EMOSENSE
FINAL PRESENTATION

Guide : Dr Dhanya PM

Akshay Ajit
Crispin Mathew
David Johns Denny
Devananth H

PROBLEM DEFINITION

- Develop a tool capable of extracting text data from the user's social media activity and process it using BERT based emotion detection and hate speech detection modules to provide the user with a detailed report of how his/her mental state has been affected by social.

OBJECTIVES OF THE PROJECT

- Mental state recognition - The primary aim of the project is to recognize the user's mental state from his/her online activity (social media and browser activity) using a extension.

- Mental state report generation - From the results of the first stage, a detailed mental state report is generated that can be accessed by the user through the website dedicated to the project.

- Hate Speech recognition - We aim to detect hate speech from the user's side in his/her online activity.

OBJECTIVE OF THE PROJECT

- We aim to implement a task suggestion module that can recommend tasks to the user based on his/her mental state report.

- Text summarization feature will also be integrated in the plugin. This can be used to summarize long paragraphs we encounter on the internet.

NOVELTY OF IDEA

- The idea of generating a mental health report for a user from his/her social media activity is an original one.

- It is a well known fact that in the modern world, social media is a prime determinant of the mental health of the population as a whole. Therefore, assigning a number to the degree of mental state changes the user experiences as a result of social media usage can be a very important task.

SCOPE OF THE PROJECT

- The timely released mental state reports sparks a need for introspection, which is the foundation of all mental health therapies.

- Analysis of a series of reports generates an idea of progressing/deteriorating mental health.

- Task suggestion based on the detected mood can help alleviate the mental state and enhances the overall quality of the day.

Literature Survey

Paper Title	Author Names	Proposed Method
Selective shallow models strength integration for emotion detection using GloVe and LSTM	Aditya Vijayvergia Krishan Kumar	Application of two complementary lightweight models instead of a single large one
Emotion Detection in Twitter Social Media Using Long Short-Term Memory (LSTM) and Fast Text	M. Alfa Riza Novrido Charibaldi	Analysis of performance of LSTM when combined with different word embeddings Fast Text, Word2Vec and GloVe

Literature Survey

Paper Title	Author Names	Proposed Method
Emotion Detection in Text using Nested Long Short-Term Memory	Daniel Haryadi Gede Putra Kusuma	Comparison of LSTM and Nested LSTM with SVM
Decoding Emotions in Text Using GloVe Embeddings	Piyush Gupta Inika Roy Gunnika Batra Arun Kumar Dubey	LSTM + GloVe
A review on sentiment analysis and emotion detection from tex	Pansy Nandwani Rupali Verma	Fundamentals of Sentiment analysis/ Emotion detection.

Literature Survey

Paper Title	Author Names	Proposed Method
Transformer models for text-based emotion detection: a review of BERT-based approaches	Francisca Adoma Acheampong Henry Nunoo-Mensah Wenyu Chen	Transformers and some transformer-based models,BERT'S strength and popularity in text-based emotion detection.
BERT-CNN: A Deep Learning Model for Detecting Emotions from Text	Ahmed R. Abas Ibrahim Elhenawy Mahinda Zidan Mahmoud Othman	BERT-CNN, combines BERT with CNN to detect emotions in text
A BERT based dual-channel explainable text emotion recognition system	Puneet Kumar Balasubramanian Raman	combination of pre-trained BERT for feature extraction and two channels, consisting of CNN and Bi-LSTM networks

Literature Survey

Paper Title	Author Names	Proposed Method
EMOTION DETECTION FROM TWEETS USING A BERT AND SVM ENSEMBLE MODEL	Ionuţ-Alexandru ALBU Stelian SPÎNU	Introduce a novel ensemble model which combines BERT and SVM models
Intermediate-Task Transfer Learning with BERT for Sarcasm Detection	Edoardo Savini Cornelia Caragea	Used BERT and trained it on related tasks like sentiment and emotion analysis before using it for sarcasm detection.

Literature Survey

Paper Title	Author Names	Proposed Methods
Combating hate speech using an adaptive ensemble learning model with a case study on COVID-19 (July 2021) (Base Paper)	Shivang Agarwal, C. Ravindranath Chowdary	Detect hate speech using A-Stacking classifier in ensemble learning.
Accelerating automatic hate speech detection using parallelized ensemble learning models (May 2023)	Shivang Agarwal, Ankur Sonawane , C. Ravindranath Chowdary	Parallel training of base models to improve speed of the final prediction.
Detecting twitter hate speech in COVID-19 era using machine learning and ensemble learning techniques (September 2022)	Akib Mohi Ud Din Khandaya, Syed Tanzeel Rabani, Qamar Rayees Khana , Showkat Hassan Malik	Describes hate speech detection using ensemble learning using a case study on COVID-19 pandemic.

Literature Survey

Paper Title	Author Names	Proposed Method
How well do hate speech, toxicity, abusive and offensive language classification models generalize across datasets? (January 2021)	Paula Fortuna, Juan Soler-Company , Leo Wanner	Comparing how different models fare in generalization of hate speech detection.
Unintended bias evaluation: An analysis of hate speech detection and gender bias mitigation on social media using ensemble learning (March 2022)	Francimaria R.S. Nascimento, George D.C. Cavalcanti, Márjory Da Costa-Abreu	Talks about data bias that is evident in hate speech detection models that lead to low generalization.

