IT4010 – Research Project - 2024

Topic Assessment Form

Project ID: 24-25J-106

1. Topic (12 words max)

Discover The Mental Health Status Using Social Media Behavioral Patterns

2. Research group the project belongs to

Centre of Excellence for AI (CEAI)

3. Research area the project belongs to

Bio-Medical and Health Informatics (HI)

4. If a continuation of a previous project:

Project ID	-
Year	-

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

The mental health crisis has become a pressing concern globally, exacerbated by the pervasive influence of social media on individual behavior and well-being. Social media platforms, while providing numerous benefits, also pose significant risks, especially to mental health. This research aims to identify the mental health status of individuals through their social media behaviors, utilizing advanced image processing and content analysis techniques.

Facial expressions provide critical insights into a person's immediate emotional response. By capturing and processing these expressions using image processing algorithms, we can determine the positivity or negativity of the user's reaction. This data, once analyzed, will be stored in a database to track emotional fluctuations and identify potential triggers for stress or joy (Kross, E.,2013). Passive activity in social media use such as reading posts is more strongly associated with depression than doing active use like making posts (Odgers CL, Jensen MR. J,2020).

The content of these posts will be analyzed to assess the percentage of positive or negative sentiments expressed. Sentiment analysis, a subfield of natural language processing, will be employed to gauge the overall tone of the user's contributions to social media. This longitudinal data will help in identifying patterns and trends that might indicate deteriorating or improving mental health over an extended period (Moreno, M. A,2011). By tracking the duration and frequency of social media usage, alongside location-based data obtained through image processing, we can infer the user's lifestyle and

environment. The sentiment of the content associated with these locations will be analyzed to determine the positivity or negativity of experiences in different settings. This comprehensive dataset will offer a deeper understanding of how specific environments and usage patterns influence mental health (De Choudhury, M.,2013).

Females were found to be more addicted to social media as compared with males (Wartberg L, Kriston L, Thomasius R.,2020). And age is a crucial factor as it influences social media usage patterns and susceptibility to mental health issues. By correlating age with the emotional responses, content sentiments, and activity patterns, we can draw nuanced conclusions about the user's mental health status. This multi-faceted approach aims to provide a holistic view of the user's mental well-being, offering potential for early intervention and personalized mental health support (Guntuku, S. C.,2019).

More importantly, symptoms of major depression have been found among the individuals who spent most of their time in online activities and performing image management on social networking sites (O'Reilly M, Dogra N, Hughes J, Reilly P, George R, Whiteman N.,2018).

References

Adolescent mental health in the digital age: facts, fears, and future directions. Odgers CL, Jensen MR. J Child Psychol Psychiatry. 2020;61:336–348.

De Choudhury, M., et al. (2013). Predicting Depression via Social Media. Proceedings of the 7th International Conference on Weblogs and Social Media (ICWSM).

Internet gaming disorder and problematic social media use in a representative sample of German adolescents: prevalence estimates, comorbid depressive symptoms, and related psychosocial aspects. Wartberg L, Kriston L, Thomasius R. Comput. Hum. Behav. 2020;103:31–36.

Guntuku, S. C., et al. (2019). Detecting Depression and Mental Illness on Social Media: An Integrative Review. Current Opinion in Behavioral Sciences.

Kross, E., et al. (2013). Facebook Use Predicts Declines in Subjective Well-Being in Young Adults. PLOS ONE.

Moreno, M. A., et al. (2011). A Pilot Evaluation of Associations between Displayed Depression References on Facebook and Self-reported Depression Using a Clinical Scale. Journal of Behavioral Health Services & Research.

Potential of social media in promoting mental health in adolescents. O'Reilly M, Dogra N, Hughes J, Reilly P, George R, Whiteman N. https://www.ncbi.nlm.nih.gov/pubmed/30060043 Health Promot Int. 2018;34:981–991.

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

This solution aims to identify and analyze a user's mental health status based on their social media behaviors. The analysis is divided into four main components, each targeting different aspects of user interactions and content on social media platforms. The data collected and processed from these components will help create a comprehensive model that can provide insights into the user's mental well-being over time. leverages facial expression analysis, content analysis, and usage pattern tracking to create a multi-faceted view of a user's mental health. By integrating short-term and long-term data with contextual information, it aims to provide a comprehensive and accurate assessment of mental well-being, adjusted for age-related factors. The outcome is a predictive model that helps in understanding and potentially improving user mental health through timely interventions and insights.

