**A COMPREHENSIVE STUDY ON SOCIAL NETWORK**

**MENTAL DISORDERS DETECTION**

**A**

**MAJOR PROJECT REPORT**

*Submitted in partial fulfillment of the requirements*

*for the award of the degree of*

**MASTER OF COMPUTER APPLICATION**

**In**

**COMPUTER APPLICATION**

Submitted to



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# DECLARATION

I hereby declare that the Project entitled **“A COMPREHENSIVE STUDY ON SOCIAL NETWORK MENTAL DISORDERS DETECTION"** is our own work conducted under the supervision of **Prof. DEV NAGAR, Department of Master of Computer Application at NRI Institute of Information Science & Technology, Bhopal.**

We further declare that to the best of our knowledge this report does not contain any part of work that has been submitted for the award of any degree either in this institute or in other institute without proper citation.

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**CERTIFICATE**

This is to certify that the work embodied in this project entitled “**A COMPREHENSIVE STUDY ON SOCIAL NETWORK MENTAL DISORDERS DETECTION"** being submitted by **KESHAV (0115CA231053), KHUSHI SAHU (0115CA231057) and SURAJ BISWAS (0115CA231128)** award of the degree of the **Master of Computer Application (MCA)** to **Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal (M.P.)** is a record of bonafide piece of work, carried out by them under our supervision and guidance in the **Department of Master of Computer Application, NRI Institute of Information Science and Technology, Bhopal (M.P.).**

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**Introduction of the project “a comprehensive study on social network mental disorders detection”:**

As we have seen that in recent years, there has been growing recognition of the importance of mental health and well-being. However, identifying and addressing mental health conditions in a timely manner remains a significant challenge. Traditional methods of monitoring mental health, such as clinical assessments and surveys, often suffer from limitations such as high cost, stigma, and delays in data collection and analysis. Mental health conditions, including depression, anxiety, and suicidal ideation, affect millions of individuals worldwide. Social media platforms have emerged as a valuable source of data for monitoring and understanding mental health trends and behaviors. This project aims to leverage natural language processing (NLP) techniques to analyze social media posts, particularly tweets from Twitter, posts from Facebook, Instagram and other social network to detect signs of mental health conditions and identify individuals at risk of suicidal ideation. By harnessing the power of social media data, we seek to provide early interventions and support for those in distress.

**Objective of Project:**

* Machine Learning Models for Linguistic Markers: Develop machine learning models capable of detecting linguistic markers and patterns indicative of mental health conditions, such as depression and suicidal ideation, with the help of social media posts.
* Actionable Alerts for Timely Interventions: Provide actionable alerts generated by the system to mental health professionals, crisis intervention teams, and social media platform moderators. These alerts facilitate timely interventions and support for individuals identified as being at risk, thereby potentially preventing self-harm or suicide attempts. These objectives outline a comprehensive approach aimed at leveraging machine learning and real-time monitoring technologies to address mental health challenges on social media platforms effectively.

**Functionalities provided by are as follows:**

* Provide the record of the entire person who is detected to be suffering from mental disorders.
* Checking for the metal disordered person.
* It also works as the interface between the patient and the doctor.
* It tracks the person who is suffering from the metal disorder and gives this information to the doctor.
* Manage all the information of the patient.
* Shows the problem of the patient to the doctor.
* It decreases the risk of suicide due to metal disorder.
* It deals with the exchange of information between disordered person and the doctor.
* Manage the information of patient.
* Integration of information between patient and doctor.

**Overview:**

### **Social Networks and User Behavior:** Social networks are digital platforms that enable users to create content, interact with others, and share experiences. Behavioral patterns on these platforms, such as post frequency, sentiment, and content type, can provide insights into users’ mental states.

* **Mental Health Disorders and Symptoms:** Mental health disorders such as depression, anxiety, bipolar disorder, schizophrenia, and PTSD often manifest in speech patterns, emotional expressions, and social interactions. These symptoms can be subtle, but social media platforms may reveal significant insights into these conditions based on users' language and behavior.

**Methodology/Planning of Work:**

* Research Design: The research design entails an experimental approach aimed at developing a machine learning system for the early detection of suicidal ideation through analysis of social media posts. This involves utilizing publicly available Reddit datasets and employing word-embedding techniques such as TF-IDF and Word2Vec for text representation. The study employs a hybrid deep learning and machine learning approach, specifically utilizing a Convolutional Neural Network and Bidirectional Long Short-Term Memory (CNN–BiLSTM) model.
* Data Collection: Data collection involves obtaining a publicly available Reddit dataset from the Kaggle website. This dataset comprises posts from Suicide Watch spanning from 16 December 2008 to 2 January 2021, including both suicidal and non-suicidal posts. The dataset encompasses a total of 232,074 posts, evenly distributed between suicidal and non-suicidal categories.
* Data Analysis: Data analysis focuses on preprocessing the text data, including tokenization, and utilizing word-embedding techniques for feature representation. The study employs both CNN–BiLSTM models for classification, considering textual and LIWC features separately.
* Implementation: The implementation phase involves the development and training of the CNN–BiLSTM models using the prepared dataset. The models are trained to classify social media posts as either suicidal or non-suicidal based on the extracted features.
* Evaluation: Model performance is evaluated using standard metrics such as accuracy, precision, recall, and F1-scores. A comparison of the test results is conducted to assess the performance of the CNN–BiLSTM model when utilizing textual and LIWC features.
* Ethical Considerations: Ethical considerations include ensuring the privacy and confidentiality of Reddit users' data. Consent protocols are adhered to, and efforts are made to minimize the risk of harm to individuals identified as potentially at risk of self-harm. Additionally, the study considers the responsible use of AI technologies in mental health applications and the potential implications of model predictions on individuals' well-being.

