Source Code

Remote Repository: https://github.com/Mikestriken/Deep-Learning-Class
Name: Michael Marais
Student ID: 801177649
Homework Number: 4

Note on Training / Validation / Qualitative datasets

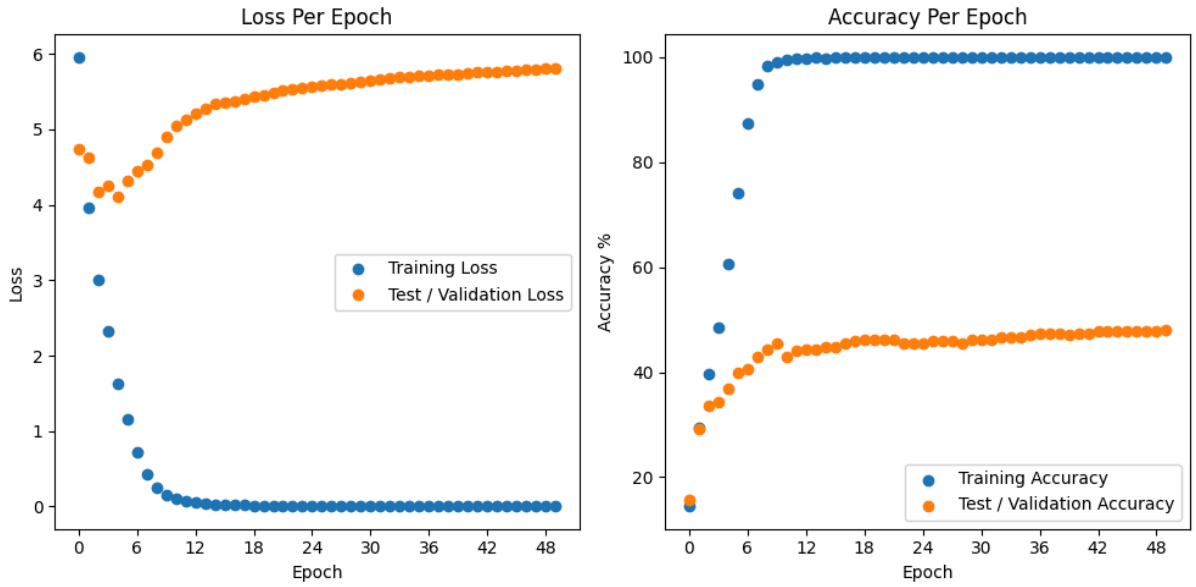
The homework problems suggest that the training dataset should be identical to the validation/test dataset. It also asks me to develop an additional qualitative dataset that is not provided. After asking Dr. Tabkhi for clarification I decided to make the validation/test dataset my qualitative dataset.

So if I mention or show a graph with the test/validation dataset, I'm talking about the qualitative dataset.

Problem 1

In this homework, we focus on sequence-to-sequence modeling. Use the English to French Dataset provided.

Developed a GRU-based encoder-decoder architecture for English to French Translation. Train the model on the entire dataset and evaluate it on the entire dataset. Report training loss, validation loss, and validation accuracy. Also, try some qualitative validation as well, asking the network to generate French translations for some English sentences.



Last Best Epoch: 49, Train Time ≈ 0 hr, 0 min, 30 sec
Train Loss: 0.00211, Train Accuracy: 100.00%
Test Loss: 5.80811, Test Accuracy: 48.13%