Literature Survey

Paper Title	Author Names	Proposed Method
Hate speech detection using static BERT Embeddings	Gaurav Rajput, Narinder Singh punn, Sanjay Kumar Sonbhadra, and Sonali Agarwal	From observations, Static BERT Embeddings performed better than Word Embeddings.
Intelligent Identification of Hate Speeches to address the increased rate of Individual Mental Degeneration	Lamima Tabassum Avaa, Asif Karimb, Md. Mehedi Hassanc, Fahad Faisald, Sami Azame, A S M Farhan Al Haquef, Sadika Zamang	We examined Fine-Tuning BERT with different learning rates and listed the outcomes.
BERT-Based Sentiment Analysis: A Software Engineering Perspective	Himanshu Batra, Narinder Singh Punn, Sanjay Kumar Sonbhadra, and Sonali Agarwal	Results show BERT based Ensemble approach and Compressed BERT Model attain improvements by

Literature Survey

Paper Title	Author Names	Proposed Method
ETHOS: AN ONLINE HATE SPEECH DETECTION DATASET	Ioannis Mollas, Zoe Chrysopoulou, Stamatis Karlos, Grigorios Tsoumakas	ETHOS is a textual dataset with 2 variants : Binary and Multi-Label based on Youtube and Reddit comments.
Improving hate speech detection using Cross-Lingual Learning	Anderson Almeida Firmino , Cláudio de Souza Baptista , Anselmo Cardoso de Paiva	This approach uses transfer learning from Pre-Trained Language Models(BERT and XLM-R) with large corpora available.

PROPOSED METHOD

- Build a browser extension that can read text from any website.
- Send this text to a server for further processing
- The processing involves detecting emotion conveyed through the text.
- The emotion recognized is sent to a database for report generation purposes.

PROPOSED METHOD

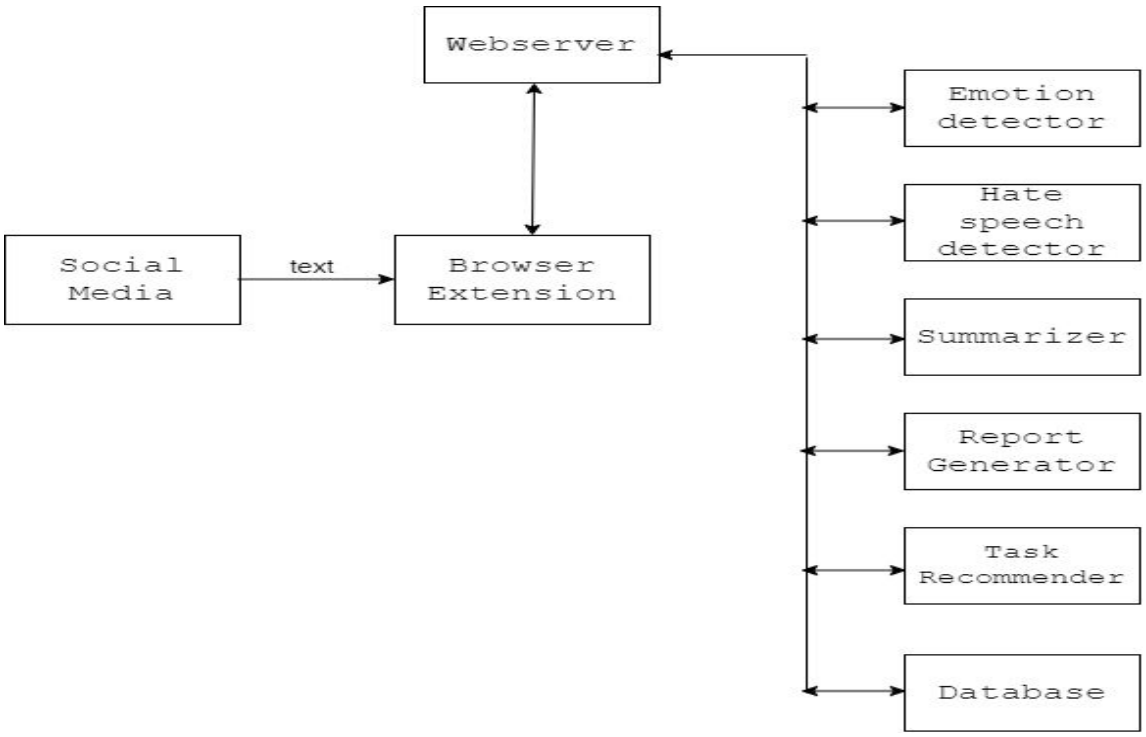
- Also the text is passed through a hate speech detection system.
- The results of the hate speech system is sent to the database for report generation purposes.
- To use the text summarization feature, the user must select text to be summarized.
- The selected text is summarized using APIs and the result is displayed in a pop up.

PROPOSED METHOD

- The user can access the mental health report through the website where he/she has to create an account.

