

Chatbots in COVID-19 Pandemic: Challenges and Solutions

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M.Sc. Project Presentation

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Motivation

- 21 % decrease in life saving surgeries
- 52% of virtual care by April 2020

Layoffs from jobs and 1M+ unemployment reported

4

1

3

2

246M+ cases across the globe

Global GDP decrease by 4%

COVID-19 PANDEMIC

3

3/17

Problem Statements

1. Information Dissemination [1]



How can we provide medically precise information through chatbots?

2. Pre-consultation Services [2]



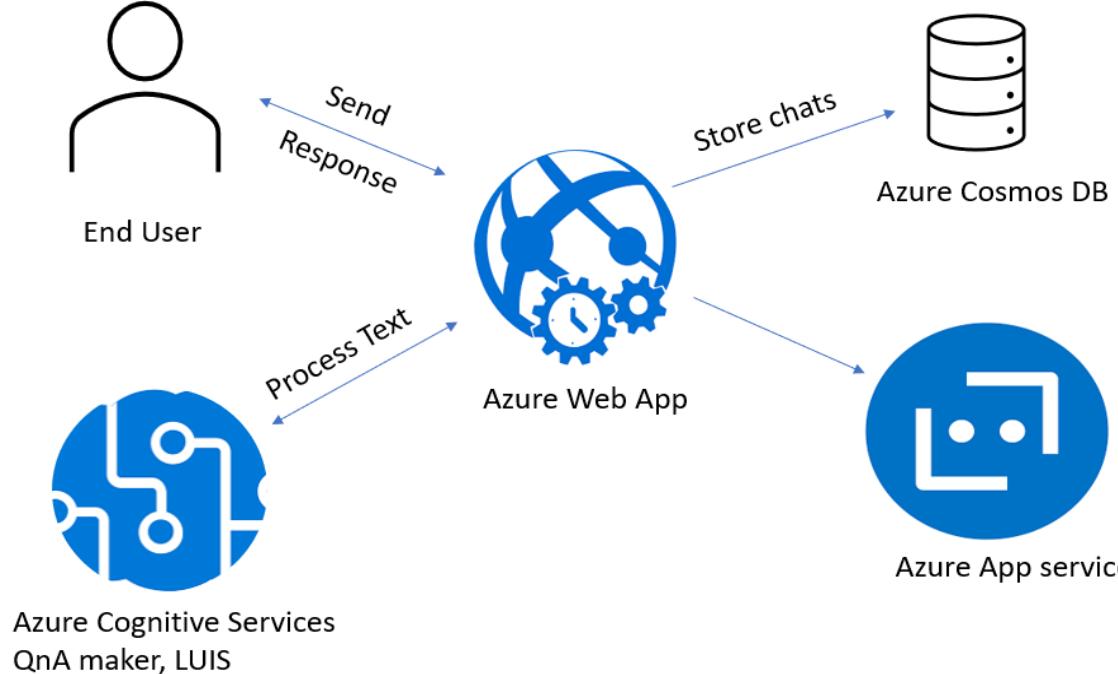
How can we collect patient health data through chatbots and narrow down the scope of clinical diagnosis?

3. Mental Health Support [3]



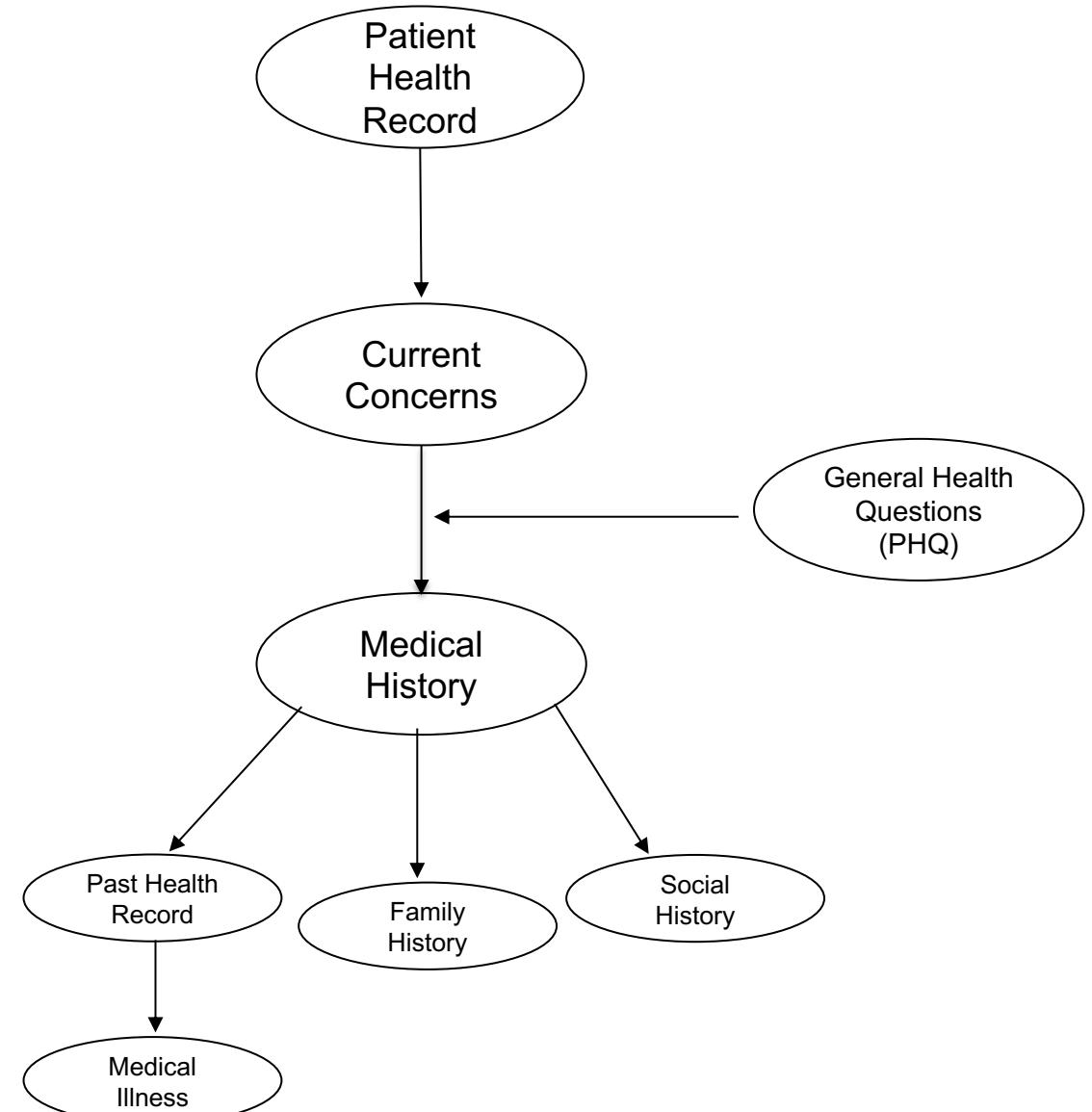
How can we identify user emotions from text in chatbots?

