**Future Work Suggestions**

1. **Development of new methods:** enhance mental illness detection capabilities.
2. Multi-modal methods: improve the accuracy and robustness of mental illness detection systems.
3. **Investigation of Factors:** Further research in precise factors to differences in depression and anxiety levels
4. Examining social interactions and community engagement in improving mental health outcomes
5. collaboration with mental health professionals, to develop effective interventions for addressing mental health challenges.
6. **Information Relay:** how the information extracted through NLP techniques (text analysis)
7. Develop a self-learning expert system for detecting symptoms and providing suggestions to remove student stress,
8. **Comparative Analysis with Other Methods:** Conducting a comparative analysis to identify insights into the effectiveness and efficiency of different approaches.
9. Collaborating with mental health professionals, and students to gather feedback and insights for optimizing the chatbot for better user engagement and outcomes.
10. Increasing accuracy for text classification methods to enhance the performance of the chatbot.
11. Focusing on gathering more information about users to provide more efficient and desired outputs.

**Other papers Limitations**

* **Generalizability:** The findings and methodologies discussed in the paper may not be universally applicable across different populations,regions, languages, or cultural contexts, limiting the generalizability of the research.
* **Limited generalizability:** The study focuses on first-year undergraduate students, and the findings may not be directly applicable to students in other academic levels or settings.
* **Small sample size:** The study involved a limited number of respondents, which may impact the generalizability of the results.
* **Short-term follow-up:** The study primarily focused on short-term outcomes, and the long-term effects of the chatbot intervention on stress management were not extensively explored
* **Collaboration Challenges:** While collaboration between HCI and MHC professionals is proposed as a model for design and evaluation, the paper recognizes that working in MHC settings poses challenges that require awareness and close collaboration to overcome.
* **Model Performance:** Effectivenessin accurately detecting stress levels and emotions may vary based on the complexity of the data and the quality of the training dataset.
* **Interpretability:** The interpretability of the models used for sentiment analysis and stress detection may be limited, making it challenging to understand the reasoning behind the model's predictions.
* **Self-Selection Bias:** Some findings may be biased due to self-selection by respondents.
* **Lack of specific intervention examples:** While the paper discusses the importance of mental health considerations, it may not provide detailed examples or case studies of successful implementations in practice.
* **Scope:** the paper does not cover all the work in NLP and mental health. It focuses on specific aspects of NLP techniques applied to mental health support, and there may be other relevant studies.
* **Rapidly Evolving Field:** leading to new studies being published regularly. The paper may not capture the most recent advancements in the intersection.
* **Data Bias**: The research may be limited by biases present in the social media data, such as demographic biases, sampling biases, or platform-specific biases.Potential bias or inaccuracies in emotion detection and mental state identification.

**Other paper Objectives**

* detecting, assessing and preventio mental health conditions
* survey the mental health status, depression, and anxiety of college students
* detect emotions, identify individuals' psychological assistance, apply computational techniques for diagnosis, and generate personalized mental health interventions.
* assist students in managing stress effectively. provide a Chatbot that can offer support and guidance during stressful periods.
* chatbots in providing support and interventions for individuals with mental health concerns.
* develop an intelligent chatbot that can assist in reducing mental illness, such as stress and depression, among students. The chatbot aims to engage with users, understand their problems through conversation, identify their emotions, calculate the percentage of negativity in their chat, and classify their mental status as normal, stressed, or depressed based on the content of their interactions.

**Other papers Use this model**

**Transformer-based models**: such as BERT, DistilBERT, Roberta, ALBERT, BioClinical BERT, XLNET, and the GPT model in the application of mental illness detection.

**Hybrid-based methods:** combine different neural networks for mental illness detection, such as CNN and LSTM models, to capture both local and long-dependency features.

**Various computational techniques:** techniques likely include text classification, sentiment analysis, and application of NLP methods to extract insights from user-generated data in the mental health domain.