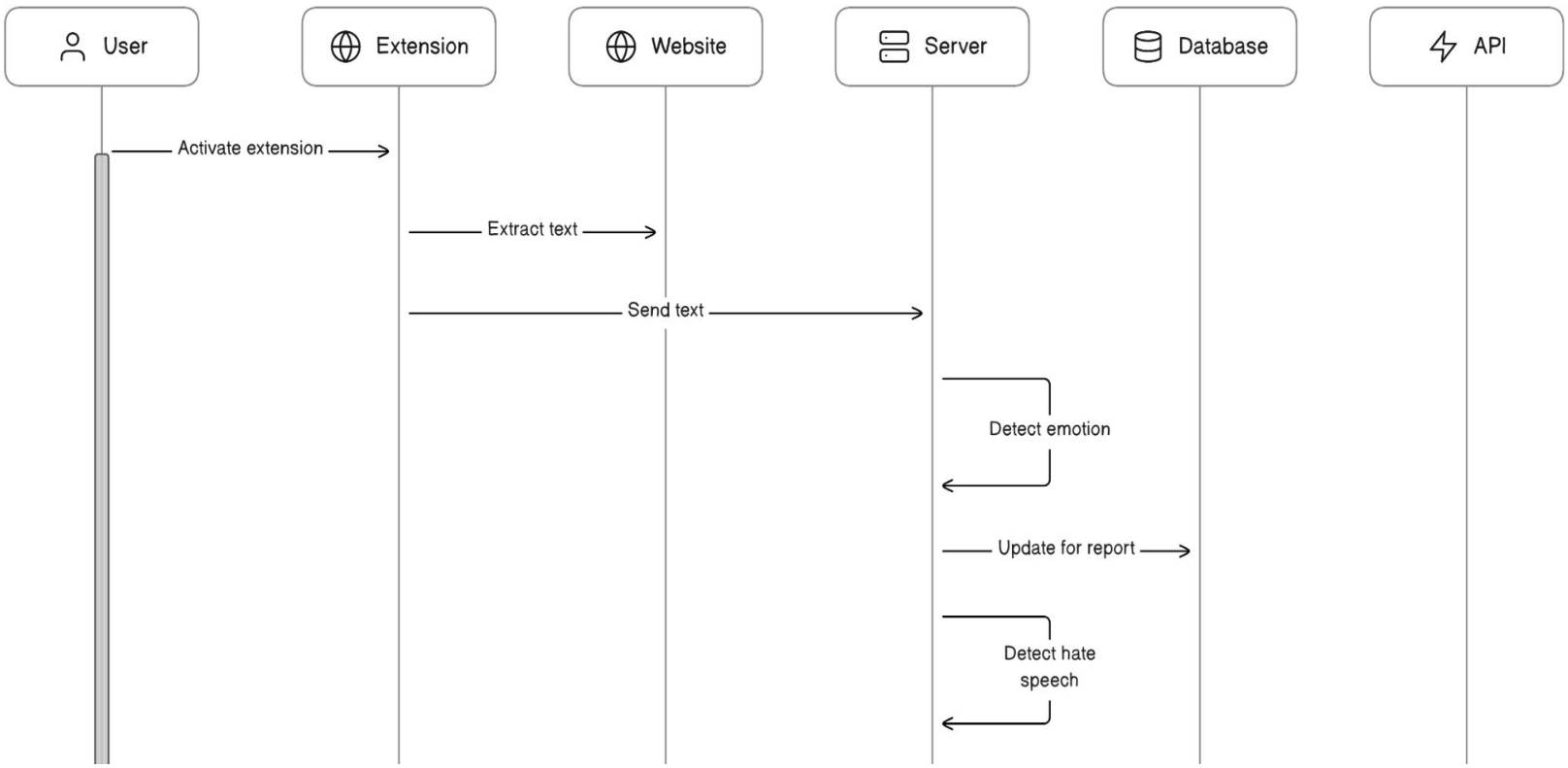
- Also, task recommendation feature is implemented using the results in the mental health report.

