

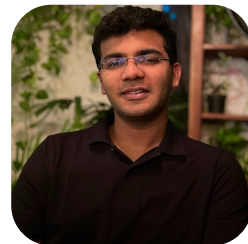
Applied AI in Mental Health

Building Bridges from Scratch to Transformation 🚀



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Agenda

1. What is Mental Health and it's relevance
2. Role of AI in Mental Health
3. Major Dimensions of AI in Mental Healthcare
4. Current Research Areas
5. Where to collaborate?

Mental Health

Mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community.



Key Facts

- Strategies to promote, protect and restore mental health.
- Mark the actions on mental health as urgent.
- Mental health has intrinsic and instrumental value.

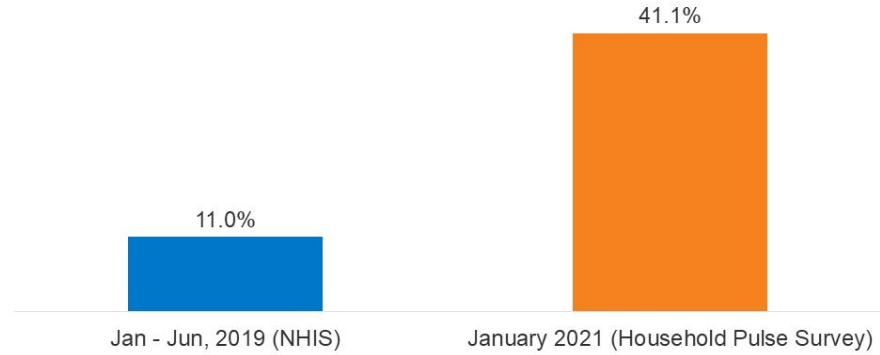
Pandemic and Rising Mental Health Issues

“Nobody Has Openings’: Mental Health Providers Struggle to Meet Demand”

– New York Times

Post COVID
Surge

Average Share of Adults Reporting Symptoms of Anxiety Disorder and/or Depressive Disorder, January-June 2019 vs. January 2021



▶ ETPrime Markets News Industry Rise Politics Wealth Mutual Funds Tech Careers Opinion NRI **Panache** ET NOW More

ET Magazine Travel

ws > Magazines > Panache > India has 0.75 psychiatrists per 100,000 people. Can telepsychiatry bridge the gap between mental health experts & patients?

India has 0.75 psychiatrists per 100,000 people. Can telepsychiatry bridge the gap between mental health experts & patients?

telepsychiatry

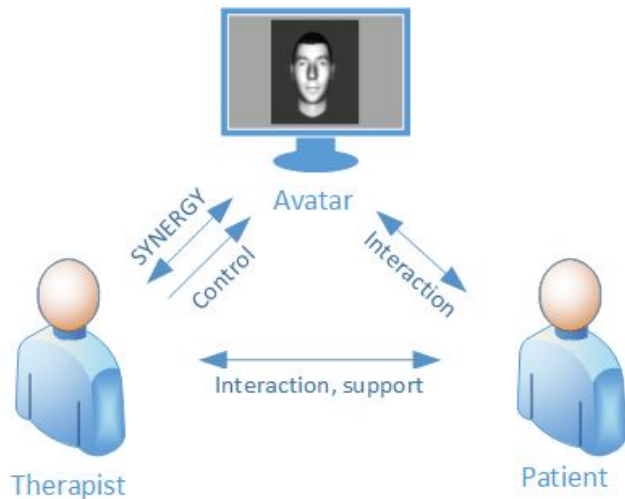


Avatar Therapy

What Role Can Avatars Play in e-Mental Health Interventions? Exploring New Models of Client–Therapist Interaction

Imogen C. Rehm¹, Emily Foenander¹, Klaire Wallace¹, Jo-Anne M. Abbott¹,
Michael Kyrios² and Neil Thomas^{1,3*}

<https://www.frontiersin.org/articles/10.3389/fpsy.2016.00186/full>



Avatar therapy: early trial results 'very encouraging'

A new Wellcome-funded study has shown that avatar therapy may help to reduce auditory hallucinations in people with schizophrenia when used alongside other treatments.

<https://wellcome.org/news/avatar-therapy-early-trial-results-very-encouraging>

Tech is working out

Manual

- Individual Counseling
- Peer Counseling

Automatic

Tech Savvy

- Virtual Mental Health Assistants

Hybrid

Tech Savvy

- Human-AI Collaboration

Hybrid

Human-AI Collaboration | Peer Counseling

People post their problems online and other peers provide support online.