**Rule-based conversational agent (CA) model:** The CA model is designed specifically for students and aims to offer personalized guidance and strategies for coping with stress,

**Natural Language Processing (NLP) models:** the chatbot employs a mix of instruction and feedback, open-ended and multiple-choice follow-up questions, and social dialogue features like empathy and meta-relational communication to improve the user experience.

**Model:** utilizes various machine learning and deep learning models for sentiment analysis, emotion classification, and stress detection:

1. Support Vector Machine (SVM)
2. Naïve Bayesian
3. Gradient Boosting Machine (GBM)
4. K-Nearest Neighbors (KNN)
5. Random Forest
6. Latent Dirichlet Allocation (LDA)
7. BERT model (Bidirectional Encoder Representations from Transformers)
8. Convolutional Neural Network (CNN)
9. Recurrent Neural Network (RNN)
10. Hierarchical Attention Network (HAN)

**LDA is a popular probabilistic model:** used for uncovering latent topics within a collection of text documents. the study aims to automatically label topics with persuasive strategies in the primary task support category of the Persuasive Systems Design (PSD) framework. Latent Dirichlet Allocation algorithm for topic modeling to deconstruct the persuasive strategies by mental health apps based on user reviews. This approach allows for the automated detection and analysis of persuasive strategies in a large number of mental health apps, providing valuable insights for researchers and developers in the field of mobile health applications.

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**We try to find this Final Result from our paper**

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1. Development of a chatbot designed to identify users' mental states, such as stress or depression, through emotional analysis of their chat data.
2. Implementation of three deep learning classifiers - Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), and Hierarchical Attention Network (HAN) - for emotion detection and mental state identification.
3. The chatbot's ability to distribute text into emotion labels (Happy, Joy, Shame, Anger, Disgust, Sadness, Guilt, Fear) and classify users' mental states based on their interactions.
4. Highlighting the importance of a social therapeutic chatbot for students and emphasizing the potential benefits of using such technology to address mental health issues among the youth.

**Papers Link**

* <https://www.zora.uzh.ch/id/eprint/251430/>
* <https://link.springer.com/article/10.1186/s40537-022-00575-6>
* <https://www.tandfonline.com/doi/full/10.1080/17434440.2021.2013200>
* <https://ieeexplore.ieee.org/abstract/document/9030346>
* <https://dl.acm.org/doi/abs/10.1145/2559206.2580931>
* <https://www.jrtdd.com/index.php/journal/article/view/698>
* <https://trepo.tuni.fi/handle/10024/133218>
* <https://ieeexplore.ieee.org/abstract/document/8147285>
* <https://link.springer.com/chapter/10.1007/978-3-030-44267-5_35>
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* <https://ieeexplore.ieee.org/abstract/document/10216523>
* <https://dl.acm.org/doi/abs/10.1145/3554364.3559119>

Papers link

* <https://www.cambridge.org/core/journals/psychological-medicine/article/abs/natural-language-processing-of-clinical-mental-health-notes-may-add-predictive-value-to-existing-suicide-risk-models/B9C3395DB61CAD0F79CBDDC93A35E790>
* <https://dl.acm.org/doi/abs/10.1145/3313831.3376328>
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* <https://ceur-ws.org/Vol-2662/BCSS2020_paper5.pdf>
* <https://journalofbigdata.springeropen.com/articles/10.1186/s40537-022-00575-6>
* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7367301/>
* <https://paperswithcode.com/dataset/dreaddit>
* <https://paperswithcode.com/dataset/smhd>

Dataset

* <https://www.kaggle.com/code/kairosart/machine-learning-for-mental-health-1/input>
* <https://www.thedeltanomics.com/post/networks-from-survey-data-creating-mock-data/>
* <https://www.kaggle.com/code/borissm/student-mental-health-eda-ml/notebook>
* <https://docs.google.com/spreadsheets/d/13StKotEwAJ1EogRgVPV9-EZaFxwMGdZtdUqz-OeCC-E/edit#gid=1454256215>
* <https://www.researchgate.net/figure/Correlation-network-among-questionnaire-items-Pearsons-r-correlation-between_fig2_356654264>