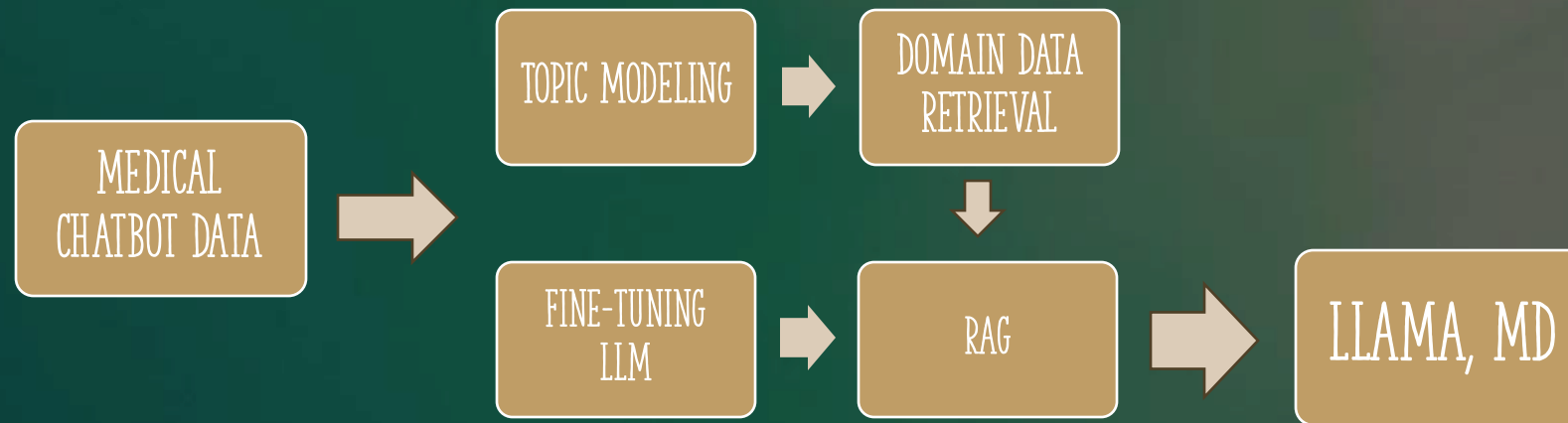# LLAMA, MD: AI SPECIALIZING IN GYNECOLOGY

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IDEA

The idea is to make a LLM proficient in a specialized domain of medical task.

DATASET

- 251k samples
- 3 Features- Description, Patient, Doctor
- Questions asked by the patient, Doctor's response
- Description of the actual question of the patient

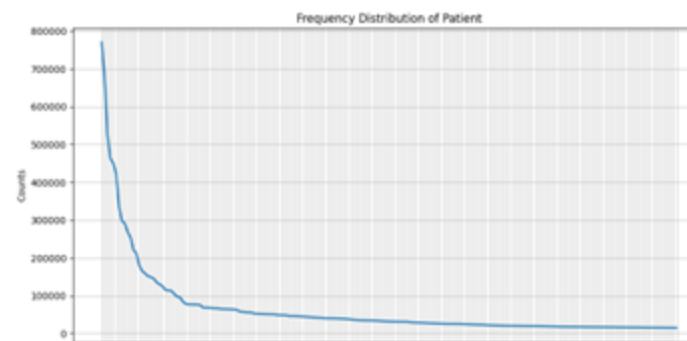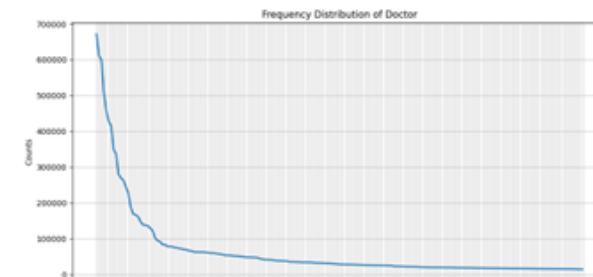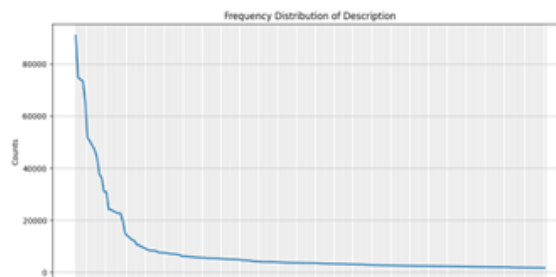| Description string · lengths	Patient string · lengths	Doctor string · lengths
1→152 99.8%	1→1.78k 99.3%	1.14k→2.28k 4.7%
Q. I get fever during rainy and winter season. Why?	Hello doctor, During rainy and winter season get frequent fevers. Most of the…	Hello. I need to know a few things, 1. Do you feel feverish, or does the thermomete…
Q. Why does one develop swelling after snake bite?	Hi doctor, I am a 40 year old female. I got cottonmouth bite on the back of the…	Hi. I could understand your crisis. For further information consult a toxicologis…
Q. Why is there a continuous rise in temperature despite taking antibiotics?	Hi doctor, My father is 71 years old. He had a fever for a week, and the…	Hi. I went through your post and investigation (attachment removed to…
Q. Can my 3 year old son lead a normal life after sepsis?	Hi doctor, My 3 year old son was diagnosed with sepsis with SIRS, three days back.…	Hello. Regards. For more information consult a paediatrician online -->
Q. What is the main reason for sepsis in a newborn?	Hello doctor, What is the main reason for sepsis to occur in a newborn? Will parent…	Hi. For further information consult a paediatrician online -->