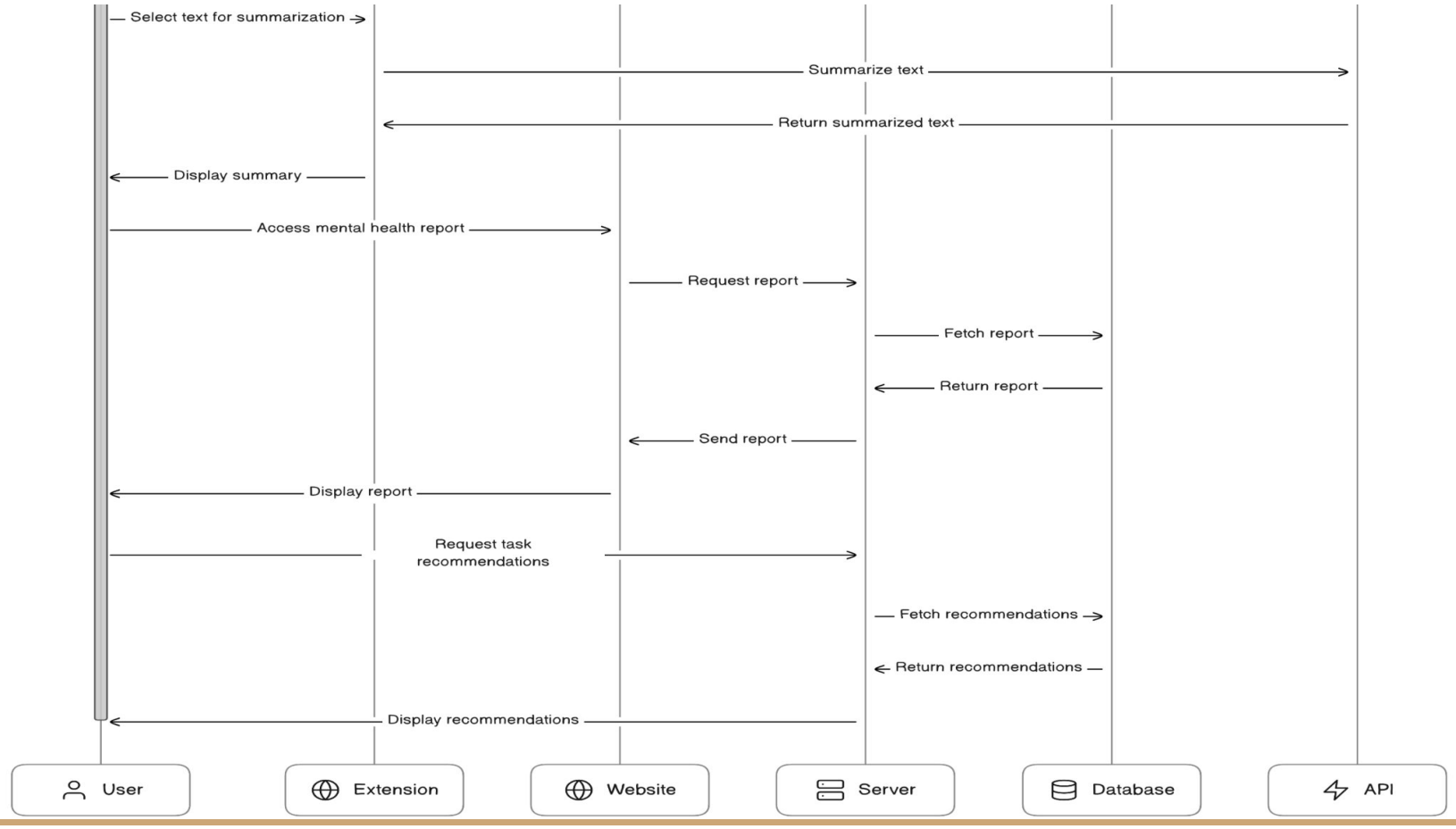
ARCHITECTURE DIAGRAM



SEQUENCE DIAGRAM

User Interaction with Browser Extension




Select text for summarization
Summarize text
Return summarized text
Display summary
Access mental health report
Request report
Fetch report
Return report
Send report
Display report
Request task recommendations
Fetch recommendations
Return recommendations
Display recommendations
User
Extension
Website
Server
Database
API