QnA Chatbots



Pre-consultation Chatbots

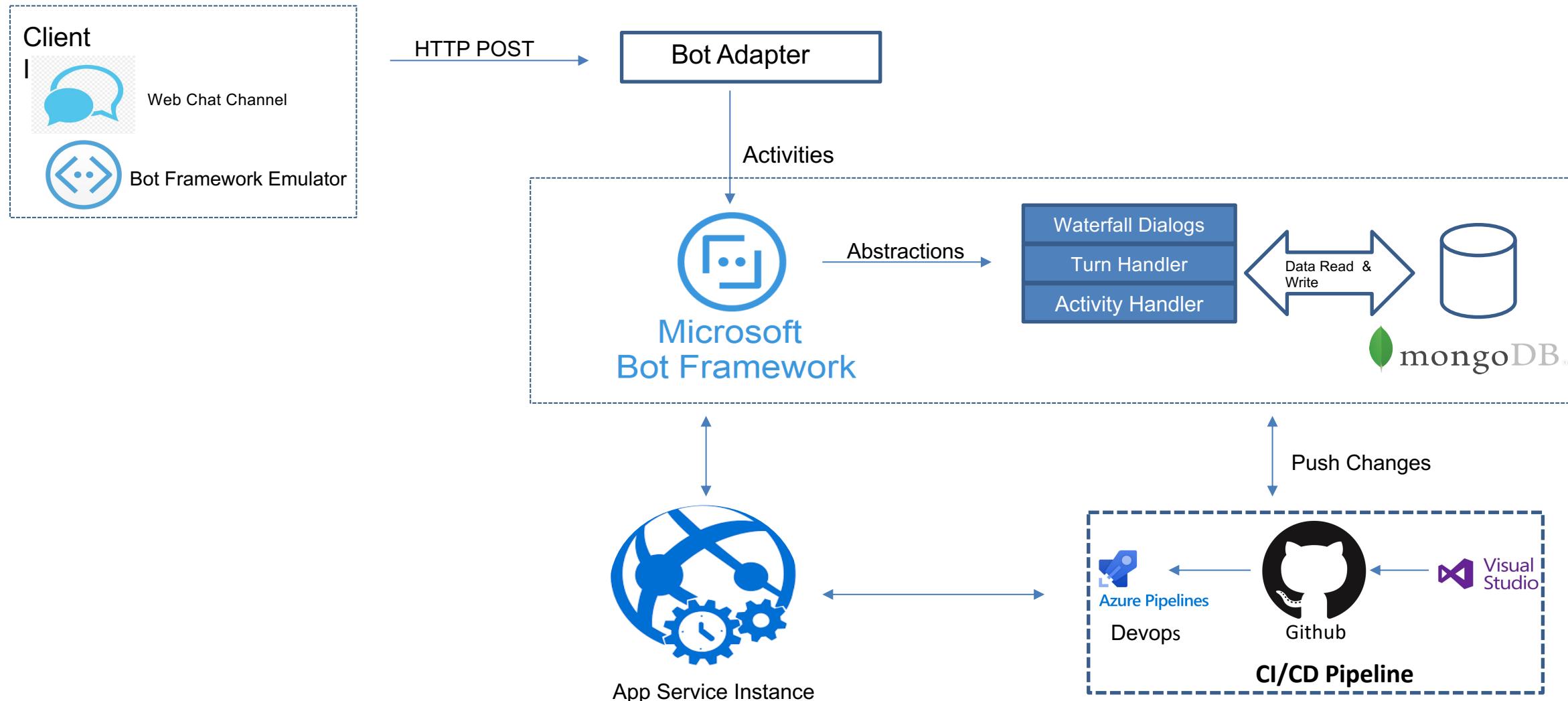
- Mimic the onsite consultation through chatbots
- Narrow down the scope of clinical diagnosis



