IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Real-Time Stress Detection System For Humans: An Image Processing And Machine Learning Approach

[1]Pranav Kulkarni, [2] Aamrapali Sarkate, [3]Kalpesh Pawar,[4] Prafullata Ohol , [5] Prof K.S.Mulani

[1234] Final year Student, [5]Professor

[12345]Department Of Information Technology

[12345]Sinhgad Institute OF Technology Lonavala, India

Abstract: In the rapidly evolving and demanding realm of technology, individuals frequently face significant stress due to substantial workloads, stringent deadlines, and ever-changing work settings. Extended exposure to such stress can adversely affect both personal health and professional efficiency. Traditional stress detection methods, like self-reported surveys and physiological evaluations, tend to be intrusive and lack real-time functionality. Consequently, there is an increasing demand for more efficient and less invasive stress monitoring solutions. This research seeks to tackle this issue by creating an innovative stress detection system specifically designed for individuals. By utilizing advancements in image processing and machine learning, the system examines facial expressions and visual indicators that suggest stress. Through the use of advanced algorithms, the system can accurately assess and interpret stress levels in real-time. Additionally, the system incorporates continuous feedback mechanisms by consistently gathering employee surveys to monitor stress levels over time and assess the success of interventions. With its real-time capabilities and non-intrusive nature, this system represents a significant advancement over traditional stress detection methods, offering employees and organizations valuable insights to promote healthier work environments.

1.INTRODUCTION

Employees in the swiftly evolving IT sector often face demanding work environments and substantial workloads, which can lead to increased stress levels. If left unmanaged, this stress can negatively impact both job performance and personal health. Traditional methods of stress detection, such as self-reports or physiological tests, have limitations in terms of real-time application and intrusiveness. As a result, there is a growing need for more innovative and effective approaches to stress monitoring and management. Our research aims to address this need by developing a comprehensive stress detection system specifically tailored for IT professionals, leveraging the latest advancements in image processing and machine learning technologies. The primary function of our system is to analyze facial expressions and other visual indicators of stress using image processing techniques. Machine learning algorithms are employed to classify and interpret these signals, providing accurate and timely stress evaluations. Additionally, the technology facilitates the regular collection of employee feedback through surveys, enabling continuous assessment of stress levels and the effectiveness of interventions.

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

1. RESEARCH METHODOLOGY

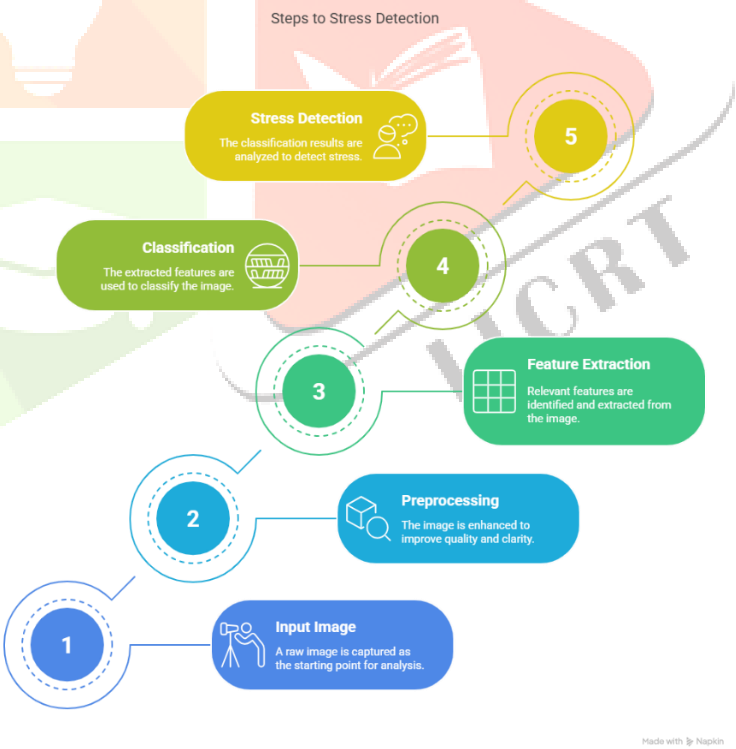
a) **Convolution Layer:** The initial phase in feature extraction from an image involves executing a convolution. This process entails identifying the image's features through small data squares. By utilizing different filters, such as identity, edge detection, box blur, and Gaussian blur, it can carry out various functions like sharpening, detecting edges, and blurring.