Identify the short-term mental status

Take the facial expressions when a user sees a post. Then calculate the positivity and negativity from the result of image processing and store it in a database. Give the reaction to the post from the result of facial expression image processing result.

Identify the long-term mental status

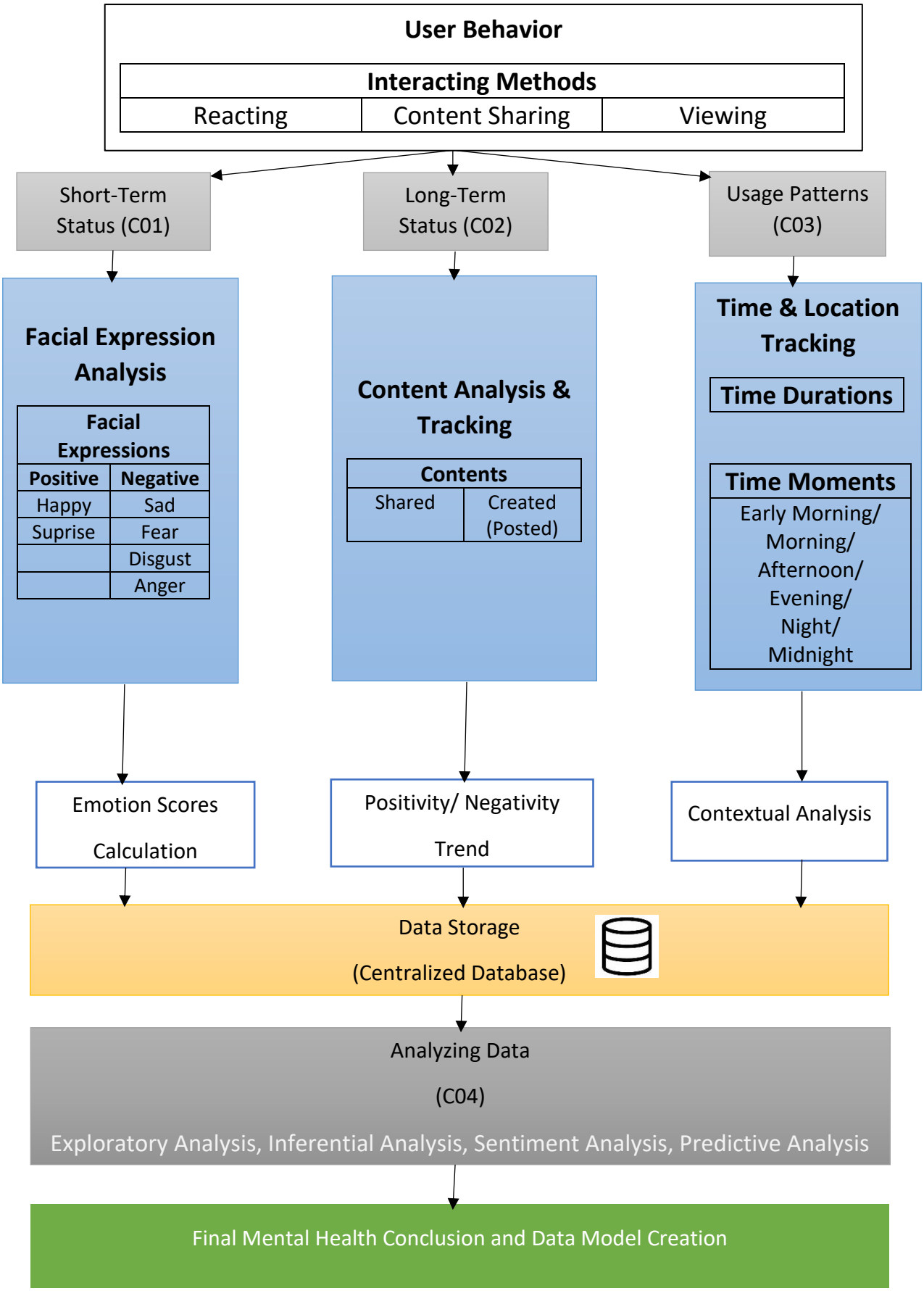
Track the sharing and creating posts by the user and calculate the percentage of positivity or the negativity by analyzing the content and store it in a database

Track times and durations that user spends on the platform

Track the times and time durations that the user spends on the platform and identify the locations by image processing if the user uploads a photo or update their timeline and calculate the percentage of positivity or negativity and store it in a database.