Super Expensive

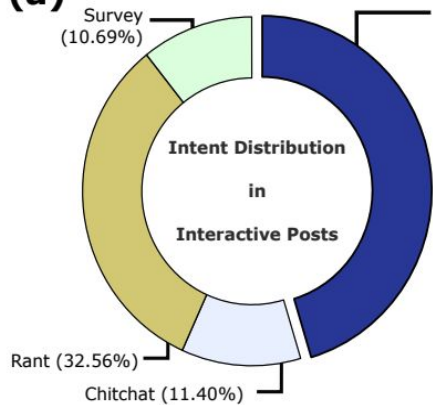
7 Cups



Free! But has its own challenges

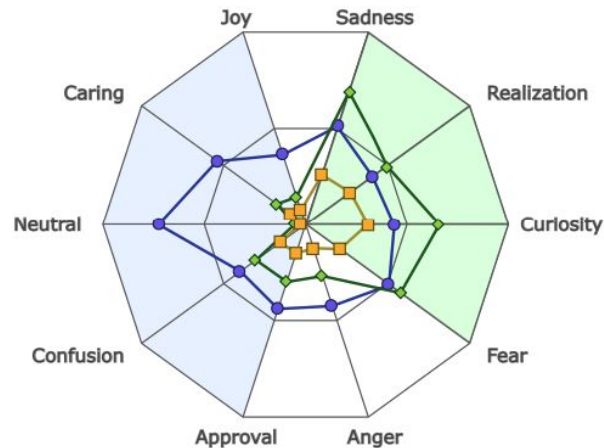
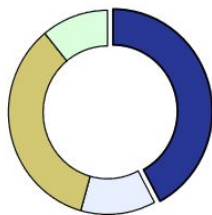
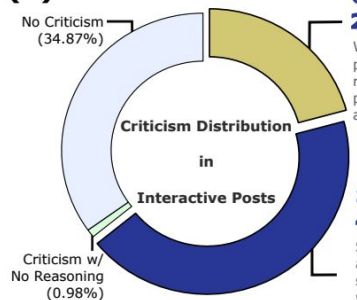


reddit

(a)

Seek Help 45.35%

Explicit intentions of seeking direct help queries or the articulation of pressing needs on OMHC platforms yields a more efficacious response as opposed to merely airing surveys or rants. On the contrary, isolated posts are dominated by *chitchat* intent.

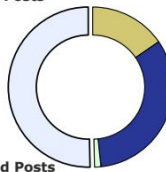
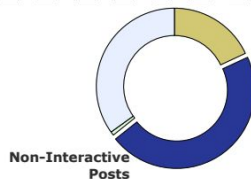
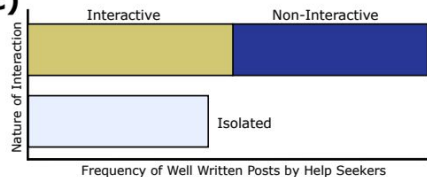
**(b)**

Criticism w/ Reasoning 20.82%

When criticising others, our findings infer that peers who communicate with a proper reasoning of causation of a situation and a profound comprehension of the topic at hand are more apt to receive assistance.

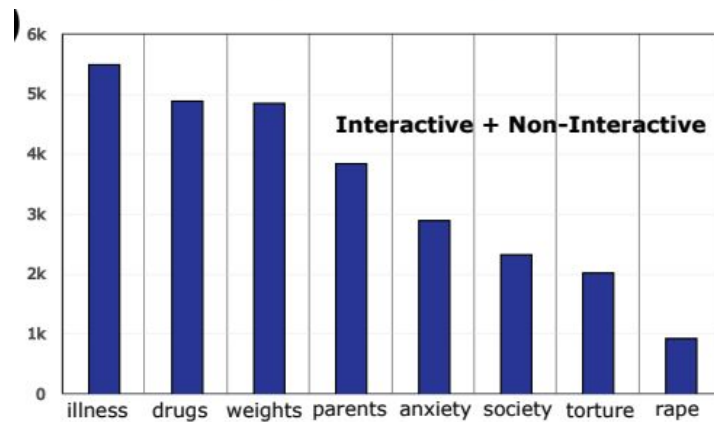
Self Criticism 43.32%

Self criticism is the most common attribute among the support seekers where our findings shows that open communication or swearing with greater emotional freedom are more likely to receive help.