b) **Pooling Layer:** When dealing with large images, pooling layers help decrease the number of parameters through a method known as spatial pooling. This approach also aids in reducing the dimensionality of the map.

c) **Fully Connected Layer:** The feature map matrix is converted into a vector format. By linking the layers, we have developed a model that leverages this feature.

d) **Softmax Classifier**: At the conclusion of the process, a classification function such as softmax or sigmoid is used to sort the results.

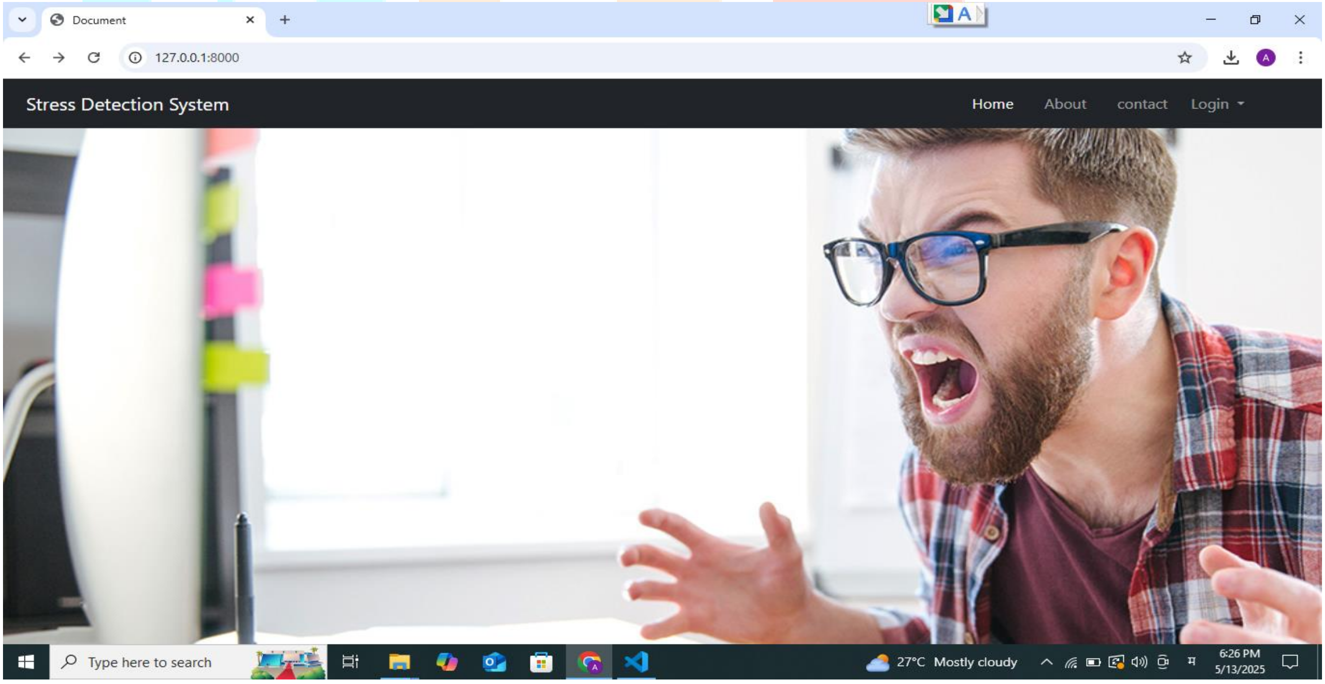
2. MODELING AND ANALYSIS

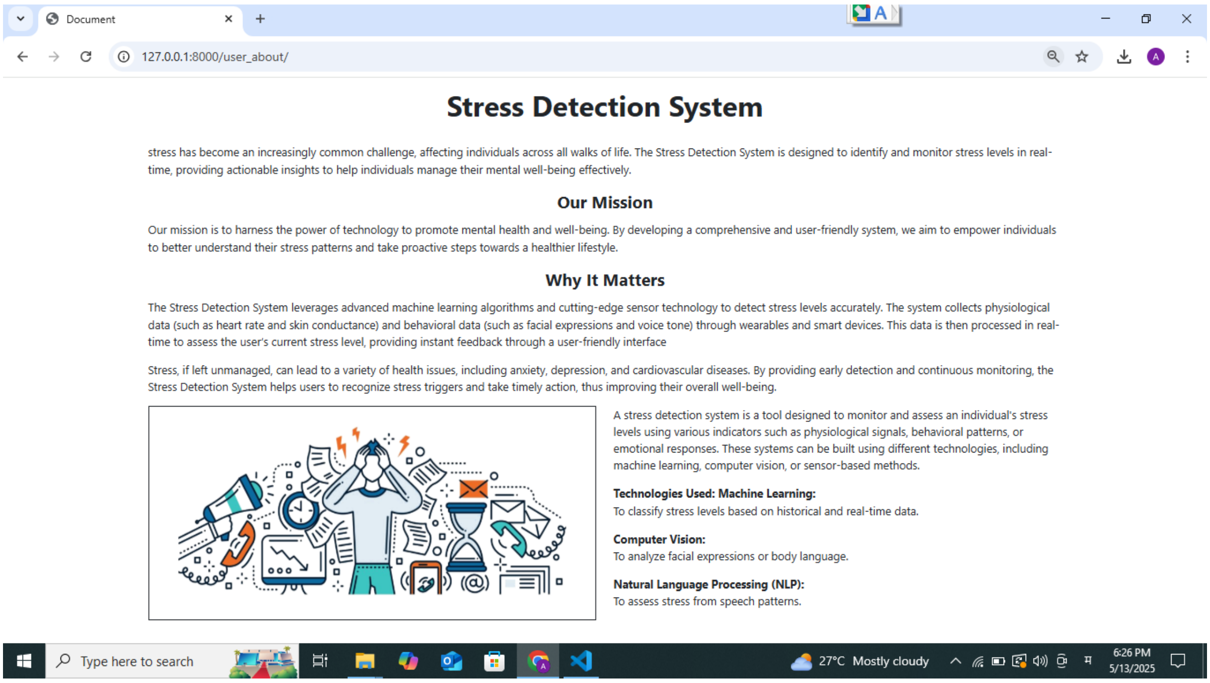


1. Input Image: The initial step involves an input image, serving as the foundational data required for stress analysis.
2. Preprocessing: This stage involves preparing the image through various steps to make it suitable for feature extraction. The
3. preprocessing steps include Grayscale Conversion: The image is transformed into grayscale, simplifying the data by reducing it to a single channel (intensity) instead of three (red, green, and blue). This reduction in complexity aids in focusing on structural details rather than color. Resized Image: The image is adjusted to a standard size, ensuring consistent processing, which allows the system to handle images of varying sizes uniformly. Median Filtering: A median filter is applied to the image to diminish noise. Reducing noise helps in obtaining clearer and more distinct features, enhancing the accuracy of feature extraction in the subsequent phase.

