

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	26 October 2023
Team ID	592309
Project Name	Project – Predicting Mental Health Illness Of Working Professionals Using Machine Learning
Maximum Marks	4 Marks

Technical Architecture:

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Data collection	Gathering relevant data sources for mental health prediction.	Surveys, Wearable Devices, HR Records, Social Media, etc.
2.	Feature Engineering	electing and creating meaningful features from raw data, e.g., psychological assessments, sentiment analysis, biometric data	Python (for data manipulation), Feature Extraction Libraries
3.	Data Preprocessing	Cleaning and transforming data, handling missing values, and standardizing or normalizing features.	Python (Pandas, NumPy), Data Cleaning Libraries
4.	Machine Learning Model	Utilizing various ML algorithms for mental health prediction.	Logistic Regression, Random Forest, SVM, Neural Networks, etc.
5.	Model Evaluation	Assessing model performance using metrics like accuracy, precision, recall, F1-score, ROC AUC.	Python (Scikit-Learn), Model Evaluation Libraries
6.	Cross-Validation	Implementing techniques like k-fold cross-validation to ensure model robustness and reduce overfitting.	Python (Scikit-Learn), Cross-Validation Libraries

7.	Hyperparameter Tuning	Optimizing model parameters for improved performance.	Grid Search, Bayesian Optimization
8.	Real-time Data Streaming	Continuously collecting and analyzing data in real-time for early detection of mental health issues.	Stream Processing Frameworks (e.g., Apache Kafka)
9.	Natural Language Processing (NLP)	Analyzing text data for sentiment and communication pattern analysis.	Python (NLTK, spaCy), NLP Libraries
10.	Privacy and Ethics	Ensuring data privacy and ethical handling of sensitive mental health information.	Compliance with Data Protection Regulations
11.	User Interface (UI)	Designing user-friendly interfaces for users to access and interpret mental health predictions.	Web UI (HTML, CSS, JavaScript), Mobile App Development
12.	Feedback Loops	Incorporating feedback to improve model accuracy and effectiveness.	Feedback Collection and Analysis Tools
13.	Support and Resources	Providing mental health resources for individuals identified as at-risk.	Mental Health Support Services and Resources
14.	Legal and Regulatory Compliance	Compliance with data protection and mental health regulations.	Adherence to Legal and Ethical Standards
15.	Deployment Platforms	Choosing the right platform for deploying models, whether on-premises or in the cloud.	Cloud Platforms (AWS, Azure, Google Cloud), On-Premises Servers

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Scalability	The application should be scalable to accommodate a growing number of users and data as more working professionals participate in the program. This is especially important if the system is deployed on a cloud-based infrastructure.	cloud-based infrastructure

2.	Interactivity	The application should provide an interactive and user-friendly interface to enable professionals and individuals to access and understand their mental health predictions easily. This could include web interfaces, mobile apps, or chatbots..	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Privacy and Security	Given the sensitivity of mental health data, the application must prioritize data privacy and security. It should comply with relevant data protection regulations and use encryption and access controls.	Technology used
4.	Machine Learning Model Updates	Regularly update the machine learning models to adapt to changing patterns and improve prediction accuracy.	
5.	Compliance	Adhere to legal and ethical standards regarding data protection and the handling of mental health information	Technology used
6.	Adaptability	The application should be adaptable to various data sources, including wearables, surveys, and HR records, and should handle different types of data effectively.	Technology used

References:

<https://www.ibm.com/cloud/architecture> <https://aws.amazon.com/architecture>