**(c)**

2.2x More Support Rate Toward Good Writers

Study shows that users prefer short, correct, and well-written posts to read while scrolling the feeds online.



Automatic-cum-hybrid

Human-AI Collaboration | VMHAs

- Many new **virtual mental health assistants** emerged.



- Generally assistants focus on generating helpful responses and understanding patients.

ChatGPT

A one stop solution



VICE

VICE World News

ChatGPT Gave Me Advice on How To Join a Cartel and Smuggle Cocaine Into Europe

Here's what happened when VICE's Global Drugs Editor spent 12 hours speaking to OpenAI's chatbot about drugs.

Technology News | News-Analysis

AI BOT AS A THERAPIST: US MENTAL HEALTH PLATFORM USING CHATGPT IN COUNSELLING LEADS TO CONTROVERSY



Koko, a mental health platform used ChatGPT in counselling sessions with over 4,000 users, raising ethical concerns about using AI bots to treat mental health.

Source: News Media vice.com

We **don't need** an **All-in-One package**

We need **modular** AI-based solution

Where can you contribute?

- **Specialized Dialog Systems**
- **Dialog Understanding**
- **Dialog Summarization**
- Datasets

Early age chatbots: ELIZA
New age: Dialog GPT, etc.

Recent Development in
Neural Dialogue Systems

Study of works related to

- Dialogue-acts
- Emotion Recognition
- Dialogue Topic

Summarization Systems

- Extractive & Abstractive
- *Standard Abstractive Summarization Approaches and metrics.*

Where can you contribute?

- Specialized Dialog Systems
- Dialog Understanding
- Dialog Summarization
- **Datasets**

Dialog Understanding	Dialog Summarization	Mental Health Counseling
Switchboard, MRDA Corpus, Reddit Corpus	SAMSum, DialogSum, HET Data (Chinese), DSS, Summarize Data, AMI, Dialogue	Crisis TextLine (Private), Reddit MR Dataset
CONVERSATIONAL DATASETS UNAVAILABLE		NEED for quality counseling conversational DATASET

– Jeremy Ang, Yang Liu, and Elizabeth Shriberg. 2005. Automatic dialog act segmentation and classification in multiparty meetings. In 2005 IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP '05, pages 1061–1064.

– Andreas Stolcke, Klaus Ries, Noah Coccaro, Elizabeth Shriberg, Rebecca Bates, Daniel Jurafsky, Paul Taylor, Rachel Martin, Marie Meteer, and Carol VanEss-Dykema. 2000. Dialogue act modeling for automatic tagging and recognition of conversational speech. Computational Linguistics, 26(3):339–371.

– Jean Carletta, Simone Ashby, Sebastien Bourban, Mike Flynn, Mael Guillemot, Thomas Hain, Jaroslav Kadlec, Vasilis Karaiskos, Wessel Kraaij, Melissa Kronenthal, Guillaume Lathoud, Mike Lincoln, Agnes Lisowska, Iain McCowan, Wilfried Post, Dennis Reidsma, and Pierre Wellner. 2006. The ami meeting corpus: A pre-announcement. In Machine Learning for Multimodal Interaction, pages 28–39, Berlin.

– Yulong Chen, Yang Liu, Liang Chen, and Yue Zhang. 2021. DialogSum: A real-life scenario dialogue summarization dataset.

– Yuanzhe Zhang, Zhongtao Jiang, Jao Zhang, Shiwan060Liu, Jianun Cao, Kang Liu, Shengping Liu, and Jun Zhao. 2020. MIE: A medical information extractor towards medical dialogues. In Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics, pages 6460–6469, Online. Association for Computational Linguistics.