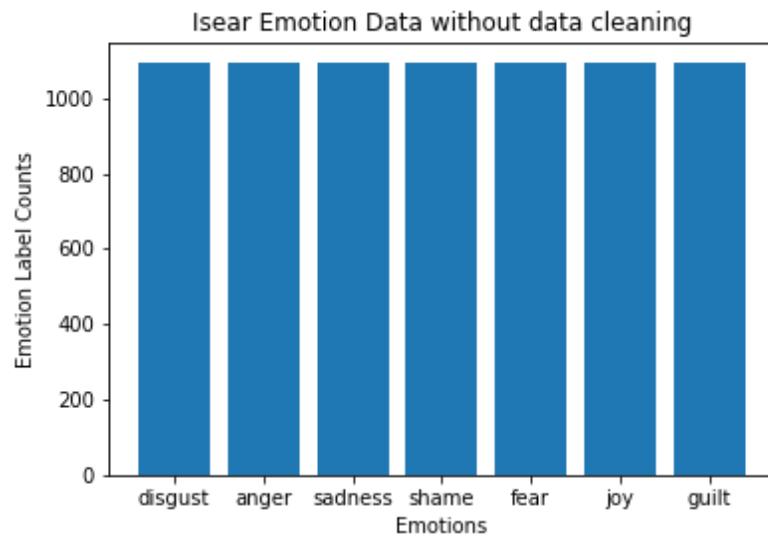
Entire Decision Flow:

