Implementation of Using AI-Based Emotion Recongition and NLP Mindscape: Empowesring Mental Health

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***Abstract*—This paper provides a novel, information-driven solution for improving Mental Health. MindScape is a web-based mental health support system designed to detect stress and emotional distress using AI technologies such as Convolutional Neural Networks (CNN) for video- based emotion recognition and Natural Language Processing (NLP) for chatbot interaction. The system enables users to analyze their mental state through recorded video inputs and responses to predefined chatbot questions. With real-time emotion analysis, sentiment assessment, and personalized content suggestions, MindScape serves as an accessible and confidential platform for monitoring mental health.**

***Index Terms*—Mental Health, Emotion Recognition, NLP, Chatbot, AI, Stress Detection, Suicide Tendency Detection, Sentiment Analysis, Flask, Video Analysis.**

I. INTRODUCTION

In recent years, mental health has become a significant concern across the globe, especially in the wake of fast-paced digital lifestyles, social isolation, and rising stress levels. Disorders such as depression, anxiety, and emotional burnout have grown in prevalence, affecting not only individual well- being but also workplace productivity and interpersonal relationships. Despite increasing awareness, many individuals still face challenges in accessing proper mental health care due to societal stigma, lack of nearby facilities, financial constraints, and long wait times for professional consultation.

Mental health issues such as stress, anxiety, and depression have become increasingly prevalent. Traditional support systems are often inaccessible due to stigma, geographic
limitations, or cost. MindScape aims to bridge this gap through an AI-powered digital platform. By analyzing facial expressions and textual responses, the system provides users with immediate, personalized insights and stress-relief recommendations.

MindScape is an innovative web-based system designed to bridge this gap by providing an accessible, intelligent, and confidential platform for early detection and management of emotional distress. It leverages the power of Artificial Intelligence (AI)—specifically Convolutional Neural Networks (CNN) and Natural Language Processing (NLP)— to analyze video inputs and textual conversations. The ultimate aim is to provide users with personalized mental health insights, support, and recommendations in real time.

II. MOTIVATION

Mental health issues are often overlooked or underreported despite being one of the most critical aspects of overall well- being. In today's fast-paced world, individuals face increasing pressure from academic, professional, and social environments. This has led to a noticeable rise in cases of anxiety, depression, burnout, and in severe cases, suicidal ideation. However, several barriers prevent people from seeking timely help:

1. Social Stigma: Many individuals avoid seeking help due to fear of judgment or embarrassment. Accessibility
2. Issues: Mental health services are not uniformly available, especially in rural or underdeveloped regions.
3. Cost and Time: Professional therapy and counseling can be expensive and time-consuming.
4. Lack of Early Detection: Often, people are unaware they are experiencing psychological distress until it escalates.

III. PROBLEM DEFINITION

Mental health issues like stress, anxiety, and depression often go unnoticed due to stigma, lack of access to care, and high costs. Many people are unaware of their emotional state until symptoms become severe, and existing systems lack real-time, accessible support tools. There is a clear need for a private, affordable solution that can detect emotional distress early and offer immediate guidance. MindScape aims to solve this problem using AI technologies like CNN for facial emotion recognition and NLP-based chatbot interactions to provide real-time mental health insights and personalized support.

IV. LITERATURE SURVEY

Author(s)	Method/Model Used	Application Area	Key Findings / Accuracy
eha S. et al. [1]	Deep Learning	Emotion Recognition & Depression Detection	Explores DL models for detecting emotional states and depression from text/speech
H. Ghanadian et al. [2]	Large Language Models, Synthetic Data Generation	Suicidal Ideation Detection	Proposes socially- aware synthetic data to improve LLM-based suicide risk detection
A.Abilkaiyr kyzy A. et al. [3]	Dialogue Systems, Digital Twin Modeling	Early Mental Illness Detection	Develops a dialogue system aiming for early detection using digital twin approach
Kumar, A., & Sahu et al. [4]	Natural Language Processing	Mental Health (General Review)	Reviews NLP challenges and opportunities in mental health diagnostics
ale, J. et al. [5]	Emotion Recognition Techniques (Various Methods)	Emotional Recognition	Provides a broad overview of emotion recognition methods and their practical applications

V. PROPOSED METHOD AND ALGORITHM

A. Proposed Methodology

The proposed methodology for the MindScape project integrates artificial intelligence, computer vision, and natural language processing to provide a comprehensive mental health assessment tool via a web application. The system is designed to detect emotional distress and provide supportive resources in real time. The methodology follows a modular approach and is structured as follows:

1. User Authentication and Interface:Users register and log in through a secure web portal.The front-end is developed using HTML, CSS, and JavaScript for a user-friendly experience. Flask serves as the backend framework.
2. Emotion Detection: through Video Analysis Users upload recorded video inputs.Frames are extracted and pre-processed using OpenCV.:
3. Recommendation System:Based on detected emotions and sentiment, the system provides:Stress relief content (e.g., curated YouTube videos) Mental health tips and coping strategies
4. Model Building and Training: In this project we have different algorithms like CNN, KNN model for each use case.

