Leveraging AI to Transform Teen Mental Health Support: Demo of AI for the Teen Talk App
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Abstract: Artificial intelligence (AI) has shown significant progress in addressing social welfare and healthcare issues. Mental illness is a serious problem where AI and machine learning applications can have a significant impact such as therapeutic chatbots, virtual assistants, predictive modeling, early diagnosis, and personalized treatment plans. As part of our volunteer work as teen advisors at the Teen Talk App program, we identified several opportunities to assist teens struggling with mental health issues using AI and Machine Learning technology. This paper presents our pragmatic approach to supporting mental health professionals by creating chatbots and AI assistants. We used Chat GPT LLM models with Kaggle datasets and knowledge retrieval tools to build chatbots and AI Assistants to provide helpful resources and prompts to mental health advisors while supporting teens at risk. Our model leverages a Machine Learning based algorithm for intent detection to proactively identify intent for self-harm and alert the advisors to escalate the chat. We also discuss AI risks such as AI bias, ethical considerations, security and privacy risks, responsible AI, and mitigation strategies to manage the AI risks. Our research indicates that AI has significant potential to transform mental health services though concerns regarding AI risk remain.

Key Words: Artificial Intelligence, Mental Health, Social Determinants of Health, Chatbot, Virtual Assistant, LLM, Chat GPT

1. Introduction - Mental health crisis and impact of AI
Along with physical well-being, mental health is one of the most important aspects of a person that must be kept in balance. A person's mental health can be defined by their personality, emotions, and psychological state. When this balance is thrown out of equilibrium, the individual could be labeled as mentally ill or disabled. In 2021, approximately 1 in 5 adults in the US had some sort of cognitive or behavioral problem that was diagnosable by the DSM-5. Today, our youth (under 25 years old) account for 15\% of all suicides. This number has only been increasing as racial and sexual minorities continue to be oppressed. Mental health issues are deeply related to Social Determinants of Health (SDOH). As per the World Health Organization, Social Determinants of Health are non-medical factors that influence health outcomes. Research has shown that children raised in neighborhoods with high poverty rates and unemployment, rural settings, limited access to quality health care, nutritious food, clean water, or educational opportunities and increased exposure to crime and drug sales have high correlation to development problems including metal health disorders, suicidal behaviors, cognitive performance and physical health issues.

As per WHO Comprehensive Mental Health Action Plan 2013-2030, health systems are not adequate to deal with the burden of providing mental health care. There is a big gap between the need for treatment and its availability across the world. Between 75\%-85\% of people in low to middle income countries receive no treatment for their mental health disorders. Another factor is the poor quality of care for those who receive treatment. As per the data provided by WHO Mental Health Atlas 2011, there is a scarcity of resources within countries to meet mental health needs as well as inequitable distribution and inefficient use of these resources. Artificial Intelligence has shown significant promise in delivering mental health support with applications such as LLM based Chatbots and AI Assistants that leverage techniques such as Natural Language Processing (NLP), Sentiment Analysis and Machine Learning models to process vast amounts of data. However, there are several concerns such as AI Bias, Hallucination, Data Privacy \& Security and Model Output Alignment that need to be managed. There are several regulations that have been implement recently such as EU AI ACT, NIST Risk management Framework and Singapore's second addition of model framework. These regulatory frameworks aim to promote trust in AI systems through principles such as Integrity, Explainability, Fairness and Resilience.

2. Research Project – Teen Talk App

The researchers volunteered at the Teen Talk App program (https://www.teentalkapp.org) whose mission is to reduce mental health crises and suicide among teens through accessible and low-barrier peer support, education, and data-driven solutions. Teen Talk App is a fiscally sponsored project of Jewish Big Brothers Big Sisters of Los Angeles, a nonprofit organization. Teen Talk App provides a free, anonymous, safe space for teens to request support from trained peers and learn from others with similar experiences.