<https://github.com/jayjoshi9727/Emotibot-MD-Canada/blob/main/decisiontree.pdf>

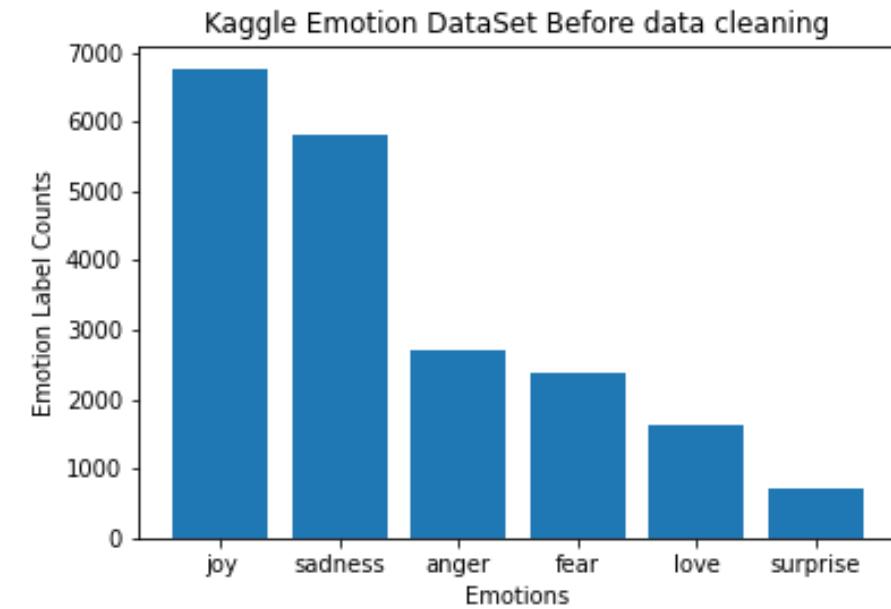
Emoti-Bot Architecture



Dataset Description

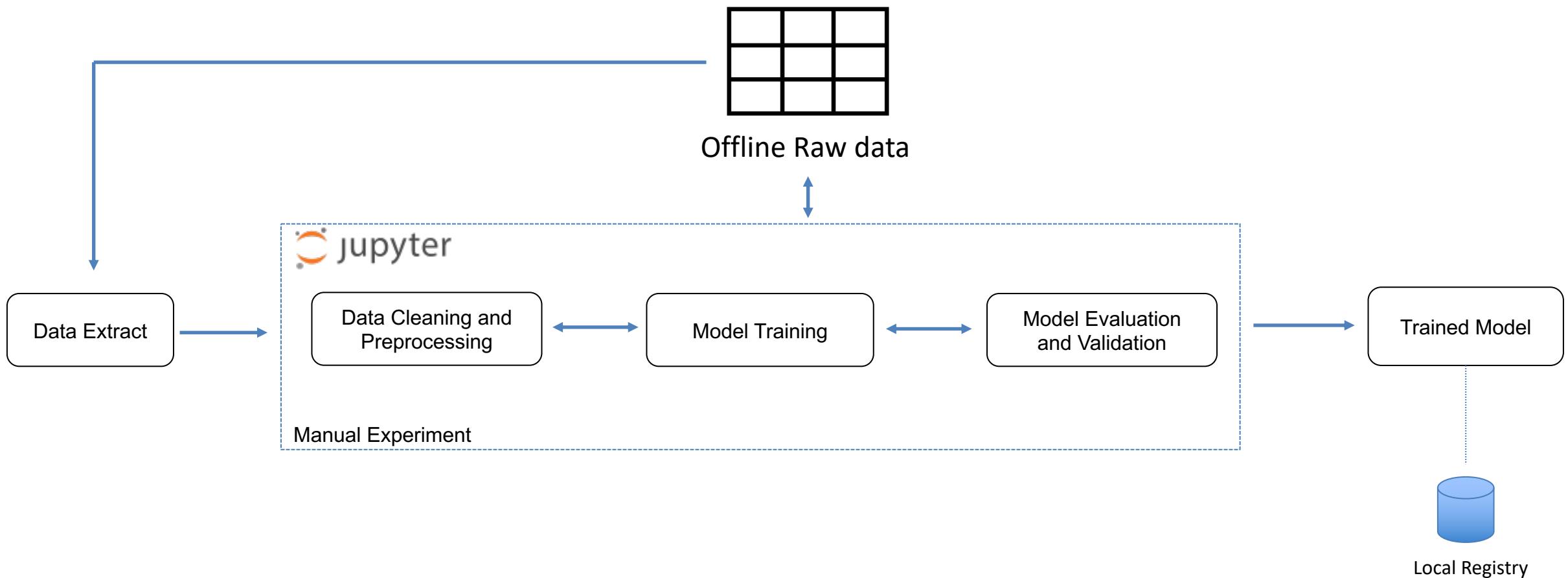


ISEAR Emotion Dataset

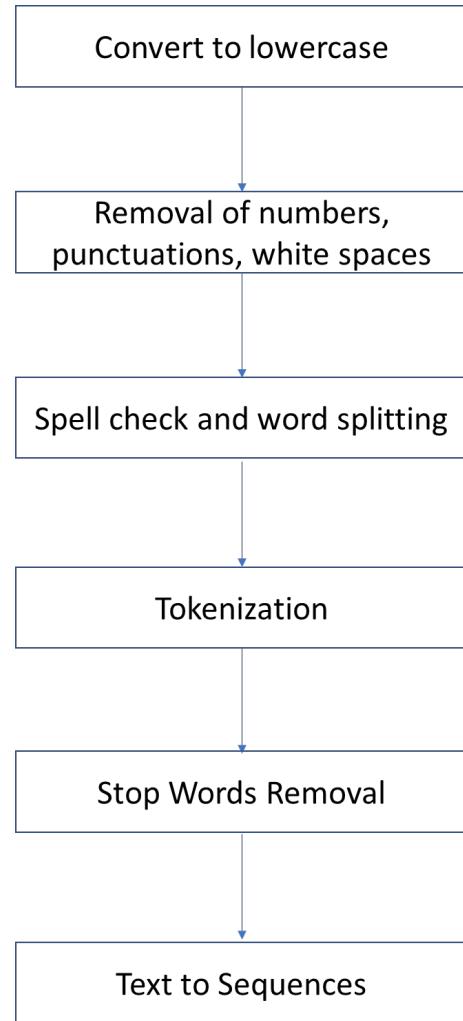


Kaggle Emotion Dataset

Experiment Stages



Dataset Preprocessing

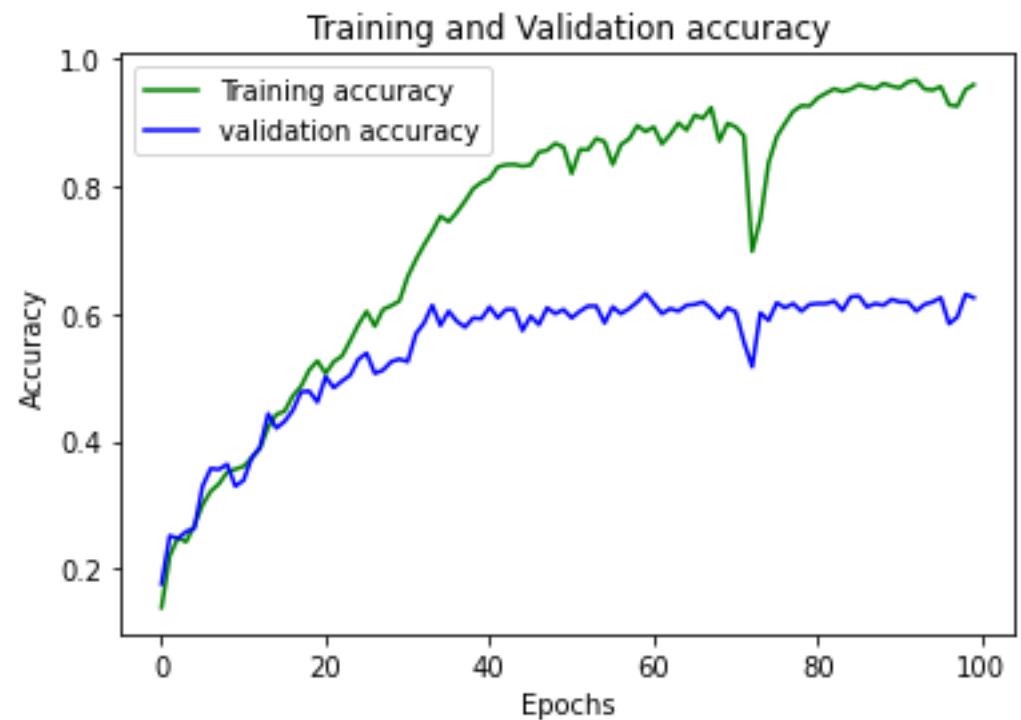


