Depression Detection

- Week 21

Name: Sinchana Kumbale

University: Manipal Institute of Technology
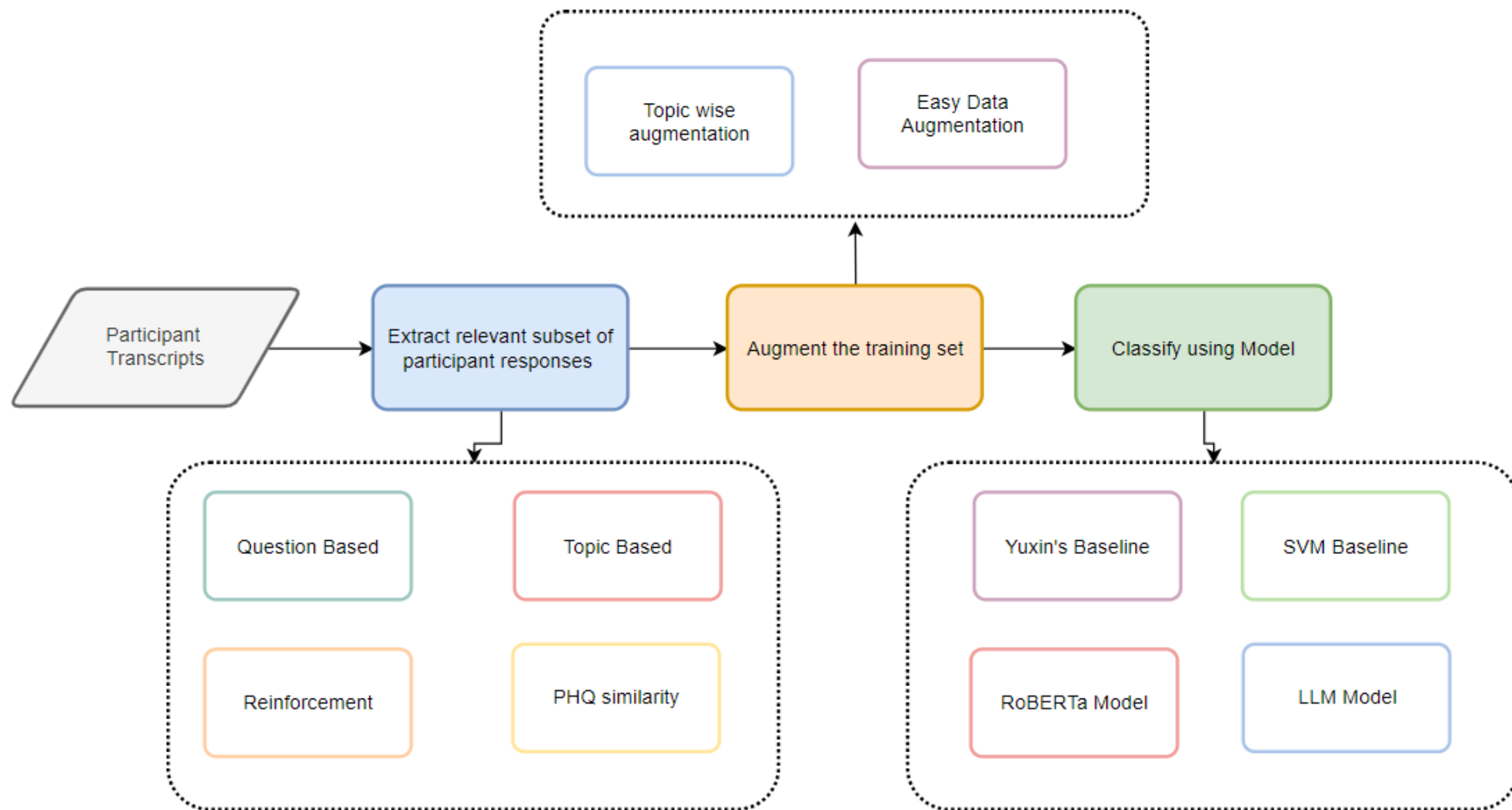
Internship Period: Jan – July 2024