Speaker and Time-aware Joint Contextual Learning for Dialogue-act Classification in Counselling Conversations

WSDM 2022

Ganeshan Malhotra[♦], Abdul Waheed[♣], **Aseem Srivastava**[♦], Md. Shad Akhtar[♦], Tanmoy Chakraborty[♦]

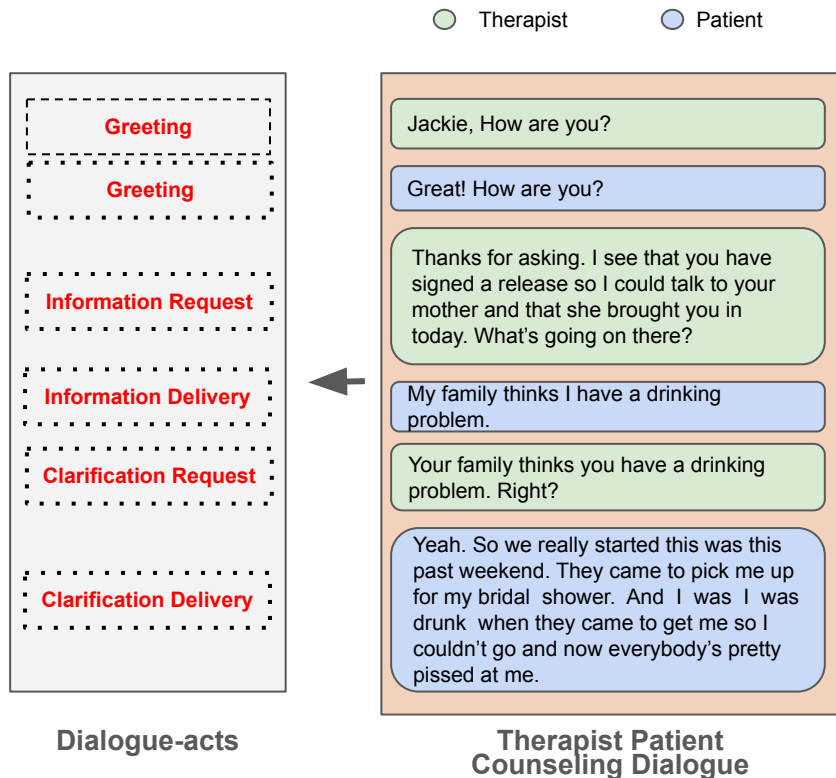
♦ BITS Pilani ♣ MAIT Delhi ♦ IIIT - Delhi

HOPE Dataset

HOPE: Mental Health cOunselling of PatiEnts.

12.9k Utterances from 212 dialogue sessions with 12 dialogue act labels divided into 3 hierarchies designed carefully to cater to the specific needs of counselling session.

Sources: Youtube, Counseling Training Portals, Public Counseling Channels.