Experiment Results

- Trained a simple LSTM model on ISEAR Emotion Dataset

LSTM Overfitting

- Large no. of training parameters
- Complexity of the model
- Small size of the dataset



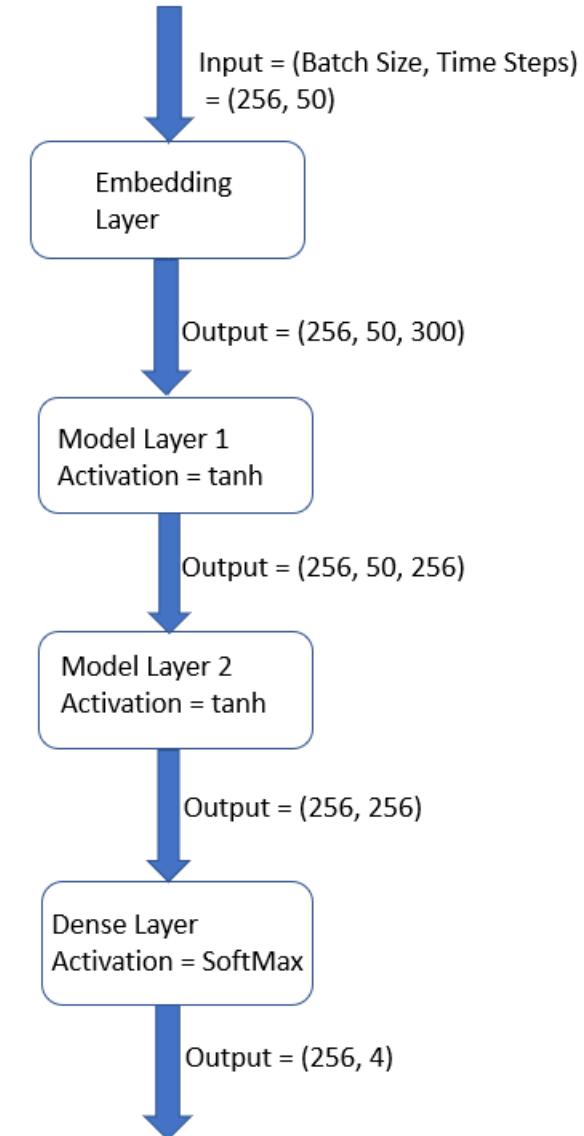
Stacked Architectures

Data

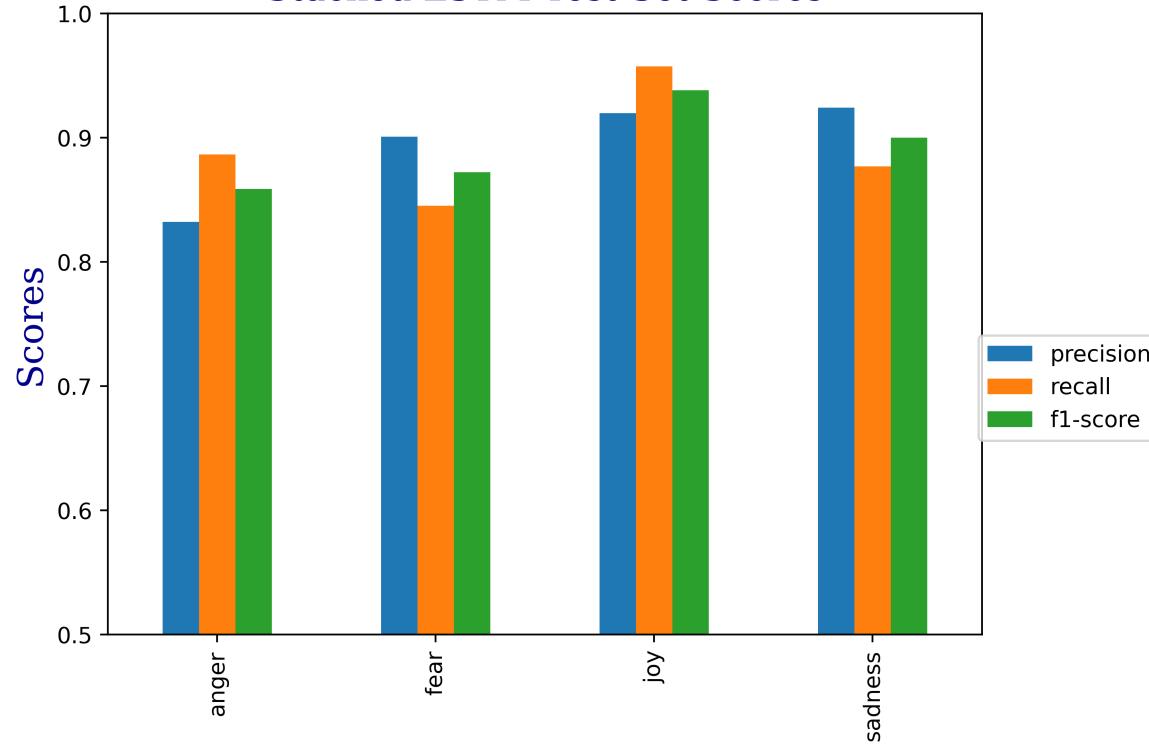
- Experimentation on ISEAR + KAGGLE Data Set,
- Training model on top four labels with highest distribution