TOPIC MODELING

UNDERSTANDING CONTEXT OF DESCRIPTION, PATIENT & DOCTOR.

1. For better topic modelling, we applied custom threshold on each columns to remove unwanted words in LSA, based on freq.

```
Thresh for description = 20000
threshold for doctor = 100000
threshold for patient = 100000
```
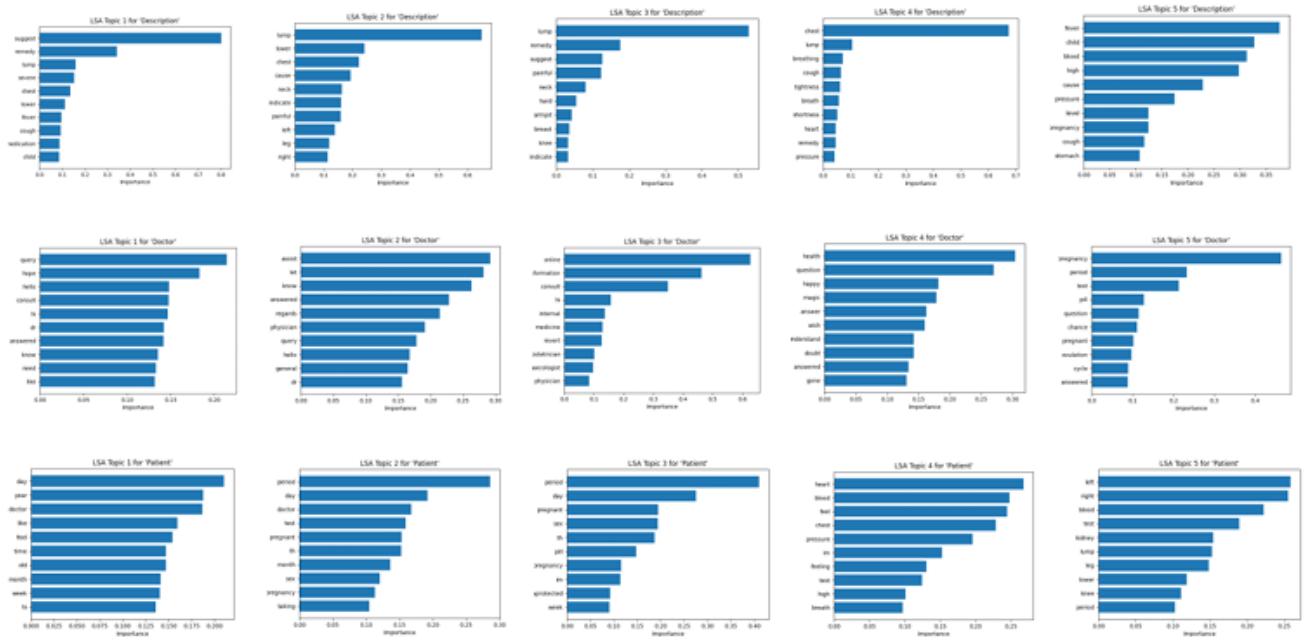

Frequency Distribution of Description

Frequency Distribution of Doctor

Frequency Distribution of Patient

TOPIC MODELING

UNDERSTANDING CONTEXT OF DESCRIPTION, PATIENT & DOCTOR.