RESULTS


4 Jan 2024, 10:40
hello
14:40
hello cristiano, i am a huge fan

RESULTS

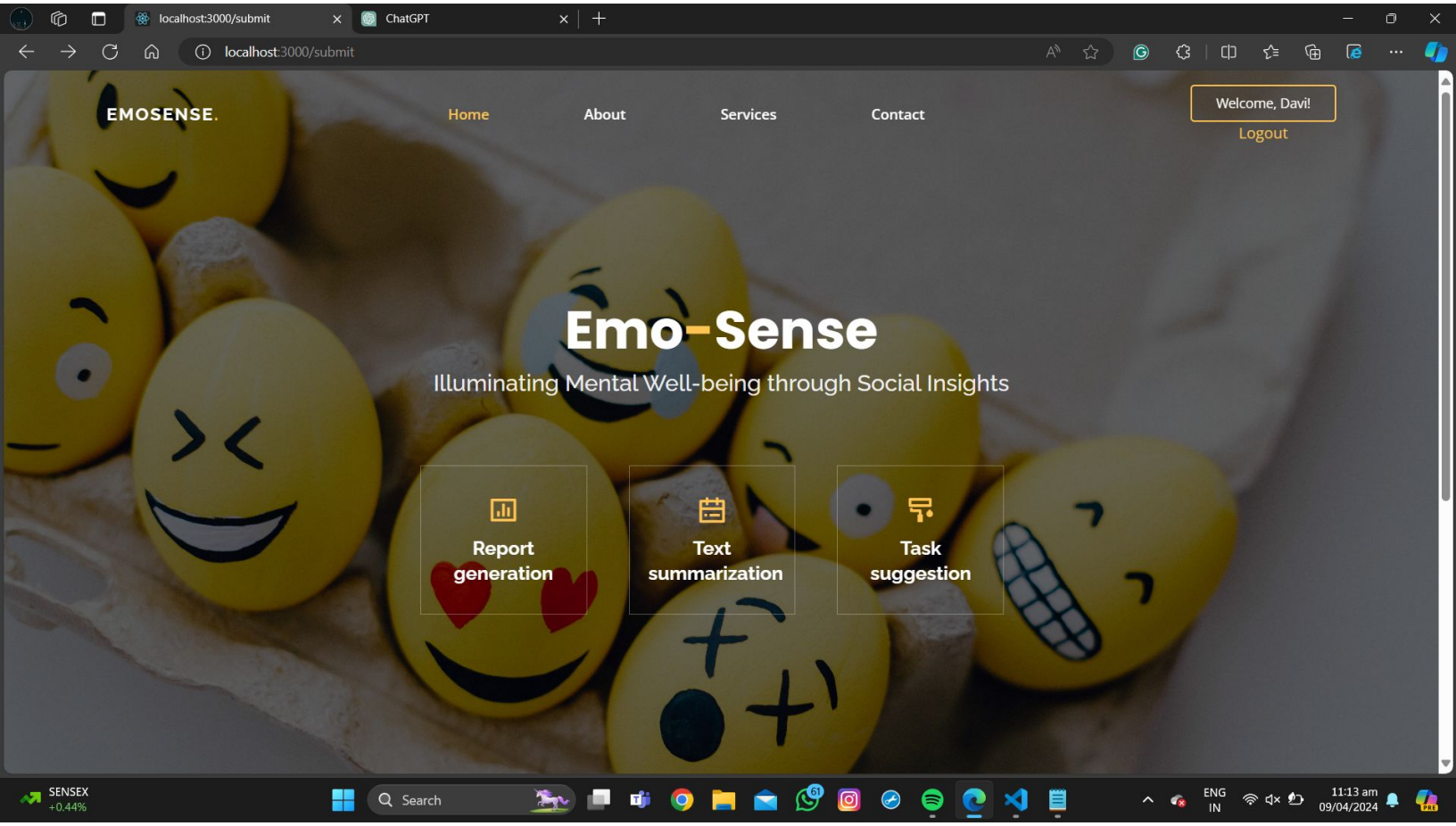
```
mysql> select * from insta_data;
+---------------------------------+--------------------------+
| text                            | timestamp                |
+---------------------------------+--------------------------+
| hello cristiano, i am a huge fan | 2024-02-21T09:10:37.089Z |
+---------------------------------+--------------------------+
1 row in set (0.00 sec)
```