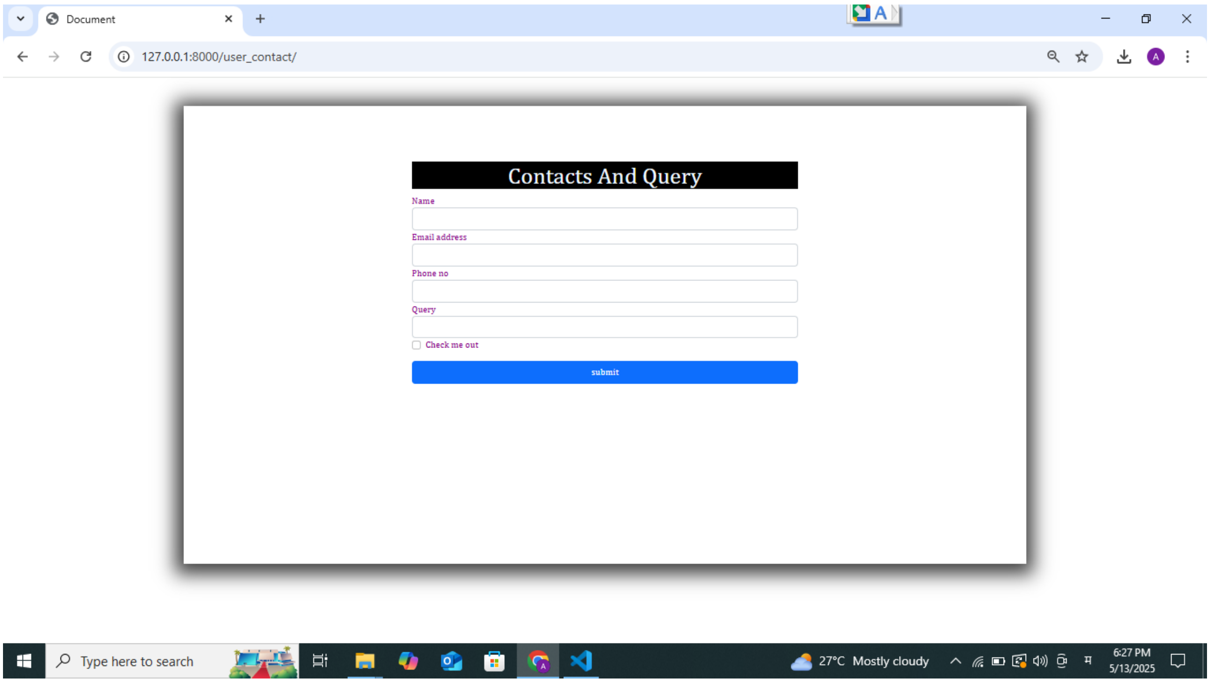
4. Feature Extraction: Following preprocessing, the system extracts essential features from the image. These features are vital for identifying patterns associated with stress. The types of features extracted include Color Features: These capture the color information in the image, which may encompass different shades and tones that could indicate stress (e.g., redness or paleness). Texture Features: These analyze the patterns in the image, such as smoothness, roughness, or repetitive patterns. Texture analysis may provide insights into stress indicators, as certain textures or patterns could be linked to stress responses. Canny Edge Features: The Canny Edge Detection algorithm is employed to identify edges within the image. Edge features help highlight key structures or boundaries, assisting in identifying significant areas or patterns in the image related to stress.
5. Classification: The extracted features are then input into a classification model. This model utilizes machine learning or statistical techniques to categorize the data based on predefined categories (e.g., stressed vs. not stressed). The classifier is trained to recognize patterns in the features that are likely associated with stress.
6. Stress Detection: The final output of the classification process is used to detect stress. Based on the classification results, the system determines if the input image shows signs of stress.
7. Overall Flow: The input image undergoes preprocessing to enhance quality, followed by the extraction of relevant features, which are used for classification. The classification results aid in detecting stress, completing the process from raw image input to stress analysis output.