- For the top 5 topics in the context of each column, we observed that the dataset is predominantly represented by themes related to Pregnancy

DATA RETRIEVAL FROM WIKIPEDIA

Stage 1. Retrieves up to 50 documents related to the query "pregnancy."

Stage 2. Collects titles of the retrieved documents for processing.

Stage 3. Saves each Wikipedia page's relevant content (excluding sections like "History" or "References")

DATA RETRIEVAL FROM TEXTBOOKS

Get a list of highly rated books on Gynecology & Pregnancy used by doctors.

Use LangChain's PDF Document Loaders to convert pdf to text files.

Pre-process the text files by removing special characters and other tags.

TEXT EMBEDDINGS

PDF Text & Wikipedia Texts

WhereisAI/UAE-Large-v1 Model

Text Embeddings Stored in Pinecone Database, along with metadata

MODEL: LLAMA 3.2 1B

- Developed by Meta

- Causal Language Model
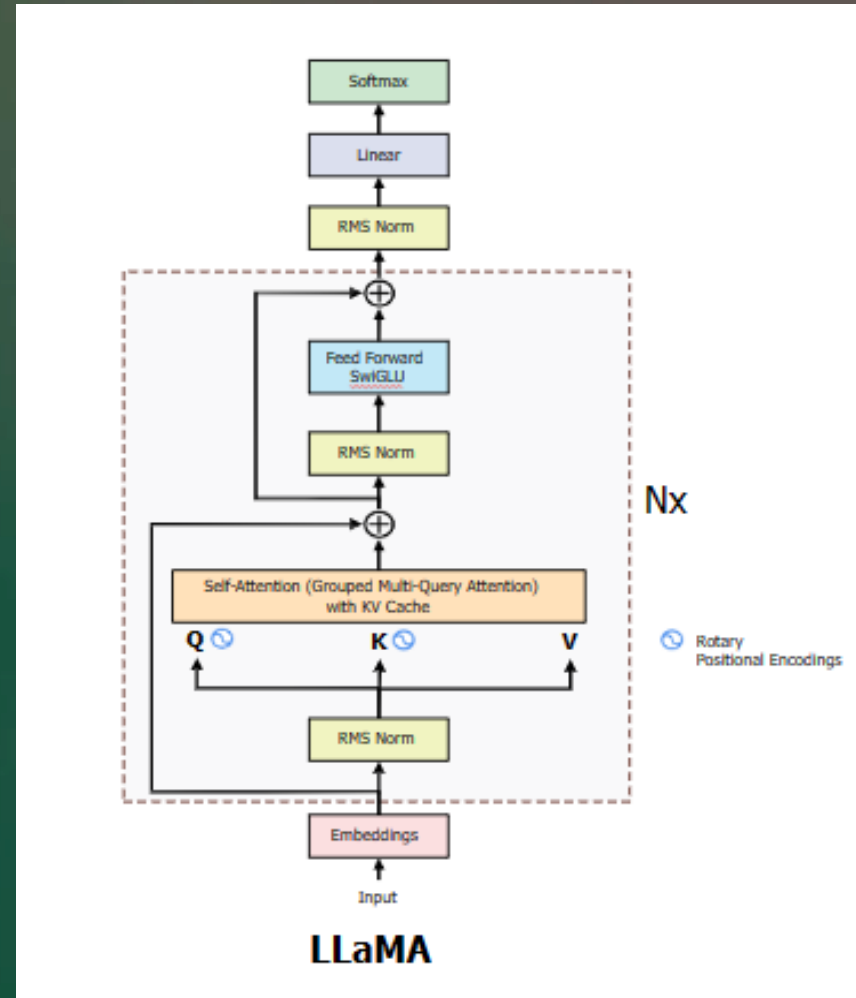
FINE-TUNING
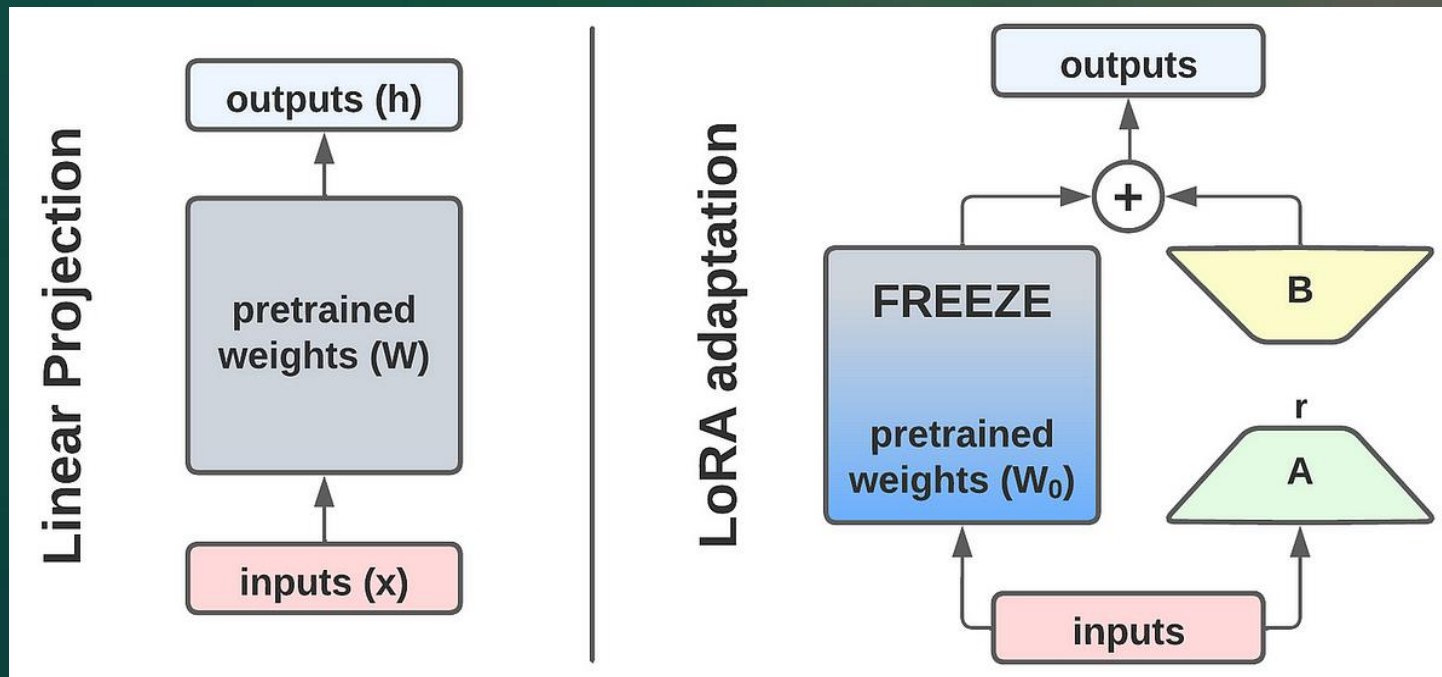
Model: LLAMA 3.2 1B

RETRAIN/FREEZE LAYERS

LORA

PROMPT FORMATTING

FINE-TUNING: LORA

LoRA- Low Ranking Adaptation

It introduces low-rank matrices into the weight update process

FINE-TUNING: PROMPT FORMATTING

Injected prompt formatted instruction to the data as preprocessing.