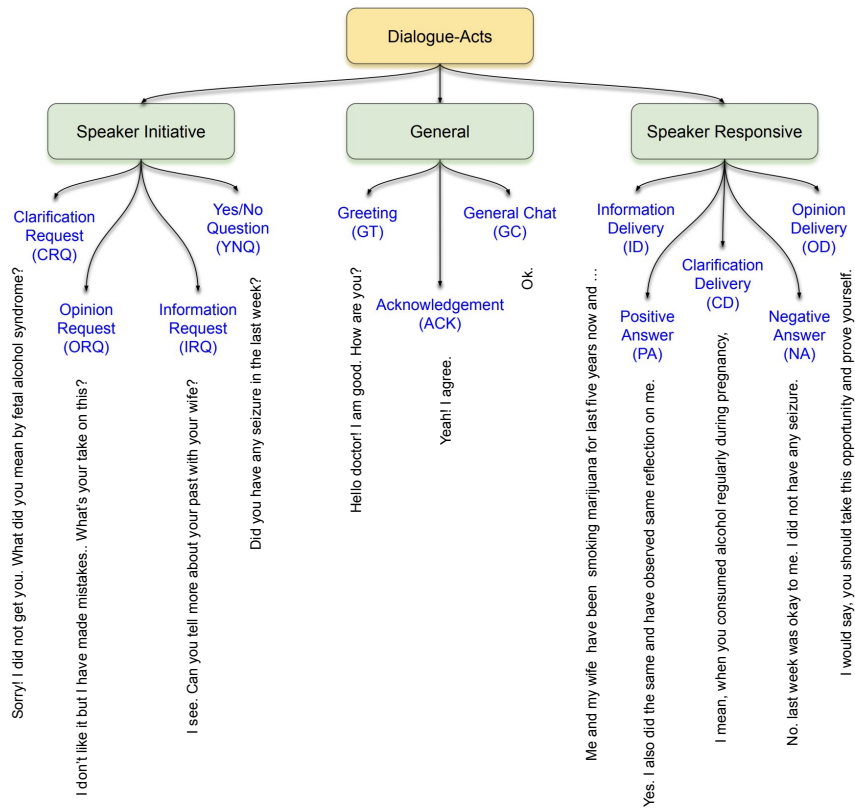


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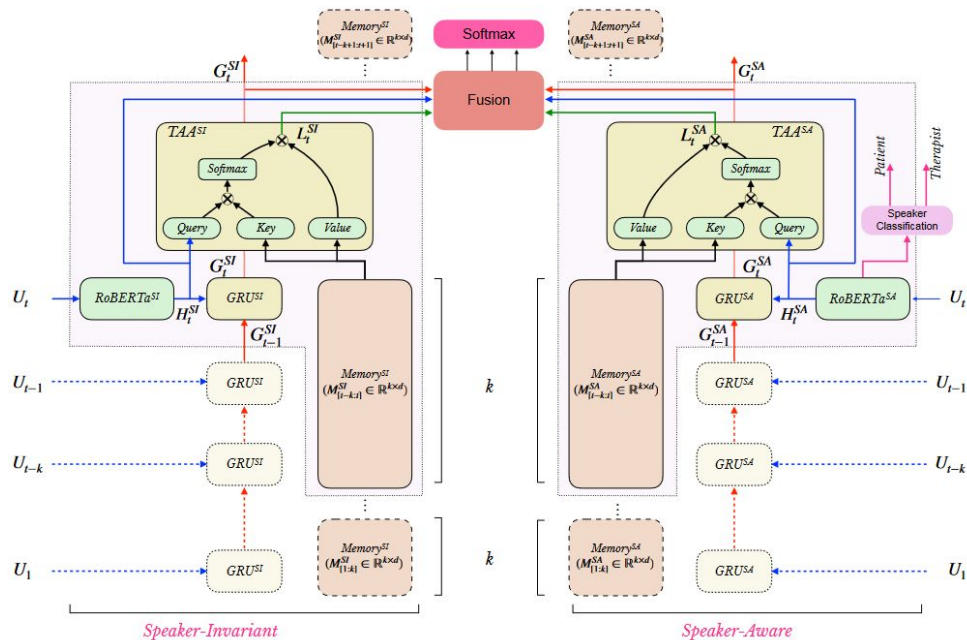
Sources: Youtube, Counseling Training Portals, Public Counseling Channels.



Task: Dialogue Act Classification

More than **6%**
relative improvement

marginal yet effective



Is one dialogue act classifier **module enough?**

Experts maintain
Counseling Notes



Counseling Summarization using Mental Health Knowledge Guided Utterance Filtering

KDD 2022

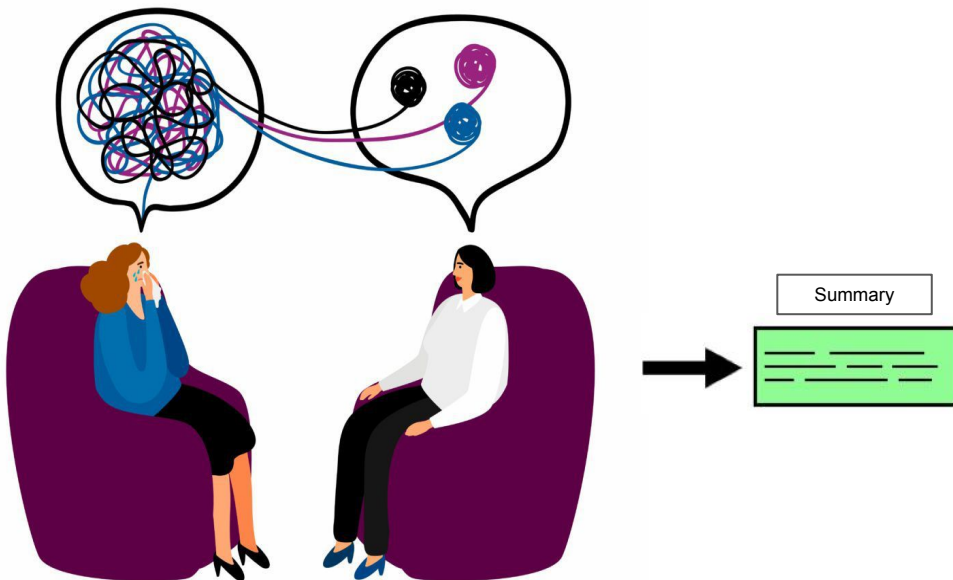
Aseem Srivastava , Tharun Suresh , Sarah (Grin) Lord   Md. Shad Akhtar , Tanmoy Chakraborty 