This methodology outlines a systematic approach for developing and evaluating a suicidal ideation detection system, integrating both deep learning and machine learning techniques while adhering to ethical guidelines and considerations.

## Feasibility Study:

* **Technical Feasibility –** This section evaluates whether current technologies can support the creation of a system capable of detecting mental health disorders based on social media activity. Social media platforms have large amounts of user-generated data that can be analyzed for mental health indicators. The data may include text posts, comments, interactions (likes, shares, retweets), and multimedia content. However, obtaining this data is often restricted by privacy policies and platform terms of service.
* Operational Feasibility – This section assesses whether the system can be effectively managed and operated on a practical level, considering resources, infrastructure, and workflow. The infrastructure for processing large-scale social media data requires robust computing resources, including servers, cloud storage, and powerful computational tools for machine learning and NLP tasks.
* **Ethical Feasibility –** This section explores the ethical implications and challenges of using social media data for mental health disorder detection. Privacy is one of the most significant concerns in using social media data for health-related purposes. Analyzing private data without explicit user consent could violate privacy laws and lead to a loss of trust among users.
* **Economic Feasibility –** This section assesses the financial feasibility of the project. Developing an automated system for mental health disorder detection involves substantial costs, including data acquisition, algorithm development, and system infrastructure.
* Legal Feasibility – This section considers the legal requirements and challenges of implementing mental health detection through social media. Detecting mental health issues through social network data must comply with privacy regulations, including GDPR, HIPAA, and other relevant national or international data protection laws.

### ****Applications and Impact:****

#### **Early Detection and Intervention –** Detecting mental health disorders early through social networks can help intervene before conditions worsen. Platforms like Facebook and Twitter have begun experimenting with tools to flag content that may indicate distress, potentially linking users to support resources.

#### **Personalized Support and Treatment –** Social network data could help healthcare professionals design more personalized interventions by tailoring treatment recommendations based on behavioral insights gleaned from social media activity.

#### **Public Health Monitoring –** Social media platforms offer a large-scale opportunity for monitoring mental health trends across populations. By tracking language trends and behavior changes, researchers and public health officials can gain insight into the mental health of entire populations or communities.

# Conclusion:

Our project represents a significant stride towards harnessing the power of machine learning and deep learning techniques for early detection and intervention in mental health crises through analysis of social media content. By leveraging models such as Convolutional Neural Networks (CNN) and employing K-fold cross validation, we have developed a robust system capable of identifying linguistic markers and patterns associated with mental health conditions, including depression and suicidal ideation.

**Future scope:**

* Multi-platform Integration: Extend analysis to multiple social media platforms.
* Multimodal Analysis: Incorporate diverse data types like images and audio.
* Real-time Intervention: Implement immediate support mechanisms.
* Longitudinal Analysis: Track changes in mental health states over time.
* User Engagement Monitoring: Identify individuals at risk of social isolation.

**Limitations:**

* Data Bias: Risk of biased training data.
* Privacy Concerns: Need for stringent data protection measures.
* Algorithmic Accuracy: Models may produce false results.
* Generalization Challenges: Performance variation across demographics.
* Ethical Considerations: Stigmatization and consent concerns must be addressed.

**Software:-**

## LANGUAGE: Python

## Web Scraping Tool: Scrapy

## Data Base: MySql

## Text Mining Tool: Gensim, RapidMiner

## Image and Video Analysis Tool: OpenCV, TensorFlow

## Reporting Tool: Jupyter Notebooks

**Hardware:-**

## CPU : multi-core processors (e.g., Intel Xeon, AMD EPYC)

## GPU: High-end GPUs NVIDIA A100

## RAM: 64GB

## Storage : 256GB SSD

## References:-

## Python:

## <https://www.w3schools.com/python/python_ml_getting_started.asp>

## NumPy:

## <https://www.w3schools.com/python/numpy/default.asp>

## Pandas:

## <https://www.w3schools.com/python/pandas/default.asp>

## MySql:

## <https://www.w3schools.com/mysql/default.asp>

## Gensim:

## <https://www.geeksforgeeks.org/nlp-gensim-tutorial-complete-guide-for-beginners>

## TensorFlow:

## <https://www.w3schools.com/ai/ai_tensorflow_intro.asp>

## Youtube:

## <https://www.youtube.com/watch?v=gmvvaobm7eQ&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw>

## Book:

## <https://www.oreilly.com/library/view/hands-on-machine-learning/9781492032632/>