Models

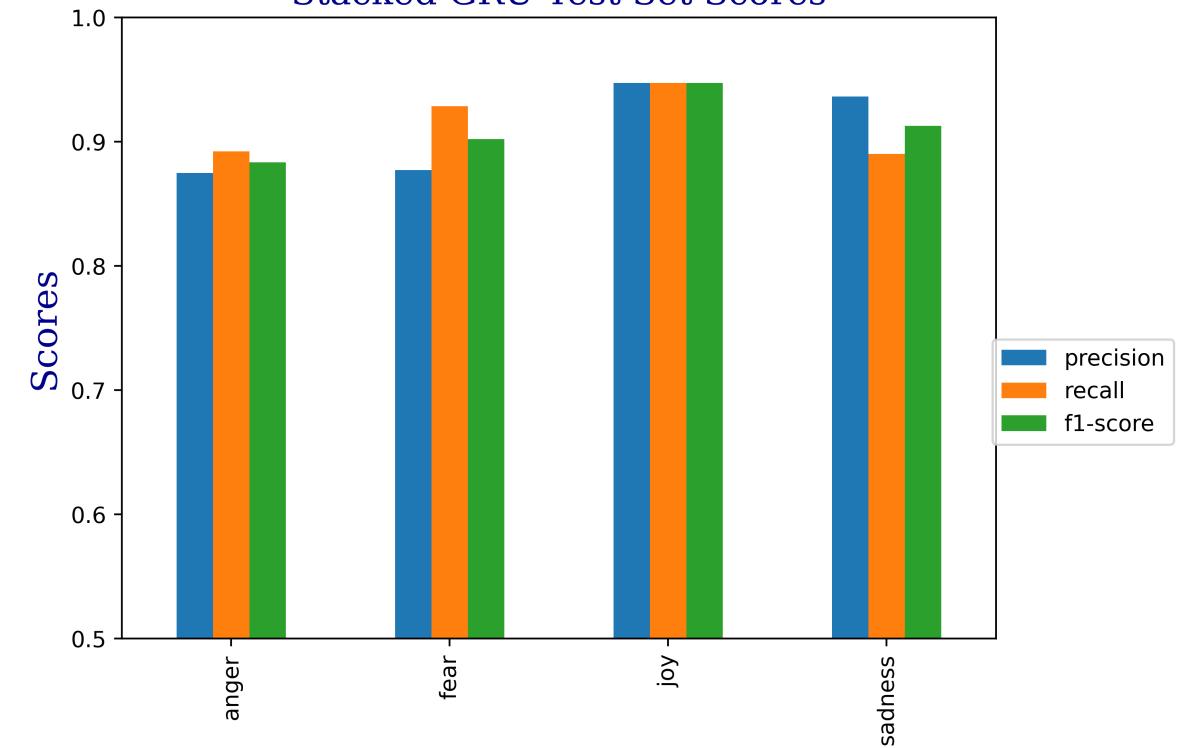
- LSTM Layers
- GRU Layers



Stacked LSTM Test Set Scores