 IIIT - Delhi

 University of Washington

 Mpathic.ai

Dialogue Summary Generation



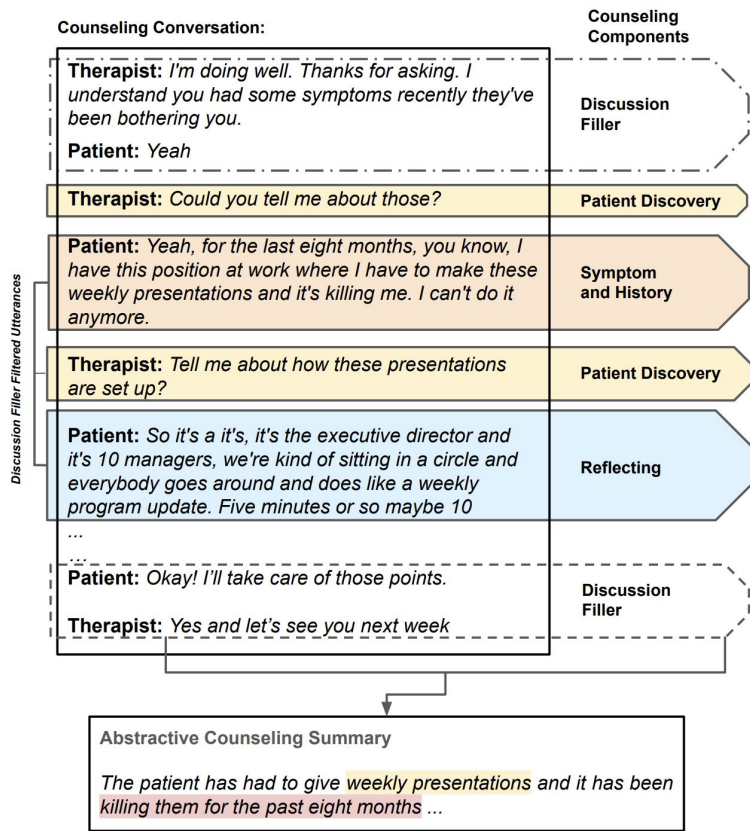
- **Understanding Client**

- Topic
- Symptoms / Reasoning
- Story
- Routine Conversation

- **Counseling Summary**

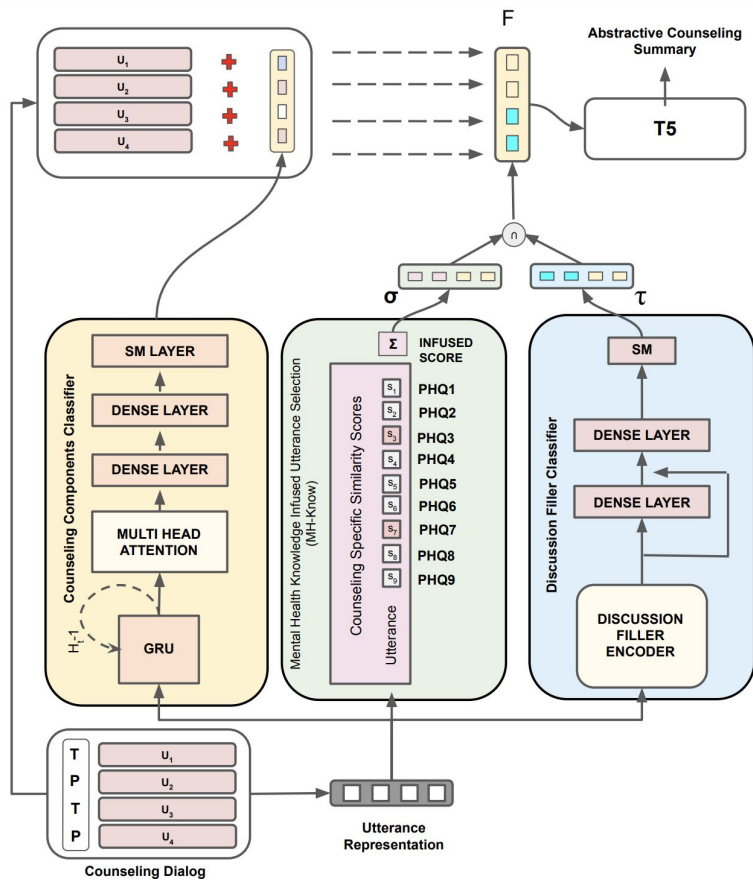
Use of state-of-the-art deep learning models to generate quality summary.