Undergraduate 4th year

Duration of the presentation: ~7 minutes

Overall State of Work

Agenda

1. **LoRA on LLM – Prompt based prediction**

2. **LoRA on LLM – Prompt Modification**

3. **LoRA on LLM - Classification**

4. **PHQ Based improvement**

5. **Tentative Plan for next week**
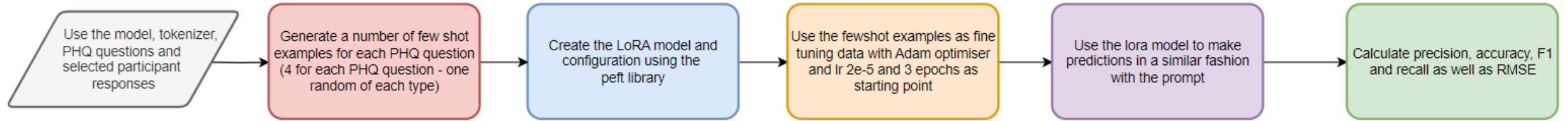
LoRA on LLM – Prompt based prediction

Fig 1: Low Rank Adaptation on the LLM model

Model: Intel's neural chat 7b version

LoRA Configuration: r=4, alpha=16 and dropout=0.01 Weights in self-attention module

Table 1: Comparing LoRA performance with different epochs

	Accuracy	F1	Recall	Precision	RMSE
4 examples	0.73	0.13	0.07	1.0	5.98
5 epochs	0.73	0.13	0.07	1.0	5.98

LoRA on LLM – Prompt Modification

Modifications:

- **Few Shot Examples** - Binary labelled 10 examples
- **Prompt Focus** - Overall depression label rather than PHQ symptom

Table 2: Comparing LoRA Binary performance with others

	Accuracy	F1	Recall	Precision	RMSE
4 examples	0.73	0.13	0.07	1.0	5.98
Zero shot binary	0.60	0..48	0.62	0.40	-
Binary Prediction	**0.67**	**0.46**	**0.51**	**0.43**	-

LoRA on LLM - Classification

Use the model, tokenizer, PHQ questions and selected participant responses → Generate few shot examples of text and binary label (10 examples) → Create the LoRA model and configuration using the peft library with a final linear layer and sigmoid activation for binary classification → Use the fewshot examples as fine tuning data with Adam optimiser and lr 2e-5 and 3 epochs as starting point → Use the lora model to make binary classification → Calculate precision, accuracy, F1 and recall
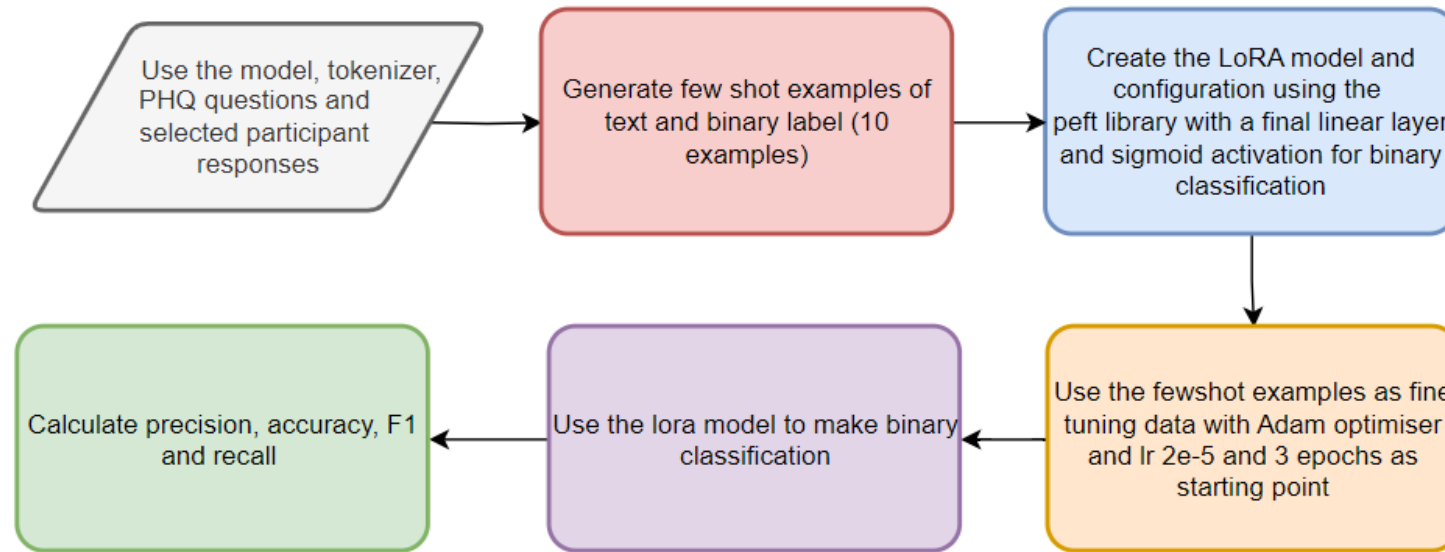
Fig 2: Low Rank Adaptation on the LLM model - Binary Classification