The Teen Talk App program provides training to teens to become peer advisors for other teens needing support. Trained volunteer teen advisors are at the core of the Teen Talk App program. Trained teen advisors are critical to the program's success as they can interact with the teens struggling with mental health issues, understand their concerns, empathize with them and support them via. chat function on the Teen Talk App. The training program for the teen talk advisors takes about 40 Hrs. over ten weeks. Training programs are conducted manually through live instruction online and are a very time-consuming process. Also, there is a limited availability of trained advisors as this is a volunteer supported initiative. This limits the amount of support that can be provided to the teens. Sometimes, the teens needing support may be at high risk for self-harm or suicide requiring the chat to be escalated to more experienced advisors or supervisors.

2.1 Practical applications of AI and machine learning for the Teen Talk App program

The detailed code description, code files and data files used for the project are available at - https://github.com/isha01agr/Neurips_AI

During our volunteering with Teen Talk App program as teen advisors, we identified some areas where AI and Machine Learning can help the Teen Talk program increase its reach, be more effective and utilize the limited resources more efficiently.

2.1.1 We created a basic mental health chatbot to support teens struggling with mental health issues using Open AI and "gpt-3.5-turbo" LLM model

We created a chatbot that can interact with teens and help answer mental health related questions and direct them to helpful resources such as information on helplines for emergencies and life-threatening crises, Federal, State and County resources, list of primary care providers. This chatbot can have conversations with the teens and help answer their questions regarding various mental health issues and answer questions and provide support while maintaining their anonymity and privacy.

Result – The chatbot worked very well and was able to answer the users' questions regarding mental health issues based on the system role of providing support to teens struggling with mental health issues. However, since we were concerned with AI risks such as AI Bias, Hallucination and other risks, we proceeded to step 2 to create an AI Assistant.

2.1.2 – We created an AI assistant using gpt-4o" model LLM model and code interpreter for knowledge retrieval to support mental health professionals and mitigate AI risks associated with GPT models.

As Chatbots may not be suitable to interact directly with the teens needing support due to AI risks mentioned above, we created an AI Assistant to support the teen advisors and manage AI risks. The AI Assistant would support the teen advisors by analyzing the live chat and providing useful tips and recommendations from verified and approved resources. The AI assistant would

be developed using the knowledge retrieval function to use the organizational resource files to answer questions about mental health and helpful resources to mitigate the AI Bias and Hallucination. An additional AI training assistant can be trained with the data from past conversations and help train new teen volunteers to become teen advisors at the Teen Talk App program. This would help in managing the limited resources and help provide more support for the teens. The researchers built an AI assistant using Open AI "gpt-4o" model with code_interpreter tool for knowledge retrieval. We created a sample file – "Help for Mental Illnesses.docx" based on the mental illness data from National Institute of Mental Health and uploaded the resource file to OpenAI Platform and created an "assistant" called "Mental Health Advisor" and provided code interpreter tool to use the resource file that was provided.

Sample Conversation with AI Assistant

Where can I get help if I feel suicidal?.

The file contains detailed information about where to get help if you are feeling suicidal or experiencing emotional distress. Here are some key resources mentioned in the document:

Immediate Help

- **Life-threatening Situations:** Call 911 or go to the nearest emergency room.
- **Suicide and Crisis Lifeline:** Call or text 988, or chat online to connect with a trained crisis counselor. This service is available 24/7 and provides confidential support. For a specialized LGBTQI+ affirming counselor, you can text "Q" to 988 or call 988 and press "3".
- **Veterans Crisis Line:** Call 988, then press "1". You can also text 838255 or chat online. This 24-hour confidential resource connects veterans with trained responders.
- **Disaster Distress Helpline:** Call or text 1-800-985-5990. This helpline provides immediate crisis counseling for people experiencing emotional distress related to natural or human-caused disasters. It offers interpretation services in more than 100 languages.