LLAMA3.2 special tokens: <|begin_of_text|>, <|end_of_text|>, <|eot_id|>, etc

```python
sample = [
    {
        "role": "system",
        "content": "You are a helpful, respectful, and honest assistant.",
    },
    {
        "role": "user",
        "content": "Who are the most influential hip-hop artists of all time?",
    },
    {
        "role": "assistant",
        "content": "Here is a list of some of the most influential hip-hop "
        "artists of all time: 2Pac, Rakim, N.W.A., Run-D.M.C., and Nas.",
    },
]
```

```
'<|start_header_id|>system<|end_header_id|>\n\nYou are a helpful, respectful,
and honest assistant.<|eot_id|><|start_header_id|>user<|end_header_id|>\n\nWho
are the most influential hip-hop artists of all time?<|eot_id|><|start_header_id|>
assistant<|end_header_id|>\n\nHere is a list of some of the most influential hip-hop
artists of all time: 2Pac, Rakim, N.W.A., Run-D.M.C., and Nas.<|eot_id|>'
```
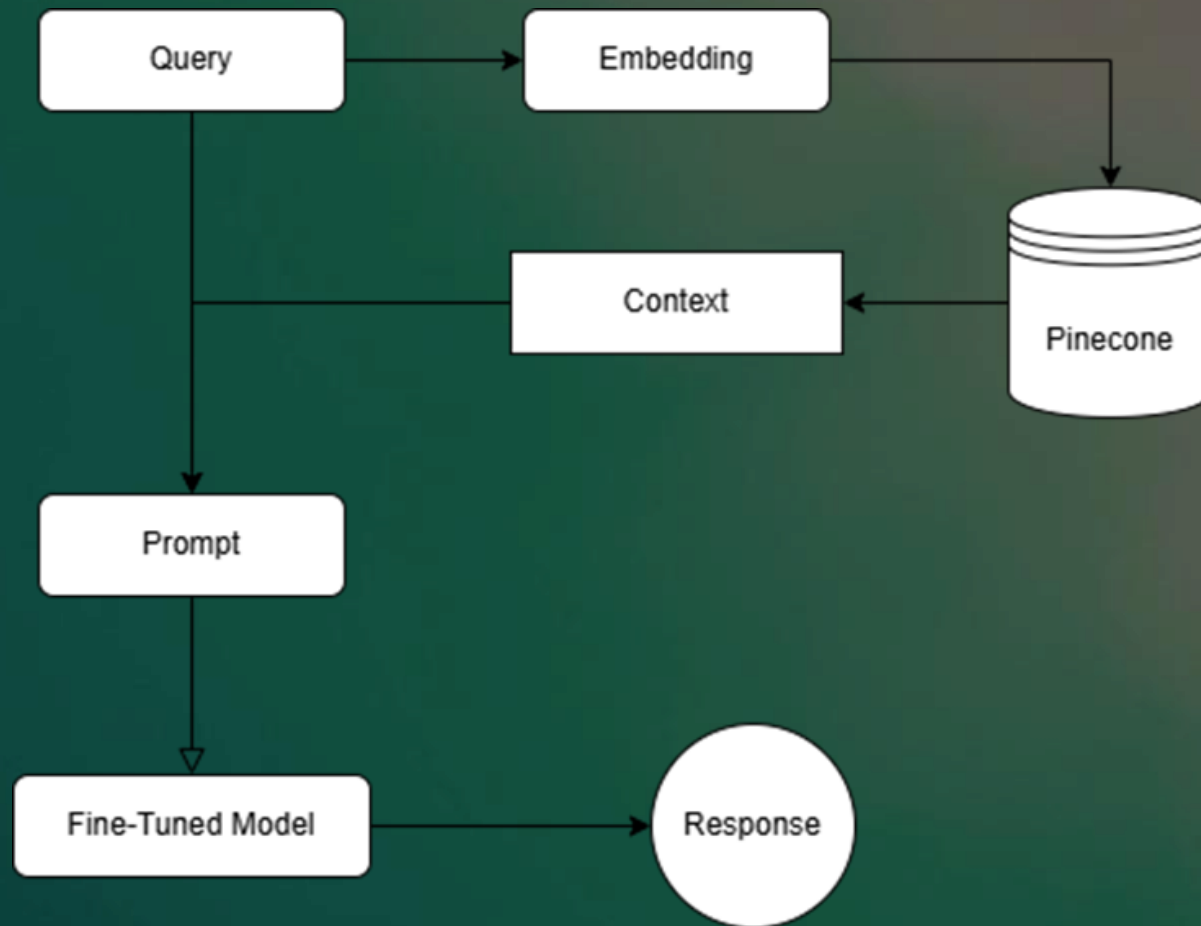
EVALUATION

CONFIG:

- Low-rank dim: 16
- Lora_alpha: 32
- Lora_dropout: 0.1
- Lr: 2e-5
- Epochs: 50

- Loss- 0.4843
- Perplexity- 1.6230
- Human Evaluation

RAG

DEMO

THANK YOU!