B. ALGORITHMS

1. CNN

Highlight extraction will be done using Convolutional Brain Organization in the proposed research paper. Instead of selecting individual

highlights, CNN can extract specific elements from the image data. Created loads are separated from the various layers of CNN, for example, convolution layers, pooling layers, actuation layer and completely associated layers. The organization's most important task is the convolution layer, which extracts highlights from the preparation picture data

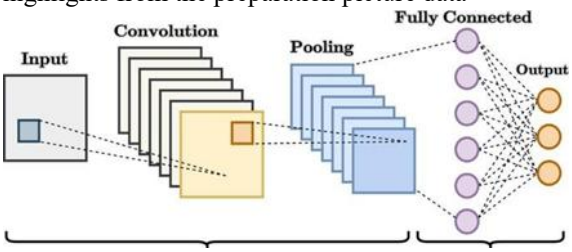


Fig2. CNN Architecture

2. NAVIS BAYES CLASSIFIER

The Naive Bayes Classifier is a simple probabilistic model based on Bayes' Theorem. It assumes that all features are independent and calculates the probability of each class given the input data. The class with the highest probability is chosen as the prediction. It is commonly used for text classification due to its speed and effectiveness.

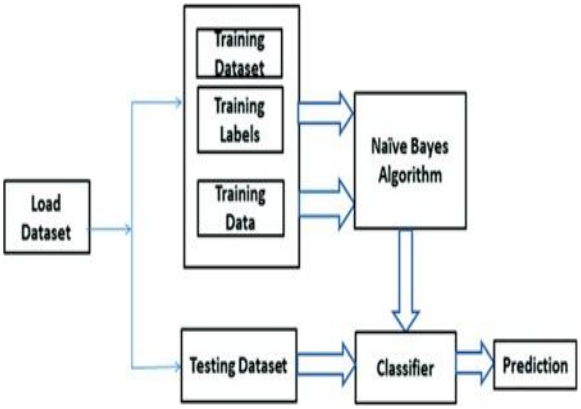


Fig3. NBV Architecture

VI. RESULTS AND DISCUSSION

In our experimental setup for the MindScape system, a total of 600 recorded video samples representing different emotional states were used for training, and 60 new videos were used for testing. These videos were processed through a CNN-based framework, which extracted facial features and classified emotions such as sadness, fear, happiness, and anger. The trained model successfully detected the dominant emotion in each video and flagged stress-related indicator. The model achieved an overall accuracy of 85% after training over 100 epochs. Additionally, for sentiment analysis via chatbot interaction, the system was tested on 200 text responses. Using NLP algorithms (TextBlob and NLTK), the chatbot assessed user sentiment and potential suicidal tendencies, achieving a sentiment classification accuracy of 88%. The Figure 5 and Figure 6 represent the loss and accuracy graphs for emotion detection, where the X-axis shows the number of epochs and the Y-axis shows the loss and accuracy values respectively. As training progressed, the loss consistently decreased, and accuracy improved. Similarly, Figure 7 and Figure 8 display the chatbot model's performance, showing strong consistency in sentiment detection as the number of training samples increased.