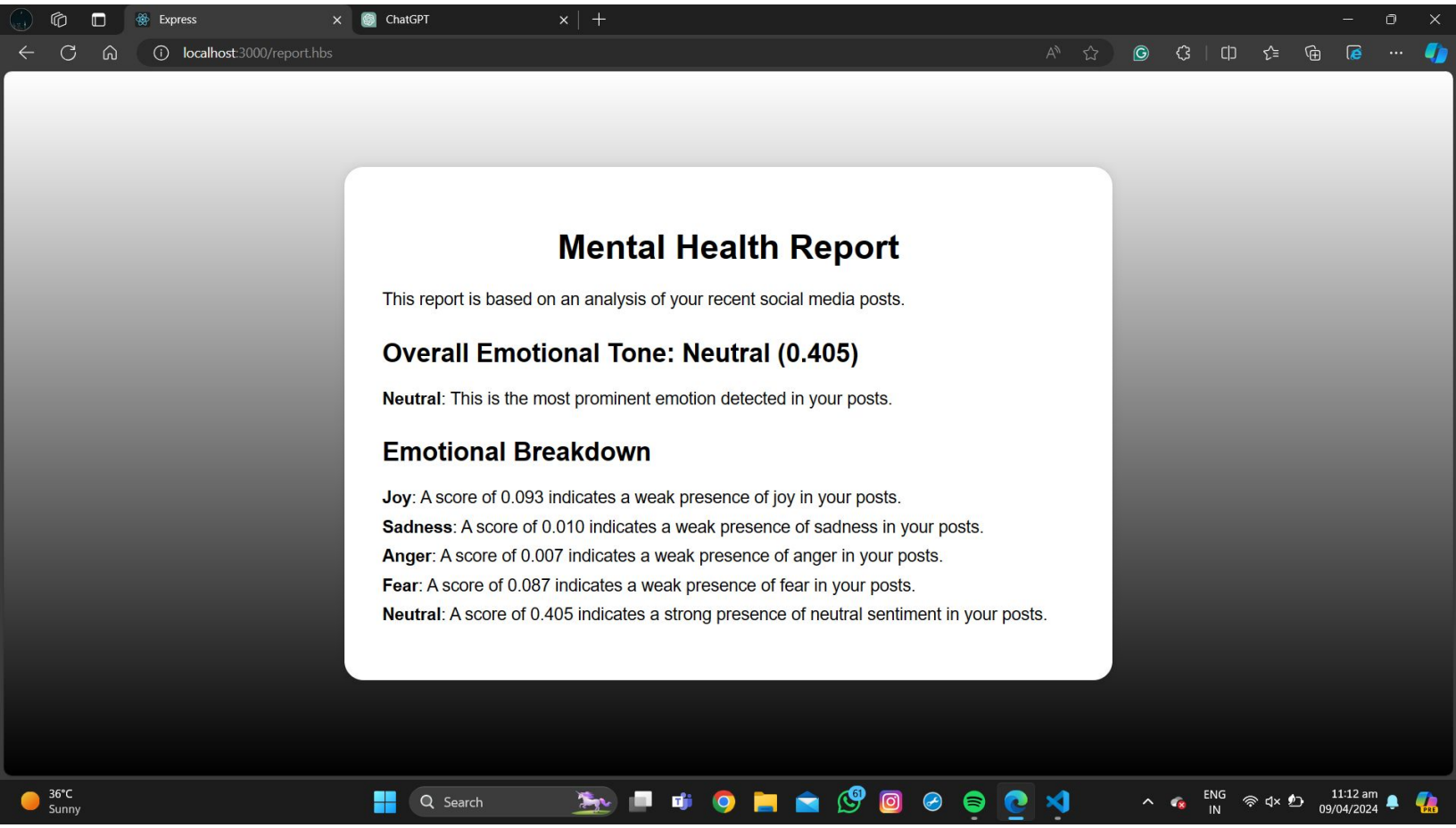
RESULTS

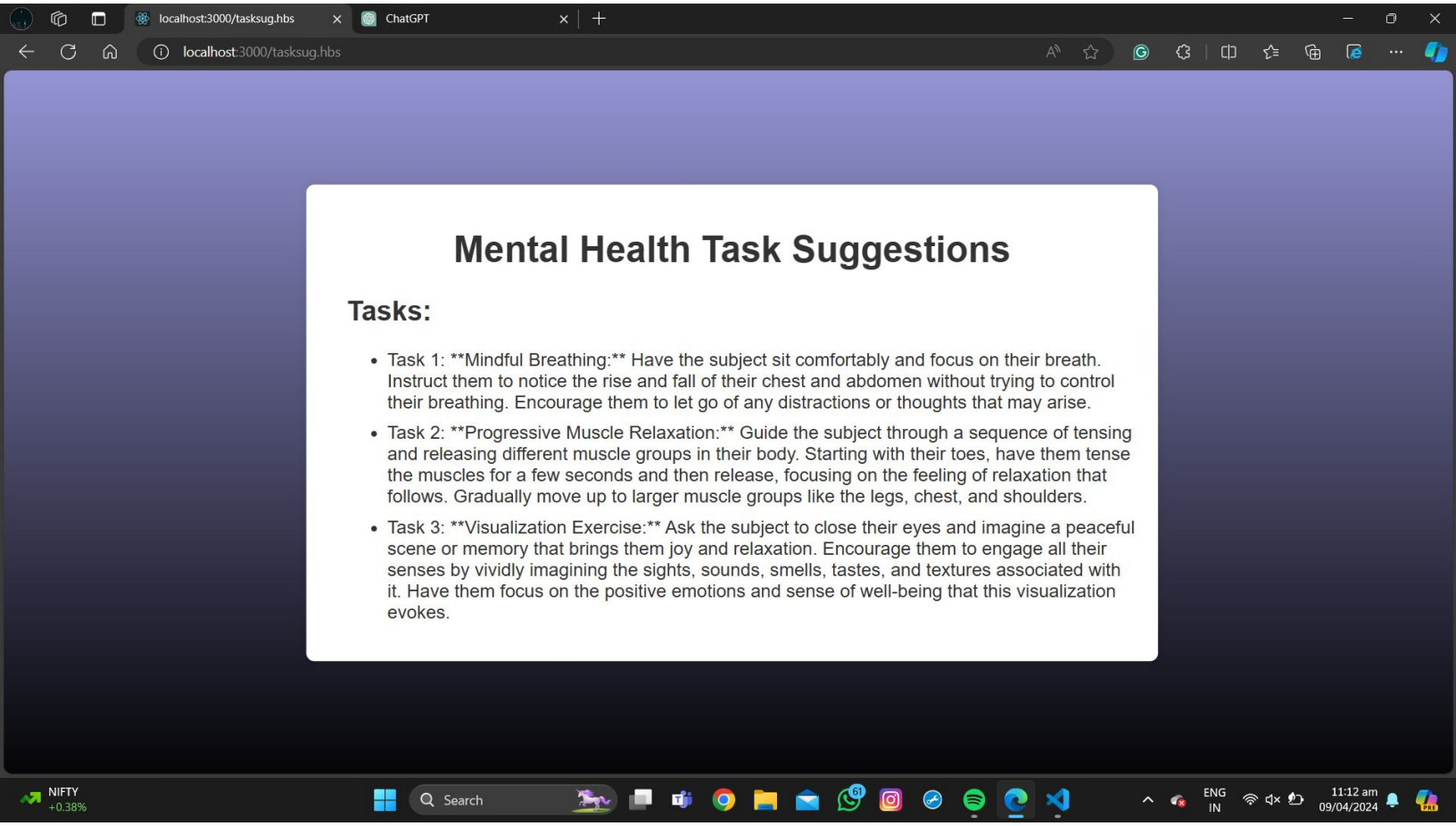
```
mysql> select * from insta_results;
+------------+-----------+---------------+-------------+-------------+-------------+
| date       | joy       | sadness       | fear        | anger       | neutral     |
+------------+-----------+---------------+-------------+-------------+-------------+
| 2024-02-21 | 0.9586112 | 0.00096629077 | 0.019724492 | 0.002208148 | 0.018489823 |
+------------+-----------+---------------+-------------+-------------+-------------+
1 row in set (0.00 sec)
```

