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HIGH RISK PROJECT

Predicting Patient Encounters Using Local LLMs to Analyze Previous Encounters

MATT DYL
MSAI Graduate Student, The University of Texas at Austin

Project Goals

What were we trying to accomplish?

I CAN PREDICT THE FUTURE...
YOU ARE GOING TO SPEND THE NEXT 5 SECONDS OF YOUR LIFE READING THIS
imgflip.com

Phase 1: Predict future patient encounters using previous medical notes.

Phase 2: Predict what the future encounter would be.

Why?

Being able to accurately forecast future patient encounters or needs would lead to better utilization of strained medical resources as well as allow for better patient outcomes as care would become more preventative rather than acute.

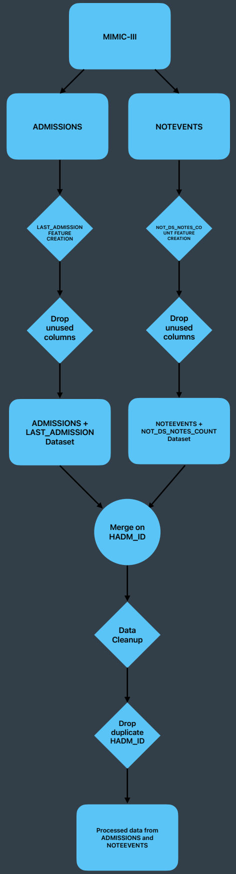
How were we going to accomplish this?

GENERATIVE AI IS
SO HOT RIGHT NOW
makeameme.org

The Data

Dataset:
MIMIC-III

Tables:
Admissions
NoteEvents


MIMIC-III
ADMISSIONS
NOTEVENTS
LAST_ADMISSION FEATURE CREATION
NOT_DS_NOTES_COUNT FEATURE CREATION
Drop unused columns
Drop unused columns
ADMISSIONS + LAST_ADMISSION Dataset
NOTEEVENTS + NOT_DS_NOTES_COUNT Dataset
Merge on HADM_ID
Data Cleanup
Drop duplicate HADM_ID
Processed data from ADMISSIONS and NOTEEVENTS

The Models

nmitchko/medguanaco-65b-GPTQ

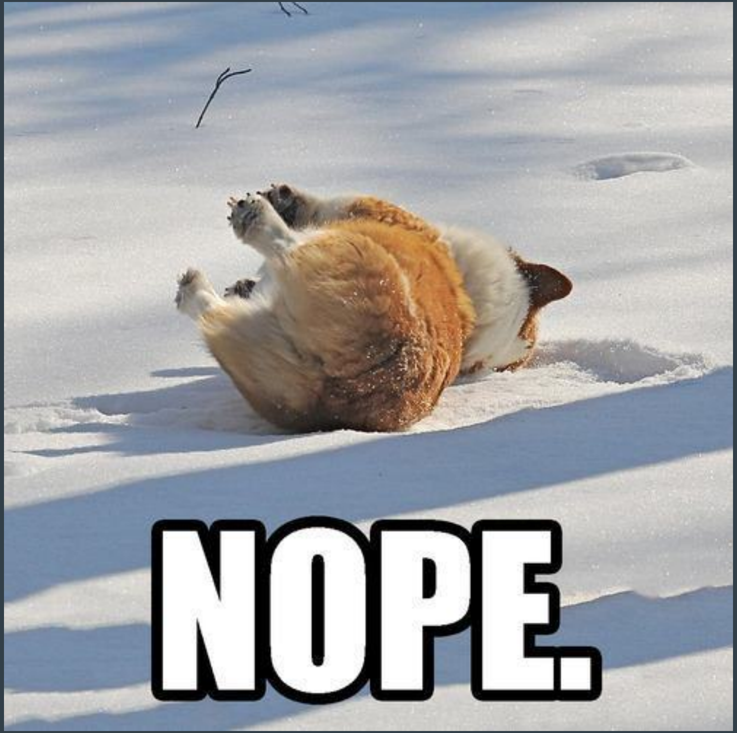
microsoft/BioGPT-Large-PubMedQA

- Due to the restrictions and privacy concerns that come with using MIMIC-III we were forced to use local LLM models to try to accomplish our goals
- Both of these models were fine-tuned for medical domain tasks and should give much better results and context vs general purpose AI models

Combine the two

- By feeding the input text we preprocessed into the model we would format prompts to input into the LLM asking a simple question of if this patient was likely to have a future admission
- We would then be able to train the model by comparing its output to our generated feature of "LAST_ADMISSION" and see if it correctly predicted whether or not the entry was the last admission for the patient
- Upon satisfactory performance of this task our scope would expand to try to predict and classify what the nature of the future admission would be by creating a new feature called "SECOND_TO_LAST_ADMISSION" and retraining the model to see if it could accurately predict the nature of the "LAST_ADMISSION" record

Were we successful?


NOPE.

Postmortem

Issues:

LLM models did not want to run on local machine

Feedback loop was excessively long

What we learned:

Local environment matters a lot

For data processing we should offload the processed data into an external file to allow simply reloading the data vs reprocessing it each time

What would we do different?

Improvements

- Be willing to pivot more quickly when an approach is not working
- Use synthetic data instead of MIMIC-III in order to be able to utilize outside computing power

That's all Folks