

Depression Detection

- Week 18-19

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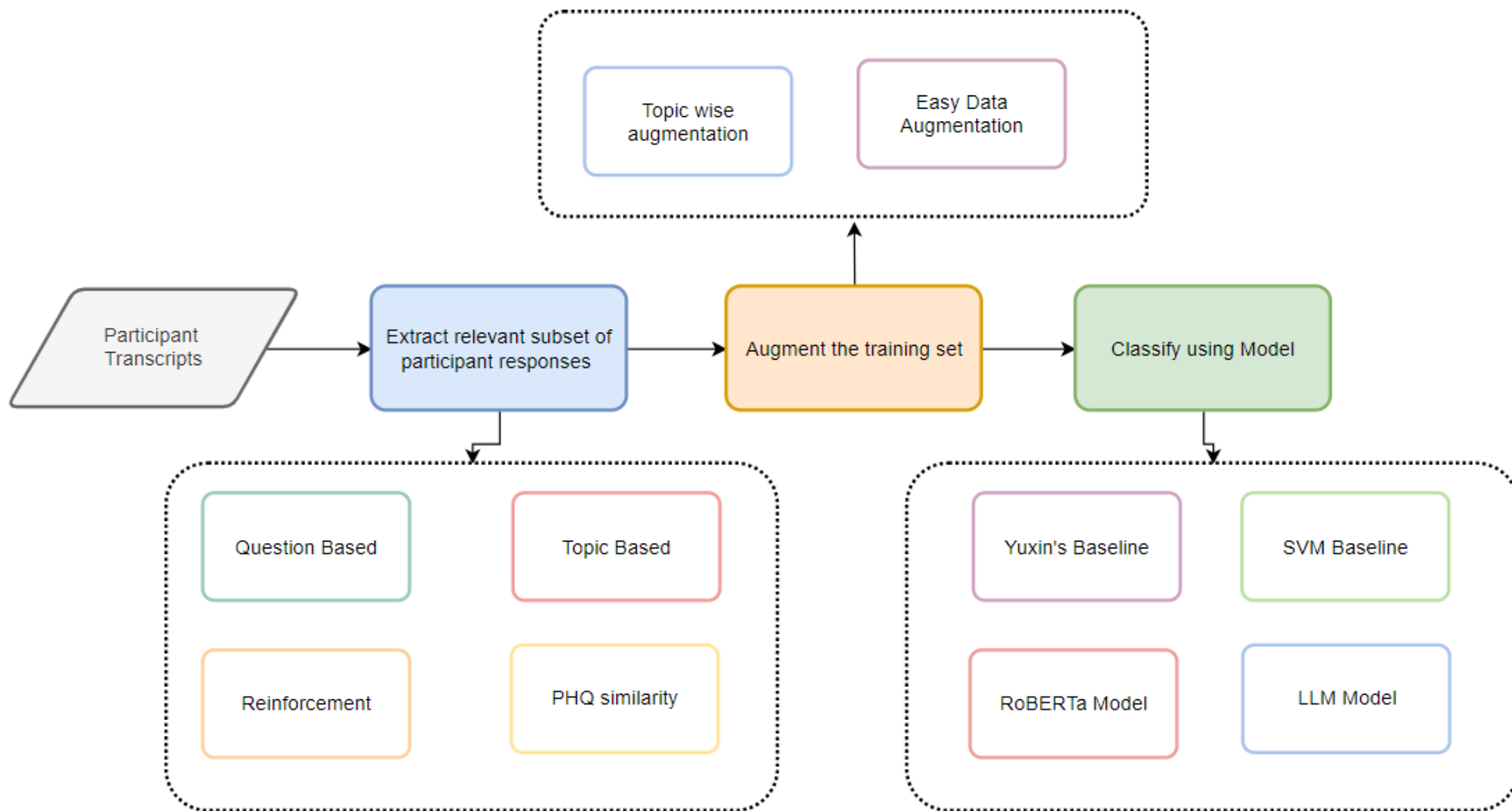
University: Manipal Institute of Technology

Internship Period: Jan – July 2024

Undergraduate 4th year

Duration of the presentation: ~10 minutes

Overall State of Work



Agenda

- 1. Analysis of Zero-Shot LLM Model**
- 2. Prompt Modification – Mitigating Overestimation**
- 3. Prompt Modification – Binary Response**
- 4. Few Shot Learning LLM**
 1. Method and Comparison with different number of examples
 2. Few shot with Augmented Dataset
- 5. Data Augmentation: Easy data Augmentation**
- 6. Tentative Plan for next week**