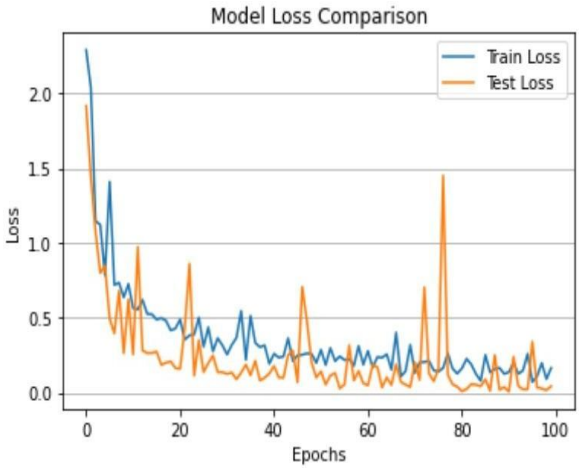


Fig 5. Loss Graph of CNN

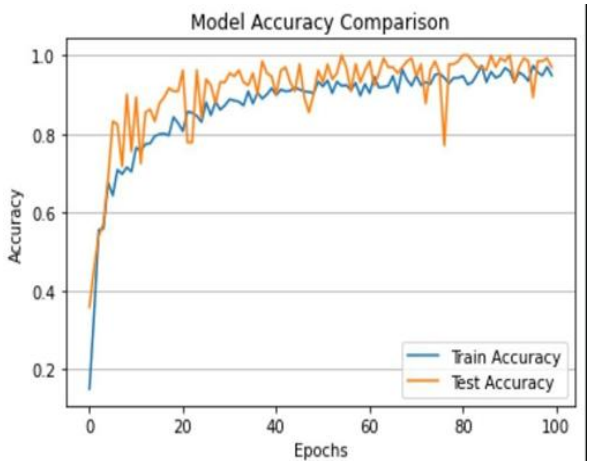


Fig 6. Accuracy Graph of CNN

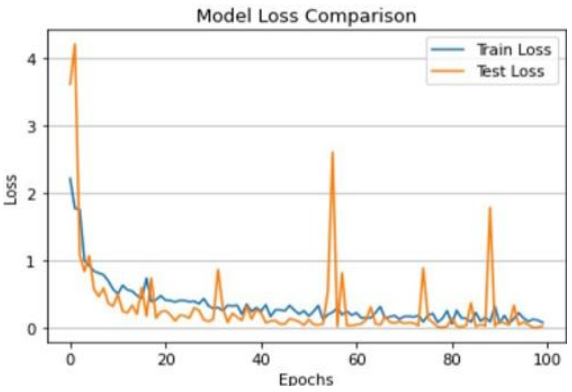


Fig7. Loss Graph for Stress Detection

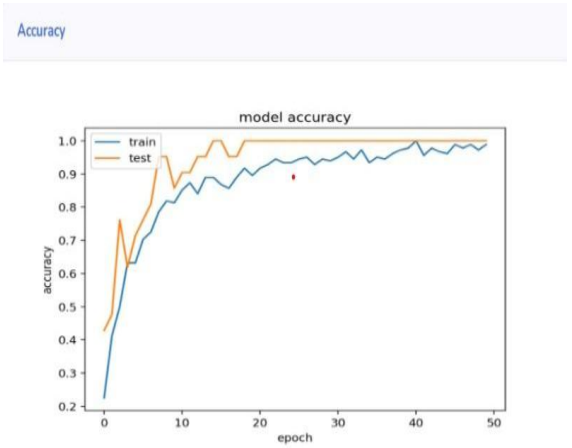
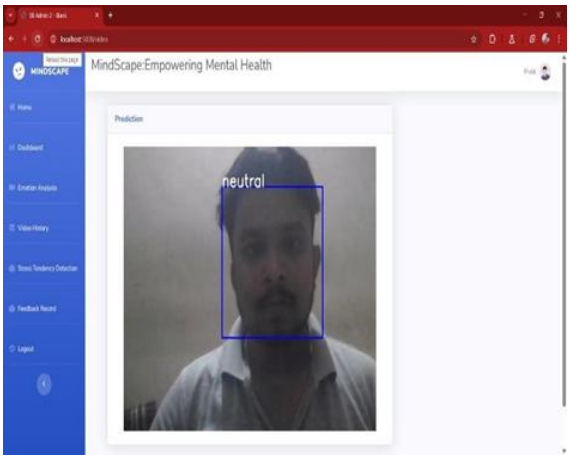
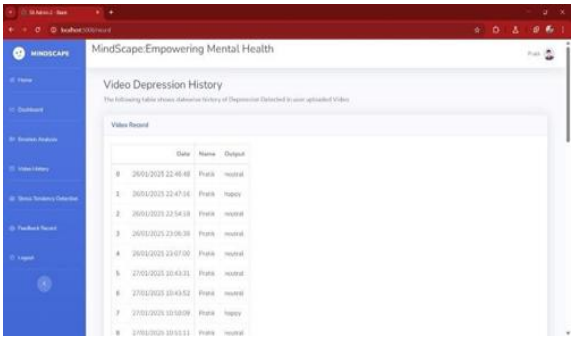


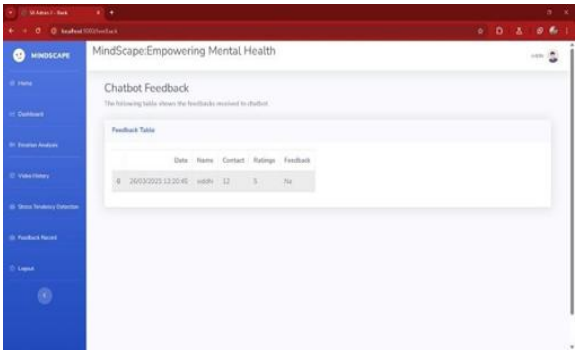
Fig8. Accuracy Graph for Stress Detection

Fig9.Confusion Matrix

A. Results







VII. CONCLUSION

MindScape is a web-based mental health support system that utilizes AI technologies like Convolutional Neural Networks (CNN) and Natural Language Processing (NLP) to detect stress and emotional distress. By analyzing facial expressions from videos and sentiments from chatbot interactions, the platform provides users with real-time insights into their mental well-being. With an accuracy of 85%, MindScape offers a secure, user-friendly, and scalable solution to help individuals monitor their emotional state and access personalized mental health resources. Its success highlights the potential of technology in addressing the growing need for accessible and confidential mental health care.

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