Issue:
Returning 0 for all samples which seems like a code issue

PHQ Based improvement

PHQ-9 Symptoms	Sample tweet	Seed terms	Final keyword list
Lack of interest (S1)	Am I depressed or am I just bored? Apathy and irony, postmodern anxiety	Disinterest	Involved, occupied, pessimism, reversion, absorbed, lifelessness, bored, enthusiasm, engrossed, worried, apathy.
Feeling down (S2)	High functioning depression, I cannot fester in my misery but i'm fuckin miserable	Hopeless, depressed	Dejected, dismayed, dispirited, demoralized, grimmed, misery, grim, downhearted, low-spirited, bleak, desperate, lost, frustrated.
Sleep disorder (S3)	Forcing myself up now so I am not awake when the power goes off much later, lol	Awake, sleep	Nap, restless, awake, whole night, bedtime.
Lack of energy (S4)	I am so exhausted and I still have work 9-5 and then red rocks day three	Tired, energy	Weary, fatigue, fag, fag out, overtire, overfatigued, burned-out, burnt-out, exhausted, dog-tired, washed-out, drained, whacked.
Eating disorder (S5)	Another saturday night where i'm too depressed to sleep after overeating....i am extremely bored of this life	Appetite, overeating	Aversion, distaste, loathing, malformed, bulimic, puffy, starve, fat
Low self-esteem (S6)	I got on the scale today and I am disgusted. Like utterly disgusted. Depression really beat my ass and had me slacking	Loser, failure	Loser, relapse, downfall, ruined, flop, dead-duck, disappointment, achiever, misfire, underdog, falling-apart, disgusted
Concentration problems (S7)	Whenever it gets close to my bday I always go through some type of cleansing/depression.. Scattered focus...	Concentrate, focus	Immersed, decentralize, deconcentrate, scattered, dispersed, unsettled, focus
Hyper/Lower activity (S8)	I spend hours of my day staring at screens, immobile. Why am I depressed???	Moving, immobile, restless	Discontent, ungratified, unsatisfied, stand-still, refrained, immobile
Suicidal thoughts (S9)	I know that I cannot undo The self-destruction, the damage I have done	Dead, hurt, suicide	Trauma, harm, suffering, anguish, hemorrhage, penetrating-trauma, torment, agony, excruciate, damaged, gag, suffocate, self-destruction

Prompt:
If you were a clinician providing a diagnosis for the PHQ symptom: {question} where some emotional feelings could include {keywords} where some example responses and labels are {fewshotexamples} For the set of selected participant responses, Participant Response: {response} Based on the level provide only a single label None, Mild, Moderate or Severe as a response.

[1] DEPTWEET: A typology for social media texts to detect depression severities, (Kabir et al, 2022) | Paper

RMSE
7.34

Tentative Plan

Plan for next week
1. Work further on LLM ideas – Hyperparameters and fixes on LoRA and GPT trial with PHQ responses
2. Continue writing the thesis and literature review paper
3. Start working on the skeleton for the conference 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