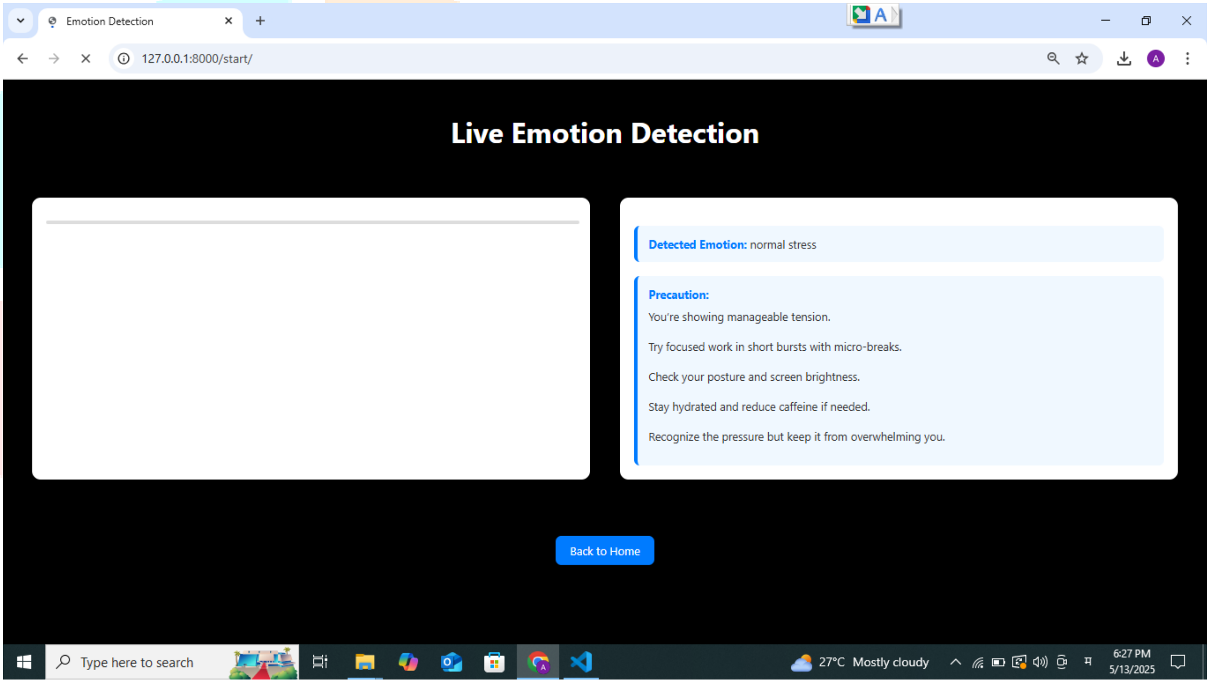
3. RESULTS AND DISCUSSION

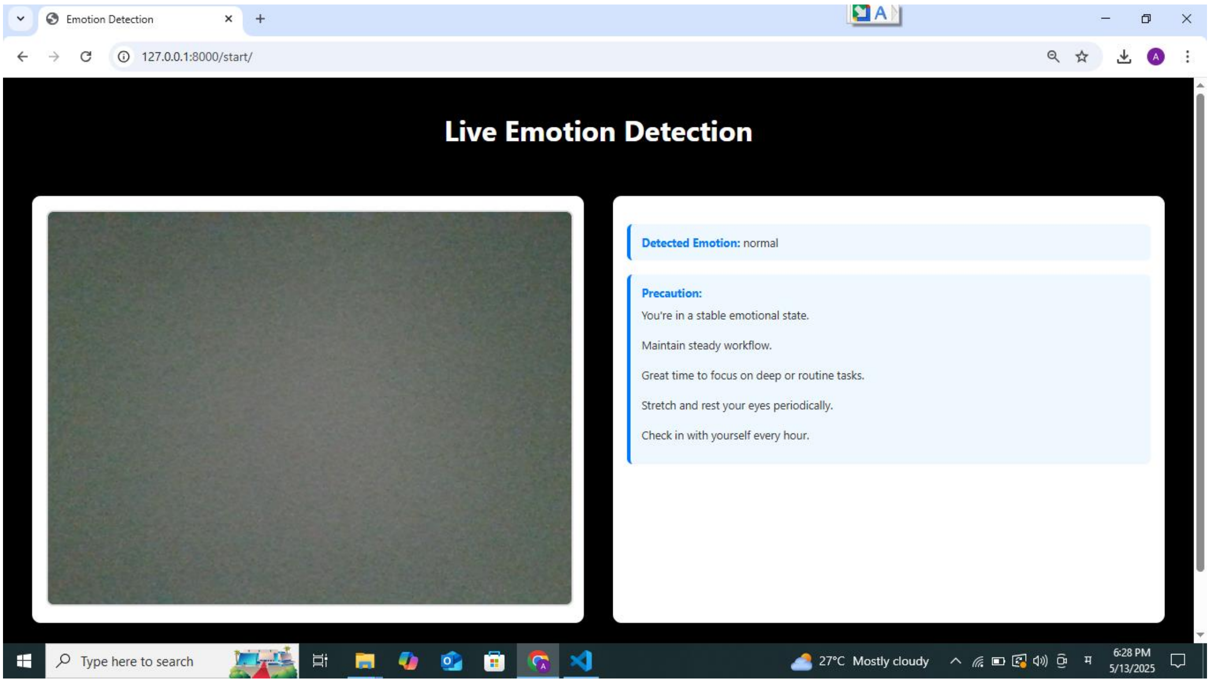


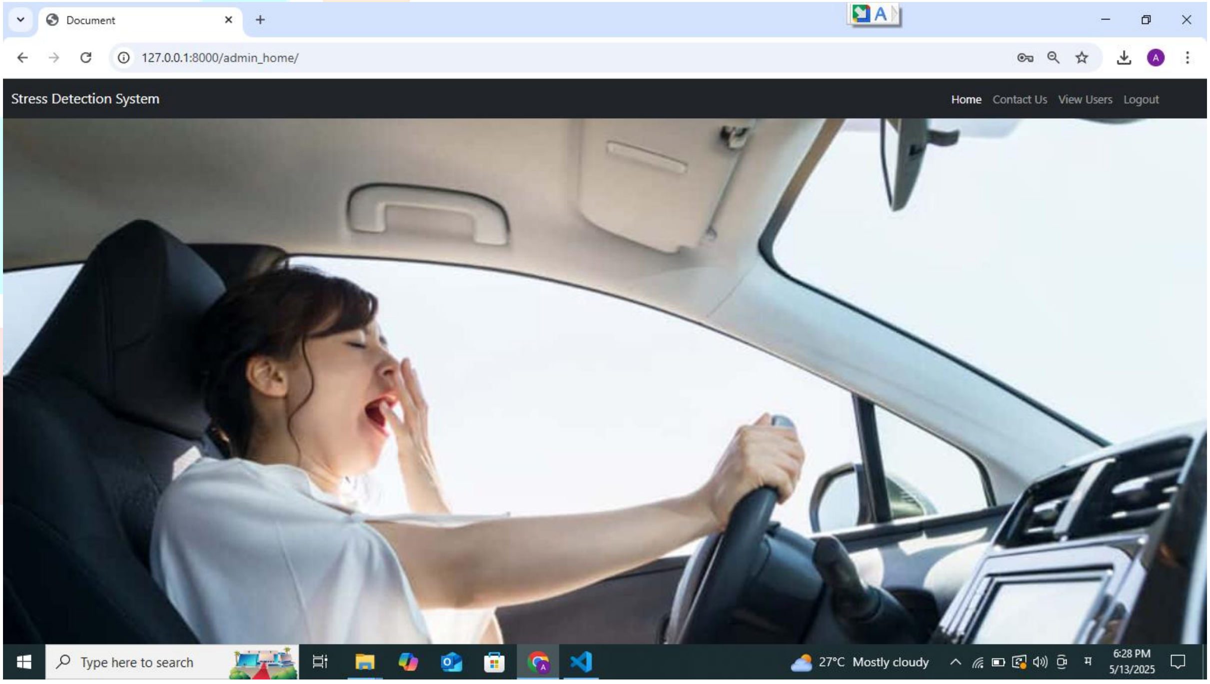

Document
127.0.0.1:8000/user_about/
Stress Detection System
stress has become an increasingly common challenge, affecting individuals across all walks of life. The Stress Detection System is designed to identify and monitor stress levels in real-time, providing actionable insights to help individuals manage their mental well-being effectively.
Our Mission
Our mission is to harness the power of technology to promote mental health and well-being. By developing a comprehensive and user-friendly system, we aim to empower individuals to better understand their stress patterns and take proactive steps towards a healthier lifestyle.
Why It Matters