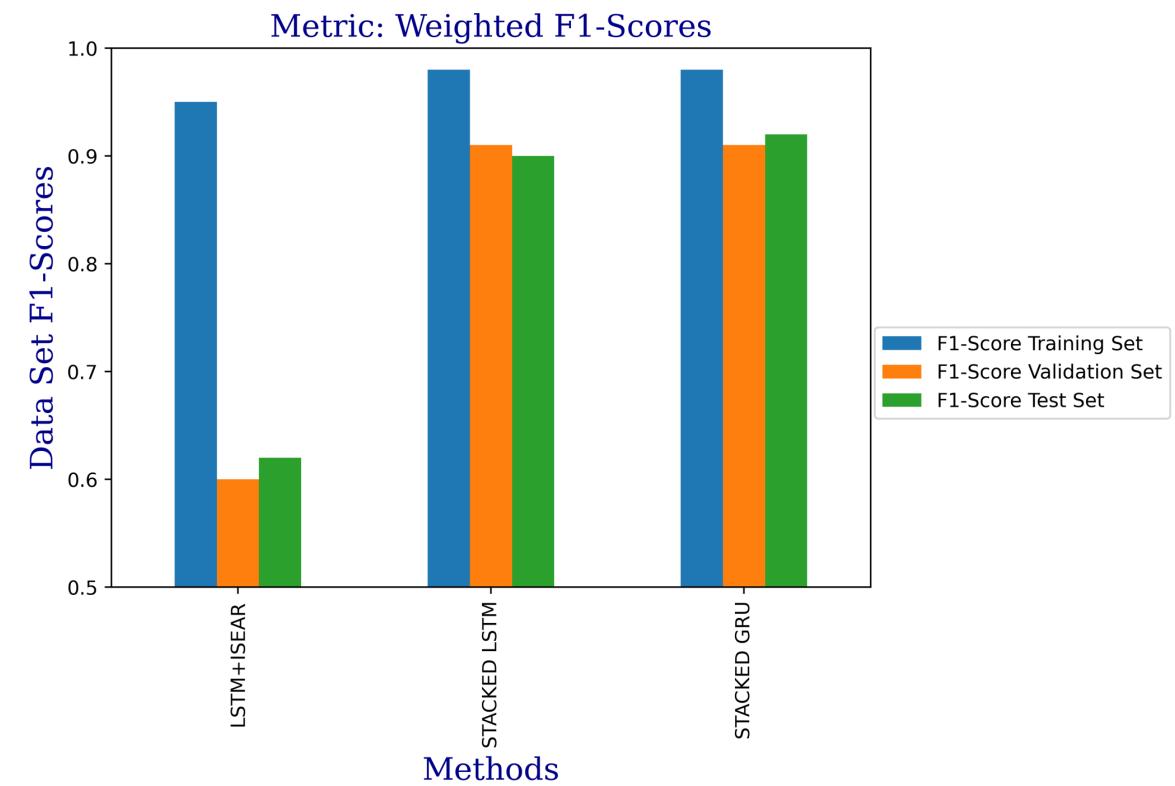
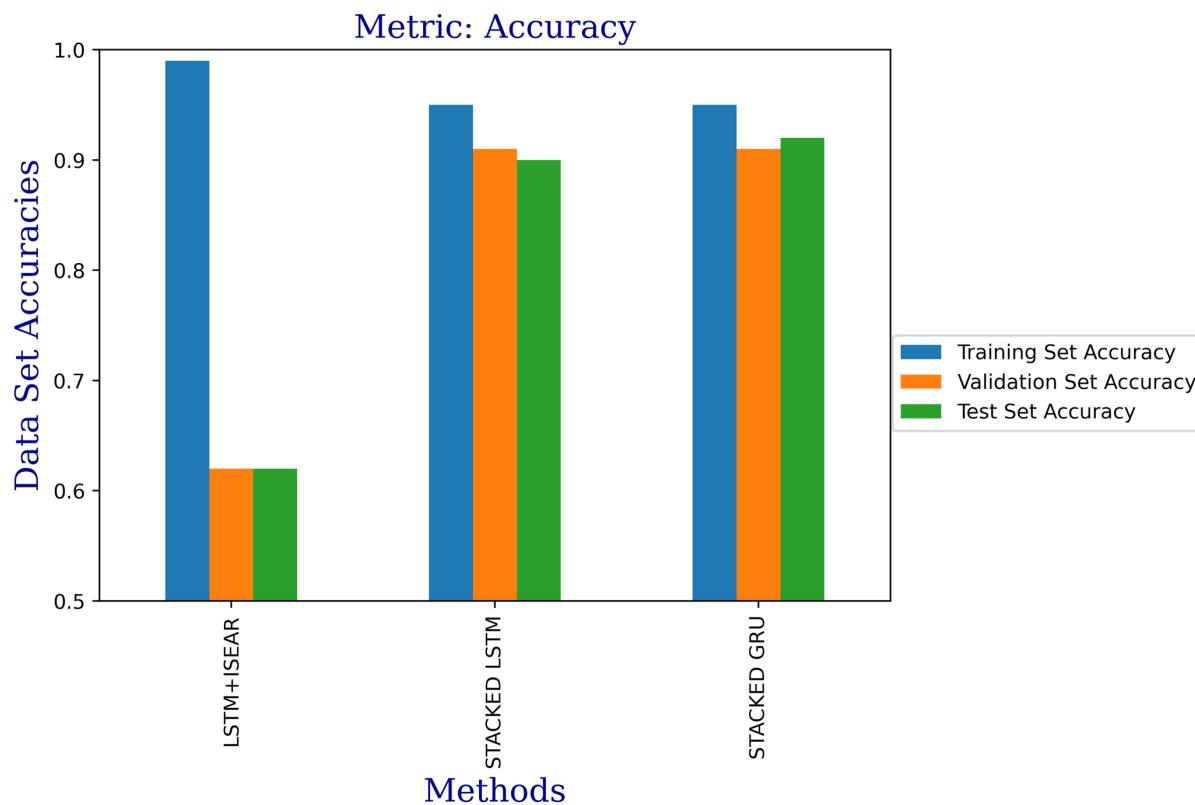
Stacked GRU Test Set Scores