Dialogue Summary Generation



- HOPE - Cognitive behaviour therapy
- A session contains psychotherapy elements viz. symptoms, history of mental health issues (reflecting), or the discovery of the patient's behavior along with some discussion filler.
- We refer to these important components as **counseling components**.

Dialogue Summary Generation



Key controlling parameters while developing such models:

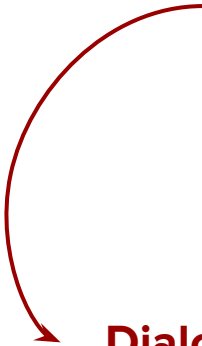
1. *Removing irrelevant utterances*
2. *Infusing Mental Health Knowledge*
3. *Pay more attention to core counseling topics*

>13% improvement

The better we understand, the more likely we are to create something of significance.

- Simon Sinek

An essential component is
understanding directives
of utterances



Dialogue Act: It deals with understanding the intended requirements of the utterances.

This essentially act as one of the precursors for the dialogue response generation.

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Dialogue Act: It deals with understanding the intended requirements of the utterances.

This essentially act as one of the precursors for the Dialogue Response Generation

Response-act Guided Reinforced Dialogue Generation for Mental Health Counseling

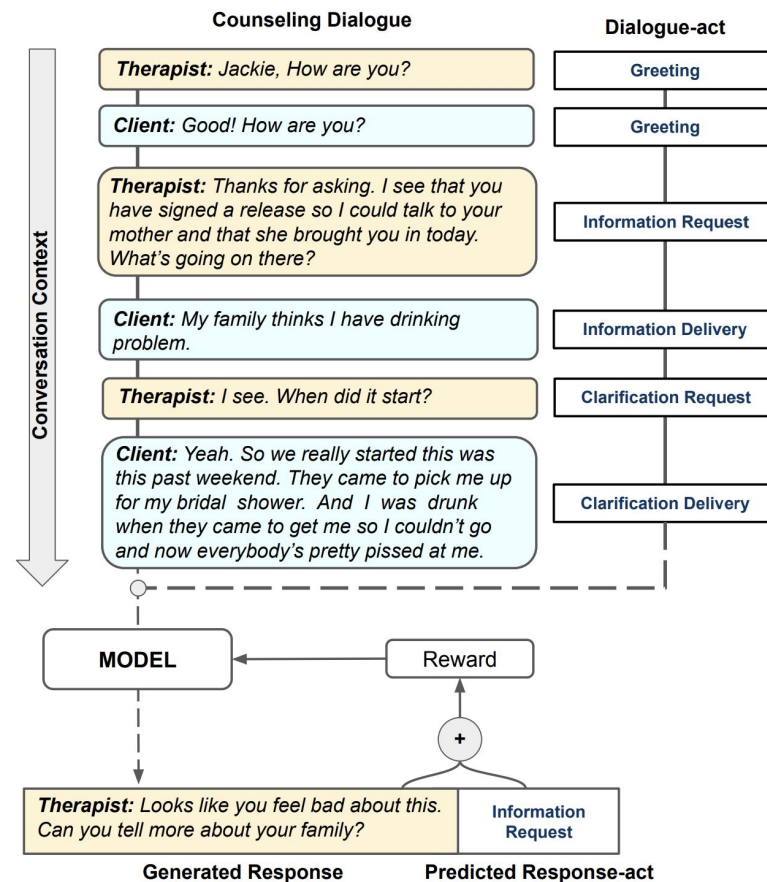
WWW 2023

Aseem Srivastava , **Ishan Pandey** , **Md. Shad Akhtar** , **Tanmoy Chakraborty** 