Analysis of Zero-Shot LLM Model

PHQ Question	RMSE	MAE
Lack of interest	1.39	0.98
Feeling depressed / Hopeless	1.19	0.94
Sleep troubles	1.24	0.96
Little energy/tired	1.47	1.02
Poor appetite	1.40	1.12
Feeling like a failure	1.33	1.01
Trouble concentrating	1.35	1.14
Moving slow/fast	1.52	1.25

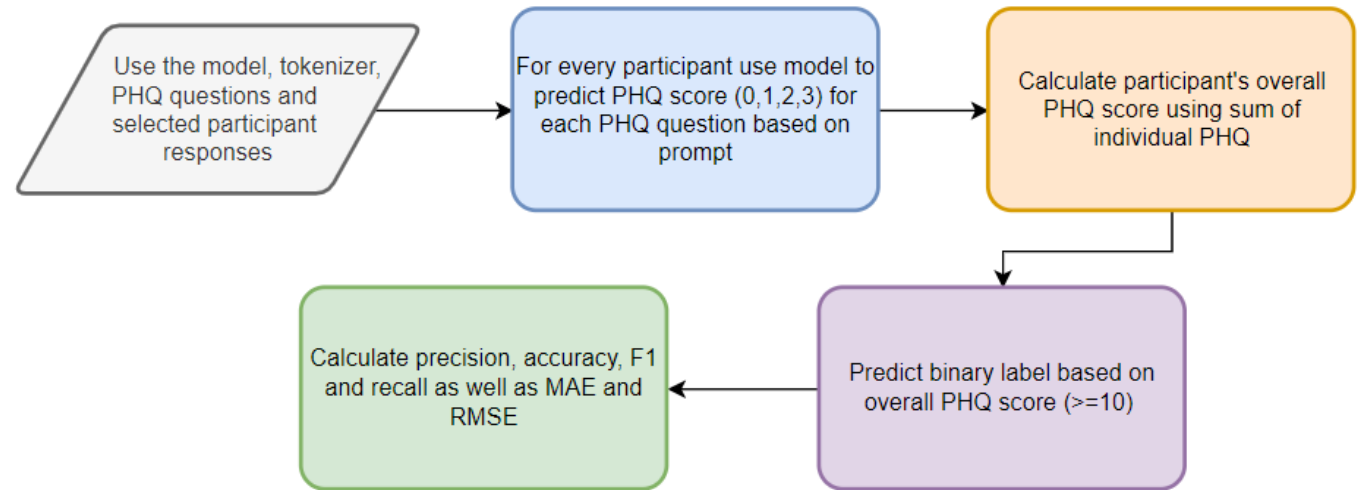


Table 1: Error for each PHQ Question

Fig 1: Zero Shot LLM method

Overall Model Analysis

Overestimation: 0.723

Underestimation: 0.205

Prompt Modification – Mitigating Overestimation

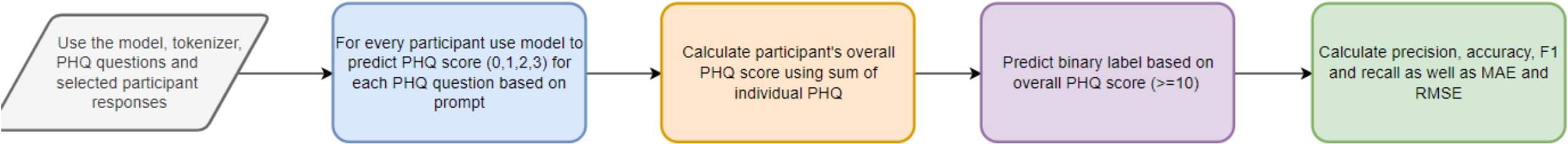


Fig 1: Zero Shot LLM method

Prompt: This is a set of selected responses from interviews with a participant. If you were a clinician providing a diagnosis for the PHQ symptom: {question} \n Participant Response: {response} \n Based on the level provide only a single number 0, 1, 2 or 3 as a response. **Ensure you do not overestimate the level.**

Table 2: Results comparing performance metrics

Model	Acc	F1	Recall	Precision	RMSE	Over	Under
Zero Shot	0.58	0.49	0.68	0.38	6.82	0.72	0.20
Mild	0.66	0.25	0.18	0.34	6.63	0.49	0.40

Prompt Modification – Binary Response

Prompt: This is a set of selected responses from interviews with a participant most similar to the PHQ questions.

