

# **NAAN MUDHALVAN PROJECT**

## **PROJECT DOCUMENT**

### **NLP-DRIVEN EMOTION DETECTION FOR MENTAL HEALTH MONITORING**

#### **Project submitted by:**

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#### **PROBLEM STATEMENT:**

Develop a machine learning model to predict an individual's mental health score based on textual input, enabling users to monitor their mental well-being and seek professional assistance if necessary.

#### **OBJECTIVE:**

- Develop a machine learning model to predict mental health scores based on textual input, facilitating self-assessment of mental well-being.
- Create a user-friendly interface for individuals to input text and receive their mental health score, promoting accessibility and ease of use.
- Empower individuals to proactively monitor their mental health and seek professional assistance if indicated by the predicted score, promoting early intervention and improved mental well-being.

#### **PROPOSED MODEL:**

- **Preprocessing and Labeling:** Utilize preprocessing techniques to read and prepare textual data for training. Assign happiness labels based on emotions (joy, love, surprise) for binary classification.
- **Neural Network Architecture:** Employ a sequential neural network model with an embedding layer for word representation, followed by dense layers for feature extraction and classification.
- **Model Training and Evaluation:** Compile the model with appropriate loss and accuracy metrics. Train the model on labeled training data, optimizing performance over multiple epochs. Evaluate model performance on validation data to ensure robustness and generalization.

The utilization of natural language processing (NLP) techniques and neural network architecture enables the model to effectively process and analyze textual data, providing a streamlined approach to understanding individuals' emotional states. Through the integration of

pre-trained word embeddings and dense layers, the model can capture nuanced patterns in language, enhancing its ability to discern between positive and negative emotional expressions. The binary classification framework, facilitated by the assignment of happiness labels, allows for a simplified yet informative assessment of mental well-being based on the input text.

## **MODULES PROPOSED:**

### **1. PREPROCESSING MODULE:**

The preprocessing module ensures input data readiness for accurate mental health scoring. It gathers and formats user responses to align with the model's requirements, involving steps like cleaning and standardizing text. Additionally, it may transform text into a suitable format for the model's input layer, such as tokenization or encoding.

Moreover, it labels emotional states, categorizing them as positive or negative, vital for model training. This process enables the model to learn patterns associated with diverse emotional states, enhancing its predictive capabilities.

### **2. MODEL ARCHITECTURE DEFINITION MODULE:**

The architecture defines a model leveraging a pre-trained embedding layer from TensorFlow Hub. It consists of two dense layers with ReLU activation and a final dense layer for binary classification. This setup is compiled with binary cross-entropy loss and binary accuracy metrics for evaluation.

### **3. MODEL TRAINING MODULE:**

Training involves fitting the model to the training data for a defined number of epochs and batch size. Validation data is preprocessed independently, evaluating model performance during training. The training history is logged for subsequent analysis.

### **4. POST PROCESSING PREDICTIONS MODULE:**

After model predictions are obtained, this module normalizes prediction scores and calculates the average probability score, reflecting the model's confidence.

### **5. USER INPUT AND PREDICTION MODULE:**

Users are prompted to provide responses regarding their mental well-being. These responses are utilized to predict a mental health score using the trained model. Subsequently, the post processing module interprets predictions and offers guidance based on the score.

## **CODE OUTPUT:**

```

▶ # Getting user input for mental health assessment
user_answers = []
user_answers.append(input('How was your recent experience at work/school? '))
user_answers.append(input('What do you enjoy doing in your free time? How does it make you feel? '))
user_answers.append(input('How do you cope with setbacks in life? '))
user_answers.append(input('Have there been any changes in your performance recently? '))
user_answers.append(input('Overall, how would you describe your current life situation? '))

```

```

⇒ How was your recent experience at work/school? rather stressful
What do you enjoy doing in your free time? How does it make you feel? i read books and write down my thoughts
How do you cope with setbacks in life? i feel things and give myself the time to do that properly. and later try to think through it with the right head
Have there been any changes in your performance recently? yes, my grades have been dropping. im losing confidence and concentration
Overall, how would you describe your current life situation? its fine, but im trying hard to heal

```

```

[12] # Predicting mental health score based on user input
user_predictions = model.predict(user_answers)
mental_health_score = postprocess_predictions(user_predictions)
print("Your mental health score is:", mental_health_score)

# Providing interpretation based on the mental health score
if mental_health_score < 25:
    print("It seems like you're going through a tough time. Remember, it's okay to seek help and support from others.")
else:
    print("Your mental health seems to be in good shape. Keep up the positive attitude and take care of yourself!")

```

```

1/1 [=====] - 0s 136ms/step
Your mental health score is: 48.39939
Your mental health seems to be in good shape. Keep up the positive attitude and take care of yourself!

```