The Stress Detection System leverages advanced machine learning algorithms and cutting-edge sensor technology to detect stress levels accurately. The system collects physiological data (such as heart rate and skin conductance) and behavioral data (such as facial expressions and voice tone) through wearables and smart devices. This data is then processed in real-time to assess the user's current stress level, providing instant feedback through a user-friendly interface
Stress, if left unmanaged, can lead to a variety of health issues, including anxiety, depression, and cardiovascular diseases. By providing early detection and continuous monitoring, the Stress Detection System helps users to recognize stress triggers and take timely action, thus improving their overall well-being.
A stress detection system is a tool designed to monitor and assess an individual's stress levels using various indicators such as physiological signals, behavioral patterns, or emotional responses. These systems can be built using different technologies, including machine learning, computer vision, or sensor-based methods.
Technologies Used: Machine Learning:
To classify stress levels based on historical and real-time data.
Computer Vision:
To analyze facial expressions or body language.
Natural Language Processing (NLP):
To assess stress from speech patterns.
Type here to search
27°C Mostly cloudy
6:26 PM
5/13/2025

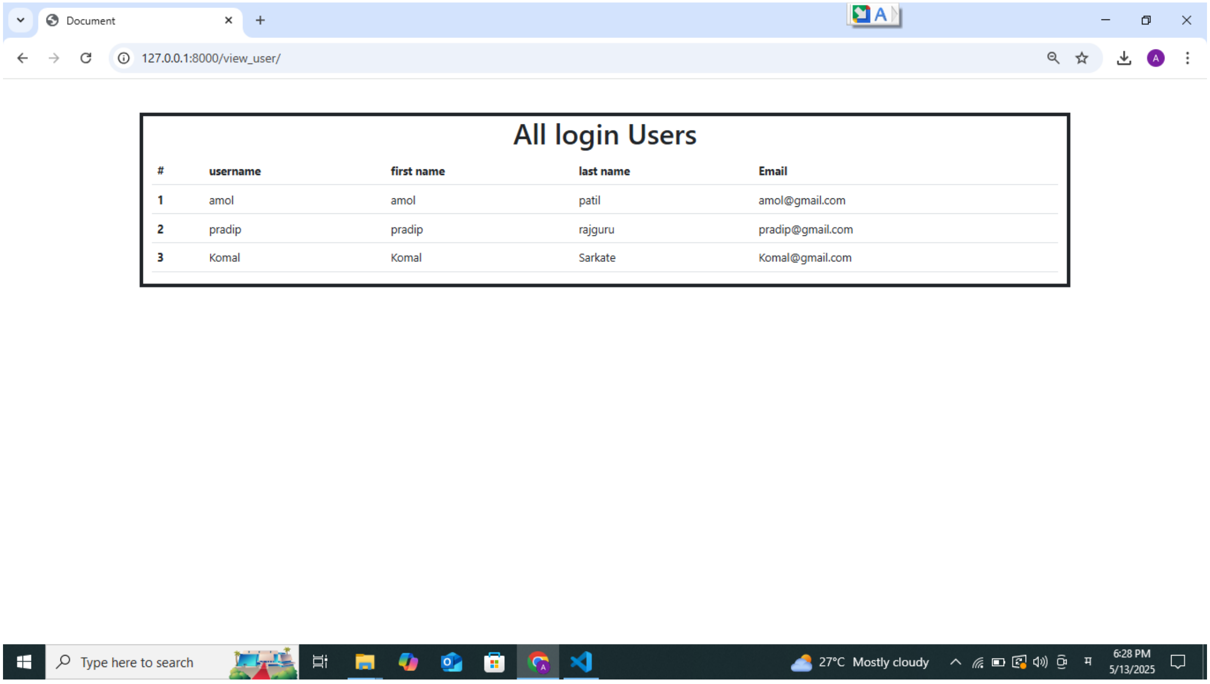

Document
127.0.0.1:8000/user_login/
Stress detection system
Home
Register
Login Form
Username
Password
Check me out
login
register here
Type here to search
27°C Mostly cloudy
6:26 PM
5/13/2025