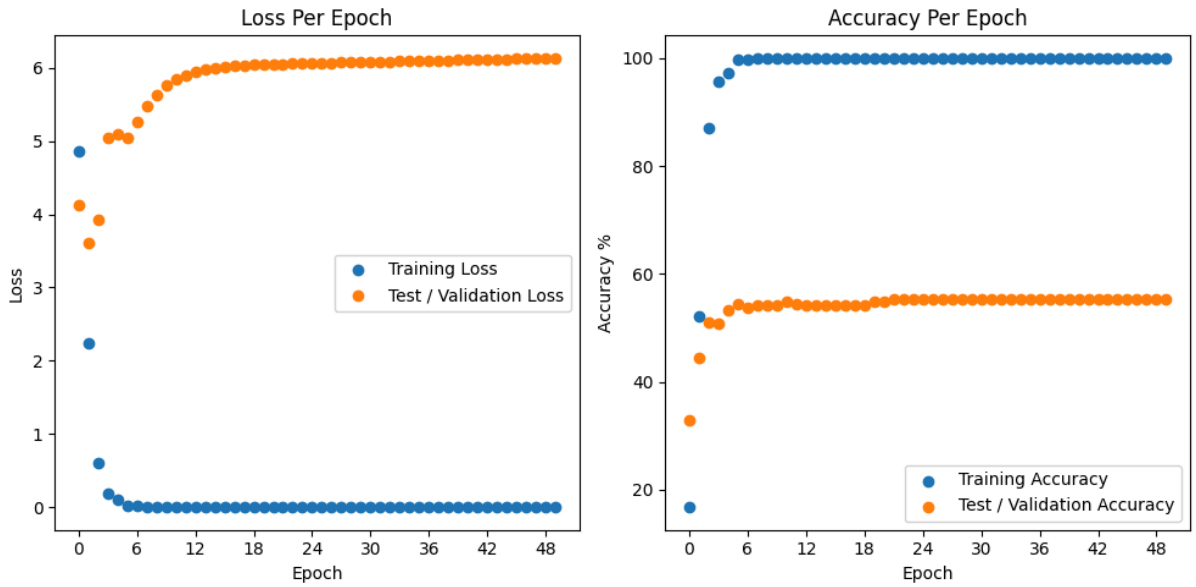
Example Output:

- Input: They walk in the park every evening EOS
- Output: Ils nagent dans la piscine EOS
- Expected: Ils se promÃ¨nent dans le parc chaque soir EOS

Note: Input was from the qualitative set, and output was a carbon copy from the train set

Problem 2

Repeat problem 1, this time extend the network with attention. Train the model on the entire dataset and evaluate it on the entire dataset. Report training loss, validation loss, and validation accuracy. Also, try some qualitative validation as well, asking the network to generate French translations for some English sentences. Also, compare the results against problem 1.



Last Best Epoch: 21, Train Time ≈ 0 hr, 0 min, 17 sec
Train Loss: 0.00050, Train Accuracy: 100.00%
Test Loss: 6.05060, Test Accuracy: 55.22%

Example Output:

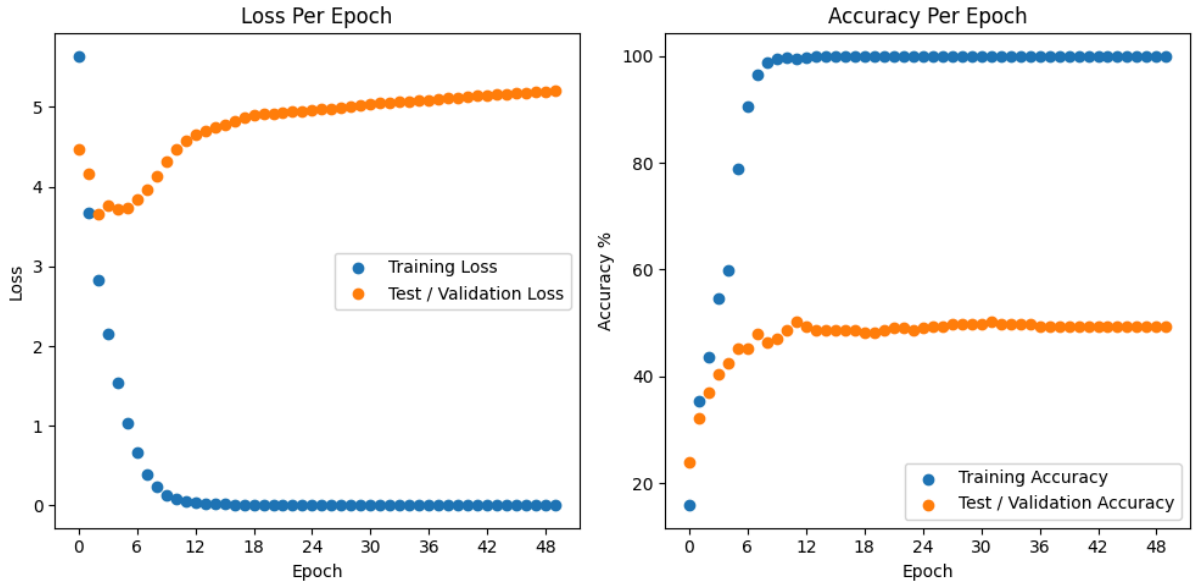
- Input: He plays soccer with friends EOS
- Output: Il joue de la guitare EOS
- Expected: Il joue au football avec des amis EOS