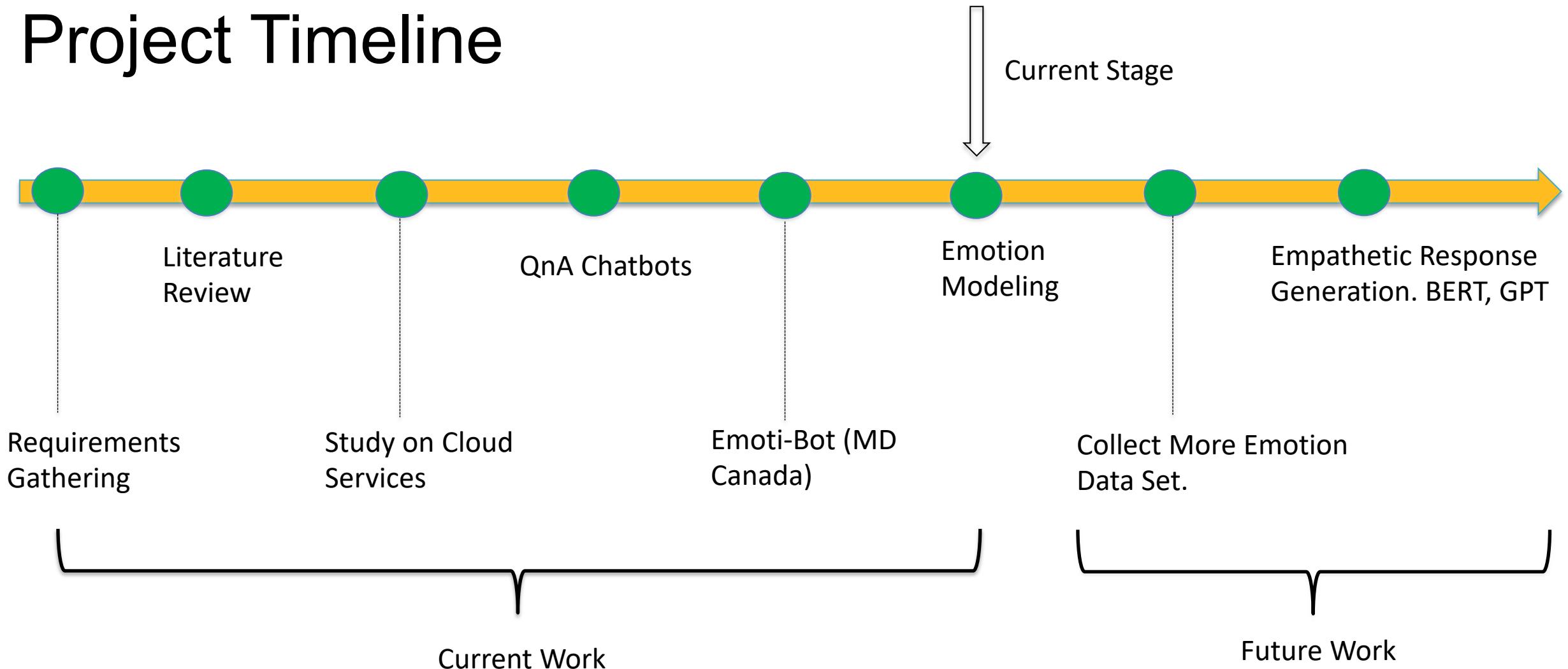
	precision	recall	f1-score	support
anger	0.83	0.89	0.86	353
fear	0.90	0.85	0.87	323
joy	0.92	0.96	0.94	588
sadness	0.92	0.88	0.90	529
accuracy			0.90	1793
macro avg	0.89	0.89	0.89	1793
weighted avg	0.90	0.90	0.90	1793

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Metrics Scores Summary



Project Timeline



Project Contributions

- **Leveraging cloud resources** to answer common queries related to **COVID-19 pandemic**.
- Worked closely with domain experts at MD Canada to **unify decision flow to narrow down scope of clinical diagnosis**. Proposed “**Emoti-bot**” **architecture** to implement the decision flow.
- **Combined datasets** from multiple open sources following **Ekman theory** of emotions. Dataset is **preprocessed and cleaned**, is made available publicly.
- **Tested stacked deep learning models** for emotion detection.
- Codes are available on GitHub

Conclusion

- Summary
- Take-away
 - Long term Adaptability
 - Ethical Chat-ops

An aerial photograph of the University of Regina campus. The image shows several modern university buildings, including a large white building with a prominent glass facade, a tall residential tower, and a lower administrative building. The campus is surrounded by green fields, trees, and a parking lot filled with cars. The sky is clear and blue.

Thank you!

Questions?



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Further Details

1. GitHub Repository for QnA Chatbots <https://github.com/jayjoshi9727/RnA-B0t>
2. GitHub Repository Pre-Consultation Chatbots <https://github.com/jayjoshi9727/Emotibot-MD-Canada>
3. CS 900 Seminar Video Links <https://youtu.be/wnlDX-n-ukE>
4. Python code for Emotion Detection https://github.com/jayjoshi9727/Emotion_Detection_In_Chatbots

References

- [1]. Retrieved from <https://drawingchange.com/project/digital-graphic-recording-online/>
- [2]. Retrieved from <https://www.telegraph.co.uk/global-health/climate-and-people/hospitals-brink-peru-coronavirus-epicentre-shifts-americas/>
- [3]. Retrieved from <https://nursing-tv.com/2022/03/01/the-covid-19-and-mental-health-of-adolescents-and-youth-statistics/>