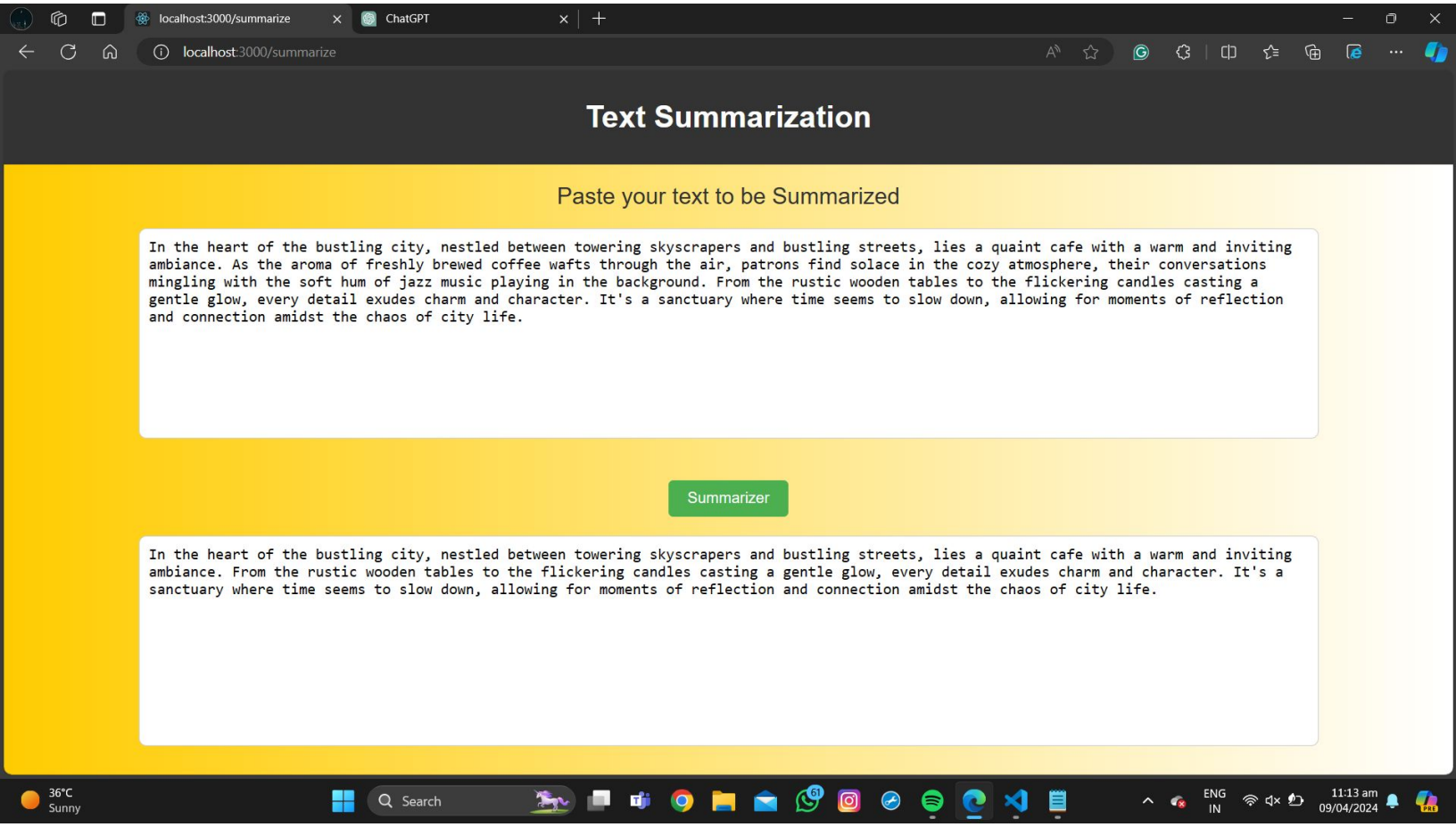
RESULTS

```
mysql> select * from insta_hate;
+---------------------+---------------------+-------------+
| date                | text                | hate_speech |
+---------------------+---------------------+-------------+
| 2024-02-21 21:56:10 | hello how are you   | Neither     |
| 2024-02-22 09:05:50 | good game yesterday | Neither     |
+---------------------+---------------------+-------------+
2 rows in set (0.00 sec)
```