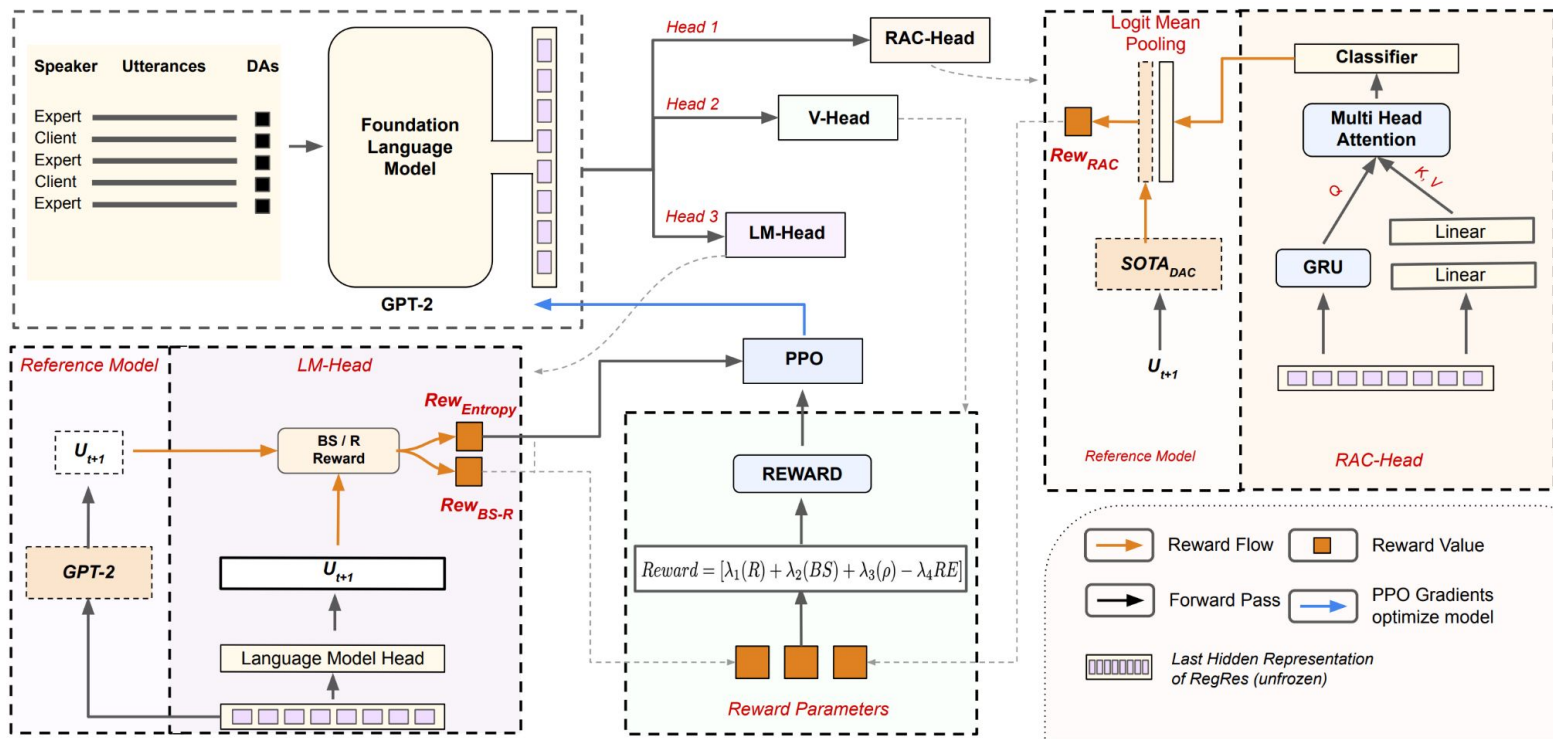
 IIT - Delhi  IIT Delhi

Response Generation

- The dialogue-acts of the utterances generally form a pattern.
- We exploit future dialogue-acts (response-acts) in guiding the RL-model to generate the intended response and maintain the flow of counselling conversation.



Response Generation



Where can you collab?

- **CORD AI**
- LCS2 Lab – IIT Delhi and IIIT Delhi
- University of Washington
- Stanford University
- Microsoft Research
(Redmond, India, China)
- AllSC, Univ. of South Carolina
- The Alan Turing
- Georgia Tech University
- Max Planck, Germany
- TU Darmstadt, Germany
- Carnegie Mellon University
- Talklife Research
- Woebot Research
- Wysa Research
- TU Munich, Germany
- MIT Media Lab
- University College of London

Thank You

Papers, Codes, Slides
and bla bla bla bla bla



To connect and know more about my work

Contact: aseems@iiitd.ac.in

Web: as3eem.github.io

Acknowledgement

