AI First Course Assistance LLM

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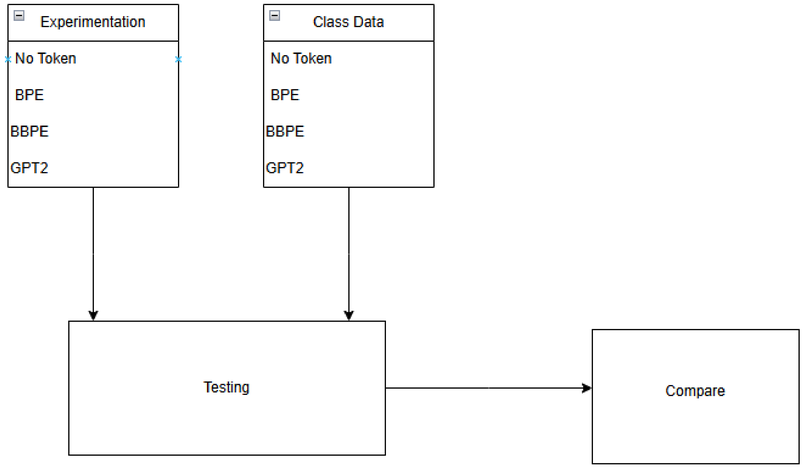
Motivation



Objective: Experiment with different hyperparameters and see how it effects a model, then train using class data.

Training Models

```
=== MODEL: ./models/no token/model_learning_rate_.0001.pth ===

Step 0: train loss 4.6677, val loss 4.6675
Step 50: train loss 3.3149, val loss 3.3527
Step 100: train loss 3.3100, val loss 3.3469
Step 150: train loss 3.2997, val loss 3.3358
Step 200: train loss 3.2536, val loss 3.2861
Step 250: train loss 3.1440, val loss 3.1459
Step 300: train loss 3.0864, val loss 3.0823
Step 350: train loss 2.9268, val loss 2.9204
Step 400: train loss 2.7829, val loss 2.7775
Step 450: train loss 2.7386, val loss 2.7349
Step 500: train loss 2.6784, val loss 2.6684
Step 550: train loss 2.6476, val loss 2.6358
Step 600: train loss 2.6012, val loss 2.5871
Step 650: train loss 2.5679, val loss 2.5562
Step 700: train loss 2.5411, val loss 2.5291
Step 750: train loss 2.5054, val loss 2.4938
Step 800: train loss 2.4729, val loss 2.4665
Step 850: train loss 2.4511, val loss 2.4459
Step 900: train loss 2.4522, val loss 2.4439
Step 950: train loss 2.4126, val loss 2.4054
```

Figure 1. Example Train and val loss of learning rate model

For the first part:

- Experiment with different hyperparameters such as learning rate, batch size, tokenizers, etc. (In total 8-9 parameters changed 4 times over 20 iterations)
- Using val loss and train loss, determine if models were overfitting or had bias and prep for part2.

Testing Outcomes

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Some Responses from Tokenizer Models w/o Class Data

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Responses from Tokenizer Models w/ Class Data

Challenges of Experimentation

```
Failed to load model ./models/class_data/model_bbpe.pth due to weight size mismatch.
Error(s) in loading state_dict for GPTLanguageModel:
        size mismatch for token_embedding_table.weight: copying a param with shape torch.Size([400, 384]) from checkpoint, th
e shape in current model is torch.Size([8000, 384]).
        size mismatch for lm_head.weight: copying a param with shape torch.Size([400, 384]) from checkpoint, the shape in cur
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        size mismatch for lm_head.bias: copying a param with shape torch.Size([400]) from checkpoint, the shape in current mo
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```
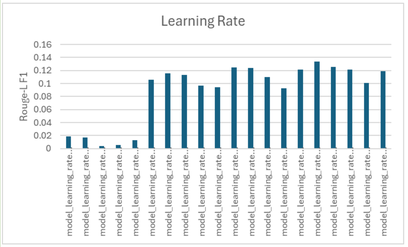
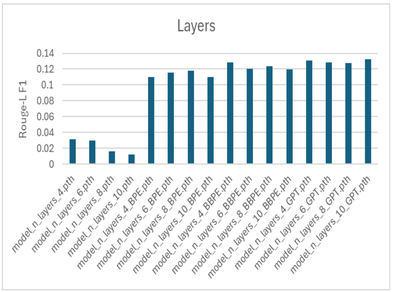
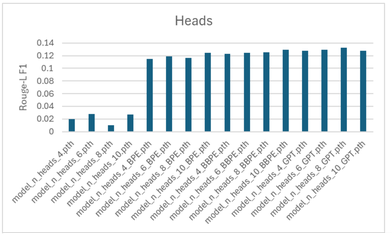

a) Hardware Limitations
b) Model Hallucinations
c) Hyperparameter Training vs Testing errors
d) Tokenizer Decoding errors

Experiments Enabled by Dataset

Results of Models Trained By Hyperparameter Testing

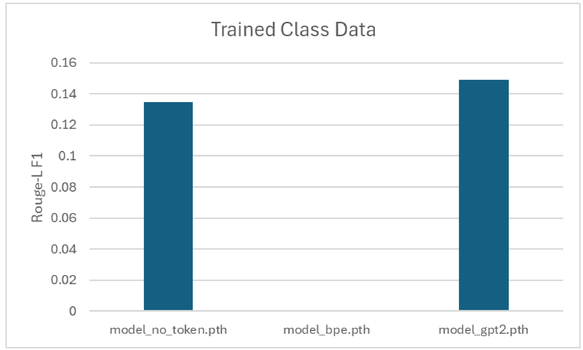






Interpretation: Models Trained on Tokenizers showed greater results rather than models trained without, more layers = better results

Results on Model Trained from Class Data



Interpretation: Tokenizers showed better performance, however showed difficulty with tokenizers such as BPE and BBPE (hallucinations/decoding errors).