Express
ChatGPT
localhost:3000/report.hbs
Mental Health Report
This report is based on an analysis of your recent social media posts.
Overall Emotional Tone: Neutral (0.405)
Neutral: This is the most prominent emotion detected in your posts.
Emotional Breakdown
Joy: A score of 0.093 indicates a weak presence of joy in your posts.
Sadness: A score of 0.010 indicates a weak presence of sadness in your posts.
Anger: A score of 0.007 indicates a weak presence of anger in your posts.
Fear: A score of 0.087 indicates a weak presence of fear in your posts.
Neutral: A score of 0.405 indicates a strong presence of neutral sentiment in your posts.
36°C
Sunny
Search
ENG
IN
11:12 am
09/04/2024


localhost:3000/tasksug.hbs
ChatGPT
localhost:3000/tasksug.hbs
Mental Health Task Suggestions
Tasks:
Task 1: **Mindful Breathing:** Have the subject sit comfortably and focus on their breath. Instruct them to notice the rise and fall of their chest and abdomen without trying to control their breathing. Encourage them to let go of any distractions or thoughts that may arise.
Task 2: **Progressive Muscle Relaxation:** Guide the subject through a sequence of tensing and releasing different muscle groups in their body. Starting with their toes, have them tense the muscles for a few seconds and then release, focusing on the feeling of relaxation that follows. Gradually move up to larger muscle groups like the legs, chest, and shoulders.
Task 3: **Visualization Exercise:** Ask the subject to close their eyes and imagine a peaceful scene or memory that brings them joy and relaxation. Encourage them to engage all their senses by vividly imagining the sights, sounds, smells, tastes, and textures associated with it. Have them focus on the positive emotions and sense of well-being that this visualization evokes.
NIFTY
+0.38%
Search
ENG
IN
11:12 am
09/04/2024



TASK DISTRIBUTION

- Web extension: Crispin Mathew
- Website: David Johns Denny
- Database: Devananth H
- Emotion detector: Crispin Mathew, David Johns Denny
- Hate Speech detector: Akshay Ajit, Devananth H
- Text summarizer: Akshay Ajit
- Report generator: David Johns Denny
- Task recommender: Crispin Mathew

CONCLUSION

- All the proposed modules – web extension, emotion detector, hate speech detector, text summarizer, report generator and task recommender have been successfully developed
- Integration of the modules into the web server has been successfully completed.
- Researched how users prefer different social media platforms to share varying emotions and generated the mental state report accordingly.

FUTURE SCOPE

- Aid therapists in diagnosis of mental health ailments
- Multi language operability
- Real time hate speech detection and intervention

REFERENCES

1. Kumar, P., & Raman, B. (2022). A BERT based dual-channel explainable text emotion recognition system. Neural Networks, 150, 392-407.
2. Vijayvergia, A., & Kumar, K. (2021). Selective shallow models strength integration for emotion detection using GloVe and LSTM. *Multimedia Tools and Applications*, *80*(18), 28349-28363.
3. Haryadi, D., & Kusuma, G. P. (2019). Emotion detection in text using nested long short-term memory. *International Journal of Advanced Computer Science and Applications*, *10*(6).
4. Abas, A. R., Elhenawy, I., Zidan, M., & Othman, M. (2022). BERT-CNN: A Deep Learning Model for Detecting Emotions from Text. *Computers, Materials & Continua*, *71*(2).
5. Albu, I. A., & Spînu, S. (2022). Emotion detection from tweets using a BERT and SVM ensemble model. *arXiv preprint arXiv:2208.04547*.
6. Riza, M. A., & Charibaldi, N. (2021). Emotion Detection in Twitter Social Media Using Long Short-Term Memory (LSTM) and Fast Text. International Journal of Artificial Intelligence & Robotics (IJAIR), 3(1), 15-26.

REFERENCES

7. Agarwal, S., & Chowdary, C. R. (2021). Combating hate speech using an adaptive ensemble learning model with a case study on COVID-19. Expert Systems with Applications, 185, 115632.
8. Agarwal, S., Sonawane, A., & Chowdary, C. R. (2023). Accelerating automatic hate speech detection using parallelized ensemble learning models. *Expert Systems with Applications*, *230*, 120564.
9. Khanday, A. M. U. D., Rabani, S. T., Khan, Q. R., & Malik, S. H. (2022). Detecting twitter hate speech in COVID-19 era using machine learning and ensemble learning techniques. *International Journal of Information Management Data Insights*, *2*(2), 100120.
10. Rajput, G., Punn, N. S., Sonbhadra, S. K., & Agarwal, S. (2021). Hate speech detection using static bert embeddings. In *Big Data Analytics: 9th International Conference, BDA 2021, Virtual Event, December 15-18, 2021, Proceedings 9* (pp. 67-77). Springer International Publishing.
11. Ava, L. T., Karim, A., Hassan, M. M., Faisal, F., Azam, S., Al Haque, A. F., & Zaman, S. (2023). Intelligent Identification of Hate Speeches to address the increased rate of Individual Mental Degeneration. *Procedia Computer Science*, *219*, 1527-1537.
12. Batra, H., Punn, N. S., Sonbhadra, S. K., & Agarwal, S. (2021). Bert-based sentiment analysis: A software engineering perspective. In *Database and Expert Systems Applications: 32nd International Conference, DEXA 2021, Virtual Event, September 27–30, 2021, Proceedings, Part I 32* (pp. 138-148). Springer International Publishing.

STATUS OF PAPER PUBLICATION

- Wrote a research paper describing the project titles “Mental Health From Social Media Activity”.

- Submitted the paper to the conference “2024 International Conference on Signal processing, Computation, Electronics, Power and Telecommunication”, to be held on July 4-5.

- Awaiting response from the conference