Responses: {responses}

If you were a clinician providing a diagnosis for depression with 1 as depressed and 0 as healthy provide a single number representing it.

Table 3: Comparison of results of the Binary prediction with other zero shot methods

Model	Accuracy	F1	Recall	Precision
Zero Shot	0.58	0.49	0.68	0.38
Mild	0.66	0.25	0.18	0.34
Binary	0.60	0.48	0.62	0.40

Few Shot Learning LLM

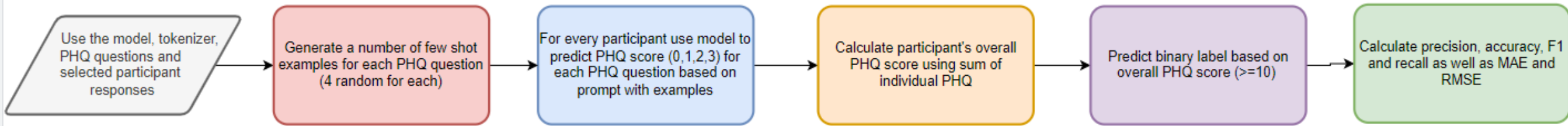


Fig 2: Few Shot LLM method

Table 4: Comparison with different number of fewshot examples

Model	Acc	F1	Recall	Precision	RMSE	Over	Under
Few shot 4	0.72	0.37	0.27	0.58	6.09	0.45	0.46
Few shot 2	0.67	0.26	0.20	0.39	8.43	0.53	0.43
Few shot 8	0.58	0.18	0.15	0.21	6.89	0.57	0.38

Prompt: This is a set of selected responses from interviews with a participant. If you were a clinician providing a diagnosis for the PHQ symptom: {question}

where some example responses and labels are {fewshotexamples}

Participant Response: {response}
Based on the level provide only a single number 0, 1, 2 or 3 as a response.

Few Shot Learning LLM

Model	Acc	F1	Recall	Precision	RMSE	Over	Under
Zero Shot	0.58	0.49	0.68	0.39	6.82	0.72	0.20
Zero Shot Mild	0.66	0.24	0.18	0.34	6.63	0.49	0.40
Binary	0.60	0.48	0.62	0.40	-	-	-
Few Shot 4	0.72	0.37	0.27	0.58	6.09	0.45	0.46
Few Shot 4 Augmented	0.73	0.35	0.25	0.58	6.00	0.45	0.47

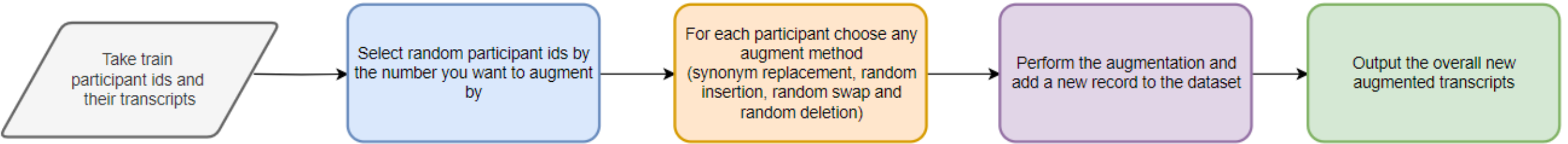
Table 5: Comparison of all current LLM methods tried

	Train	Test	Dev
DAIC	107	47	35
WOZ			
Aug	207	47	35

Table 6: Number of participants in augmented and original dataset

Data Augmentation: Easy data Augmentation

Fig 3: Easy Data Augmentation



	Accuracy	F1	Recall	Precision
Raw Transcript	0.64	0.65	0.67	0.63

Table 7: Results with raw transcript on Yuxin's baseline

	Acc	F1	Recall	Prec
Reinforce	0.53	0.61	0.73	0.52
Augment	0.66	0.67	0.80	0.52

Table 8: Results with reinforcement technique on Yuxin's baseline

	Acc	F1	Recall	Prec
Topic 29	0.65	0.69	0.79	0.62
Augment	0.71	0.70	0.71	0.70

Table 9: Results with topic-based technique on Yuxin's baseline

Tentative Plan

Plan for next week

1. Work further on LLM ideas – Improving specific PHQ based predictions and trying out better few shot example selections
2. Working on potential fine tuning on the LLM model
3. Continue writing literature review paper

Relevant Links

1. Overall project plan and timeline: [Link](#)
2. Analysis and notes from relevant papers: [Link](#)
3. GitHub documenting everyone's presentations and codes: [Link](#)
4. Overleaf document for the literature review: [Link](#)

End