Analyze all databases and train a model

Analyze all above databases and get the conclusion about the mental status with the age of the user. We can create data modal from the conclusion of this process.


User Behavior
Interacting Methods
Reacting
Content Sharing
Viewing
Short-Term Status (C01)
Long-Term Status (C02)
Usage Patterns (C03)
Facial Expression Analysis
Facial Expressions
Positive
Negative
Happy
Sad
Suprise
Fear
Disgust
Anger
Content Analysis & Tracking
Contents
Shared
Created (Posted)
Time & Location Tracking
Time Durations
Time Moments
Early Morning/ Morning/ Afternoon/ Evening/ Night/ Midnight
Emotion Scores Calculation
Positivity/ Negativity Trend
Contextual Analysis
Data Storage
(Centralized Database)
Analyzing Data
(C04)
Exploratory Analysis, Inferential Analysis, Sentiment Analysis, Predictive Analysis
Final Mental Health Conclusion and Data Model Creation

7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

In first 3 components in this research, we must collect data and create datasets. To get the final conclusions and analyze the mental status from the collected data set we need expertise guidance. For that we are planning to connect with a psychiatrist. It may help to improve the accuracy of the final state.

For implement this research project, need to understand on the image processing, natural language processing, data processing and machine learning are the main requirements. In first component we need to identify the facial expression of the user when the user views the content, for that need image processing. In the second component need to analyze the content and identify the emotion type. For the 2 content types created (written) content and shared content (images) we need image processing and natural language processing for capture these contents. For analyze both captured details we need machine learning.

In above that mentioned that we need machine learning to analyze the captured data and get the result. For that we need data sets to train a model to work with image processing and natural language processing. We have datasets collected online and hence manual creation of a dataset is not required. Datasets were available through Kaggle and other sources.

Facial key point detection:

facial keypoint detection (kaggle.com)

8. Objectives and Novelty

Main Objective Identify the mental health situation from the social media behaviors			
Member Name	Sub Objective	Tasks	Novelty
Amarasinghe R.A.D.T.	Identify the short-term mental status	• Take the facial expressions when a user sees a post. • Then calculate the positivity and negativity from the result of image processing and store it in a database. • Give the reaction to the post from the result of facial expression image processing result.	To capture the instant changes of the individual mental state changes the best method is study the reaction patterns and status on post and news feeds. For achieve it the most accurate way is observe the facial expressions at the reading moment.
Ekanayaka E.M.C.S.	Identify the long-term mental status	• Track the sharing and creating posts by the user and calculate the percentage of positivity or the negativity by analyzing the content and store it in a database.	As another parameter the long-term mental status, to capture it we need to observe the patterns and the states of mental status changing in regular period. To achieve it we need to track the shared and updated posts and feeds of the user.
Nanayakkara A.A.R.	Track times and durations that user spends on the platform	• Track the times and time durations that the user spends on the platform and identify the locations by image processing if the user uploads a photo or update their timeline and	Track the times that the identified user is active in the social media platform during a certain period and measure the time

			calculate the percentage of positivity or negativity and store it in a database.	period that the identified user is active in the social media platform. Also need the location if the identified user visits to a place in the certain period.
Senadheera W.D.N.D.	Analyze all databases and train a model		• Analyze all above databases and get the conclusion about the mental status with the age of the user. • We can create data model from the conclusion of this process.	Analyze all above details using several analyzing techniques (Exploratory Analysis, Inferential Analysis, Sentiment Analysis, Predictive Analysis). and create a conclusion about the Mental Health status of the social media users and identify the patterns of the social media user's mental health with reactions, online times, the sharing and posting contents in the social media. Take the above data as the parameters and train a model to measure the stress level of social media users.

9. Supervisor checklist

a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes	✓	No	

b) Does the proposed topic exhibit novelty?

Yes	✓	No	

c) Do you believe they have the capability to successfully execute the proposed project?

Yes	✓	No	

d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes	✓	No	

e) Supervisor's Evaluation and Recommendation for the Research topic:

I recommend this topic for this group.

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Dr.	Junius	Anjana	24/June/2024
Co-Supervisor	Dr.	Nathali	Silva	
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

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Topic Assessment Form

<u>This part is to be filled by the Topic Screening Panel members.</u>

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

The Review Panel Details

Member's Name	Signature

*__Important__:

1. According to the comments given by the panel, make the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.
2. If the project topic is rejected, identify a new topic, and follow the same procedure until the topic is approved by the assessment panel.