Note: Input was from the qualitative set, output was a carbon copy from train set

Problem 3

Repeat problems 1 and 2, this time try to translate from French to English. Train the model on the entire dataset and evaluate it on the entire dataset. Report training loss, validation loss, and validation accuracy. Also, try some qualitative validation as well, asking the network to generate English translations for some French sentences. Which one seems to be more effective, French-to-English or English-to-French?

Without Attention



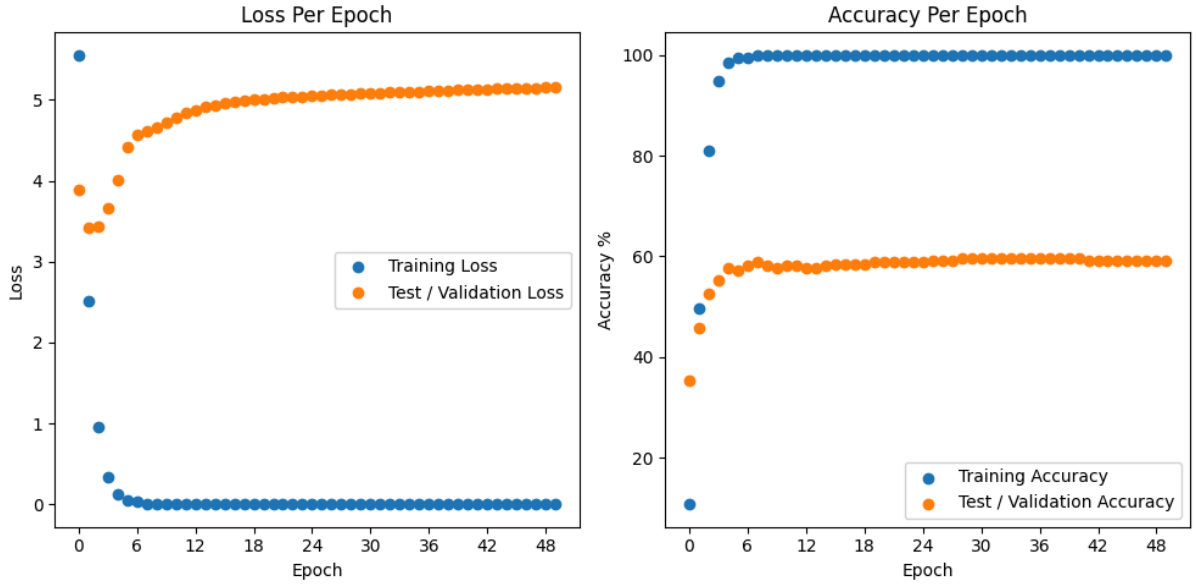
Last Best Epoch: 11, Train Time ≈ 0 hr, 0 min, 17 sec
Train Loss: 0.05727, Train Accuracy: 99.51%
Test Loss: 4.57694, Test Accuracy: 50.20%

Example Output:

- Input: Il conduit au travail le matin EOS
- Output: He shaves in the morning EOS
- Expected: He drives to work in the morning EOS

Note: Input was from the qualitative set, and output was a carbon copy from the train set

With Attention



Last Best Epoch: 28, Train Time ≈ 0 hr, 0 min, 25 sec
Train Loss: 0.00044, Train Accuracy: 100.00%
Test Loss: 5.06931, Test Accuracy: 59.61%

Example Output:

- Input: Nous aimons la musique franÃ§aise EOS
- Output: We love music EOS
- Expected: We love French music EOS

Note: Input was from the qualitative set, and output was a carbon copy fthe rom train set

French to English Vs. English to French

In general, translating from French to English had a much better accuracy and loss than English to French.