Code Snippet:

```python
file = client.files.create(
  file=open("Help for Mental Illnesses.docx", "rb"),
  purpose='assistants'
)

assistant = client.beta.assistants.create(
  name="Mental Health Advisor",
  description="You are mental health assistant and help answer questions
  model="gpt-4o",
  tools=[{"type": "code_interpreter"}],
  tool_resources={
    "code_interpreter": {
      "file_ids": [file.id]
```

```python
thread = client.beta.threads.create(
  messages=[
    {
      "role": "user",
      "content": "Where can I get help if I feel suicidal?.",
      "attachments": [
        {
          "file_id": file.id,
          "tools": [{"type": "code_interpreter"}]
```

```python
run = client.beta.threads.runs.create(
  thread_id=thread.id,
  assistant_id=assistant.id,
```

```python
def display_thread_messages(messages):
    # EXPECTS MESSAGES IN ASC ORDER!
    for thread_message in messages.data:
        print(thread_message.content[0].text.value)
        print('\n')
```

Result – The AI Assistant was able to refer to the file provided and answer the user's question accurately based on the information in the file. This was very encouraging as it helps manage the AI risks and limit the legal liability. In future the AI Assistant can be created to learn from historical conversations and train new volunteers to become teen advisors.

2.1.3 – Build a Machine Learning algorithm using Kaggle.com dataset and TF-IDF Vectorization and Support Vector Machine (SVM) classifier for intent classification.

We created a Machine Learning algorithm to predict and classify mental health problems such as depression, suicidal thoughts, schizophrenia etc. and help advise the teen advisors to escalate the chat to the supervisors in a timely manner and ask for support. Researchers used the dataset from Kaggle.com to build the machine learning model for Teen Talk App - kaggle/input/mental-health-conversational-data/intents.json. This dataset is a set of past conversations related to mental health and can be used to determine the intent behind the chat.

Once the intent is identified, the model would then escalate the call based on the severity of the intent.
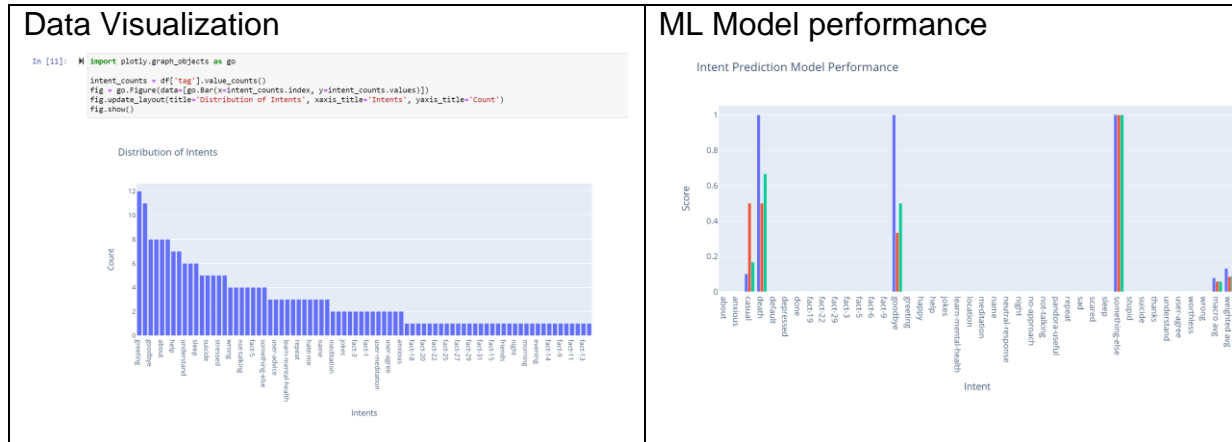
Result – The model was successfully able to classify the intents based on the precision, recall and F-1 scores. We were able to deploy the model and teach it how to generate responses for each intent that the ML model identified. In future, we can create additional Machine Learning models to identify the teens at risks based on Social Determinants of Health factors such as Age, Gender, Zip Code, Household Income, Crime etc. and create an outreach program to identify and support teens at higher risk for metal health related issues.

3. Conclusion

Based on our research regarding existing applications of AI and hand on project development using Open AI's LLM Models and Machine Learning, we are excited about the potential of AI technology in transforming the teen mental health space. Integrating AI into programs like Teen Talk App can help enhance their effectiveness by creating customized outreach program to target at risk teen population and deliver personalized, data driven interventions that can significantly improve mental health outcomes for teens at risk. These features would allow such programs to reach more teens, improve the quality of support and optimize resource allocation. While AI offers numerous benefits, addressing potential risks such as bias, data privacy, and security concerns is crucial to ensure safe and effective implementation of these tools and strategies.

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