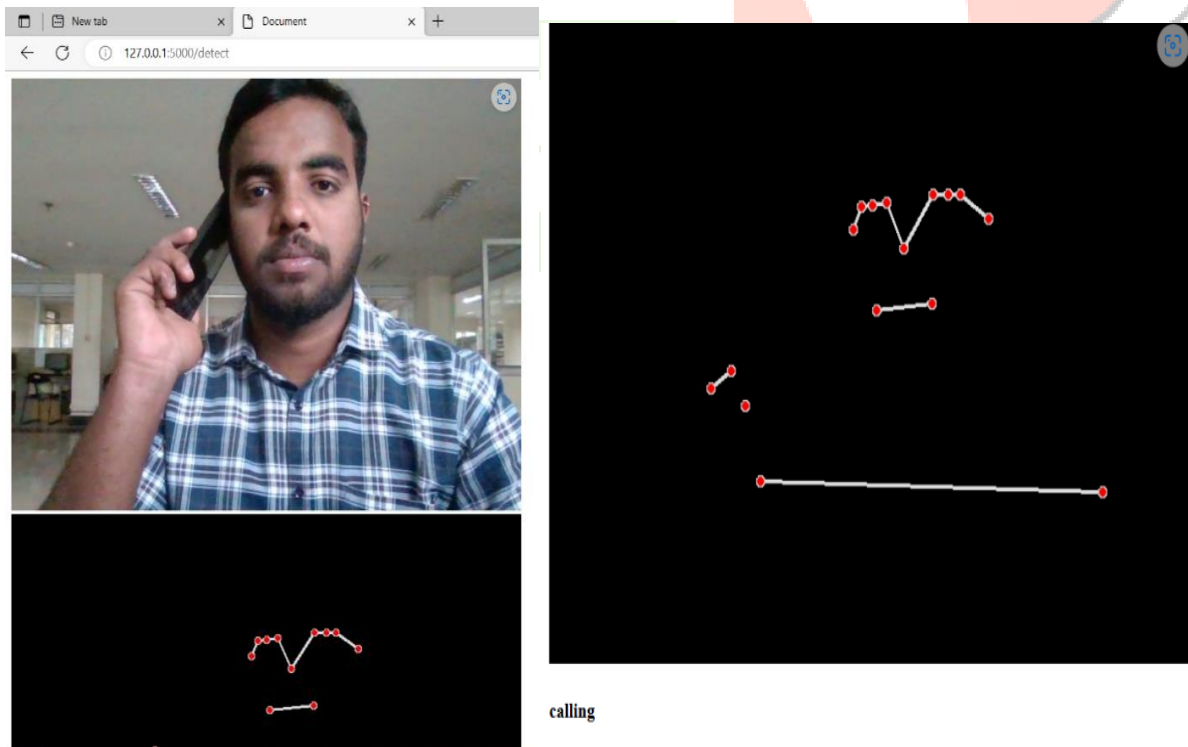
Fig: - 5.1 Predicting the pose through browse



Fig: - 5.2 Predicting the pose through the Open

## VI. CONCLUSION

This paper proposes a model which is used for recognizing human activities patterns from smart meters data. The human habits and behaviour follow a specific pattern that could be used in health applications to monitor the health problems of individuals living alone or people with self-limiting conditions. Predicting body motion has a wide variety application. As the rate of working of both parents in a family has increased dramatically in the recent years, this project helps in taking care of the children. Though the care takers are present this project sets parents at work in peace. This can help to monitor their children while doing their office work.

## VII    REFERENCES

1) W. Lin, Y. Kotakehara, Y. Hirota, M. Murakami, K. Kakusho and H. -P. Yueh, "Modeling Reading Behaviors: An Automatic Approach to Eye Movement Analytics," in IEEE Access, vol. 9, pp. 63580-63590, 2021, doi: 10.1109/ACCESS.2021.3074913.

2) H. A. Ullah, S. Letchmunan, M. S. Zia, U. M. Butt and F. H. Hassan, "Analysis of Deep Neural Networks for Human Activity Recognition in Videos—A Systematic Literature Review," in IEEE Access, vol. 9, pp. 126366-126387, 2021, doi: 10.1109/ACCESS.2021.3110610.

3) N. Crasto, P. Weinzaepfel, K. Alahari and C. Schmid, "MARS: Motion-Augmented RGB Stream for Action Recognition," 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Long Beach, CA, USA, 2019, pp. 7874-7883, doi: 10.1109/CVPR.2019.00807.

4) F. Al-Azzo, C. Bao, A. M. Taqi, M. Ghassan, "Human actions recognition based on 3D deep neural network," 2017 Annual Conference on New Trends in Information & Communications Technology Applications (NTICT), Baghdad, Iraq, 2017, pp. 240-246, doi: 10.1109/NTICT.2017.7976123.

5) S. Shakya, S. Sharma, and A. Basnet, "Human behavior prediction using facial expression analysis," in 2016 International Conference on Computing, Communication and Automation (ICCCA), 2016, pp. 399– 404.

6) S. Ghosh, A. Dasgupta and A. Swetapadma, "A Study on Support Vector Machine based Linear and Non-Linear Pattern Classification," 2019 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, India, 2019, pp. 24-28

7) M. Mittal et al., "An Efficient Edge Detection Approach to Provide Better Edge Connectivity for   Image Analysis," in IEEE Access, vol. 7, pp. 33240-33255, 2019.

8) D. Bharatia and P. Rane, "Research on advanced image analysis and it's applications," 2019 Global Conference for Advancement in Technology (GCAT), Bangalore, India, 2019, pp. 1-5, doi: 10.1109/GCAT47503.2019.8978277.

9) S. Yu, L. Xie, L. Liu and D. Xia, "Learning Long-Term Temporal Features With Deep Neural Networks for Human Action Recognition," in IEEE Access, vol. 8, pp. 1840-1850, 2020, doi: 10.1109/ACCESS.2019.2962284.

10) Y.-C. Jian, "Eye-movement patterns and reader characteristics of students with good and poor performance when reading scientific text with diagrams", *Reading Writing*, vol. 30, no. 7, pp. 1447-1472, Sep. 2017.