Document
127.0.0.1:8000/user_contact/
Contacts And Query
Name
Email address
Phone no
Query
Check me out
submit
Type here to search
27°C Mostly cloudy
6:27 PM
5/13/2025


Emotion Detection
127.0.0.1:8000/start/
Live Emotion Detection
Detected Emotion: normal stress
Precaution:
You're showing manageable tension.
Try focused work in short bursts with micro-breaks.
Check your posture and screen brightness.
Stay hydrated and reduce caffeine if needed.
Recognize the pressure but keep it from overwhelming you.
Back to Home
Type here to search
27°C Mostly cloudy
6:27 PM
5/13/2025


Emotion Detection
127.0.0.1:8000/start/
Live Emotion Detection
Detected Emotion: normal
Precaution:
You're in a stable emotional state.
Maintain steady workflow.
Great time to focus on deep or routine tasks.
Stretch and rest your eyes periodically.
Check in with yourself every hour.
Type here to search
27°C Mostly cloudy
6:28 PM
5/13/2025


Document
127.0.0.1:8000/admin_home/
Stress Detection System
Home
Contact Us
View Users
Logout
Type here to search
27°C Mostly cloudy
6:28 PM
5/13/2025



4. CONCLUSION

This initiative marks a crucial advancement in merging machine learning with image processing technologies to tackle workplace stress among employees and individuals. By facilitating real-time stress detection and offering tailored interventions, the system aspires to create a healthier and more efficient work setting. Although promising, the project encounters several hurdles, such as concerns over data privacy, the precision of stress detection, and the ethical issues related to continuous monitoring. Nevertheless, with meticulous execution and ongoing improvements, the system holds the potential to significantly benefit both technology and society. It not only deepens our comprehension of stress management in high-pressure settings but also lays the groundwork for future innovations aimed at enhancing employee well-being and organizational performance.

5. REFERENCES

[1] Nazzere Oryngozha, Pakizarshamoi, Ayan igali, "Detection and Analysis of Stress-Related Posts in Reddit's Acamedic Communities", [IEEE 2024]

[2] Georgios Taskasaplidis, Dimitris Fotiadis, Panagiotis D. Bamidis, "Review of Stress Detection Methods Using Wearable Sensors" [IEEE 2023].

[3] Syed Raza Moosavi, Muhammad H. Zafar, Malik N. Akhtar and Shahzaib F. Hadi, "Early Mental Stress Detection Using Q-Learning Embedded Starling Murmuration Optimiser-Based Deep Learning Model", [IEEE 2023].

[4] Georgios Taskasaplidis, Dimitris A. Fotiadis and Panagiotis D. Bamidis, "Review of Stress Detection Methods Using Wearable Sensors", [IEEE 2023].

[5] Georgios Fevgas, Thomas Lagkas, Vasileios Argyriou, Panagiotis Sarigiannidis, "Detection of Biotic or Abiotic Stress in Vineyards Using Thermal and RGB Images Captured via IoT Sensors", [IEEE 2022].

[6] Ahmad Rauf Subhani, Wajid Mumtaz, Mohamed Naufal Bin Mohamed Saad, Nidal Kamel, Aamir Saeed Malik, "Machine Learning Framework for the Detection of Mental Stress at Multiple Levels", [IEEE 2021].

[7] Soyeon park, Suh-yeon Dong, "Effects of Daily Stress in Mental State Classification",[IEEE 2020].

[8] Muhammad Amin,Khalil Ullah,Muhammad Asif, Abdul Waheed, Sana Ul Haq, " ECG Based Driver's Stress Detection Using Deep Transfer Learning and Fuzzy Logic Approaches",[IEEE 2019].