AI1808: Group 2

8TH WEEK REPORT

Friday, June 28 2024

Overview

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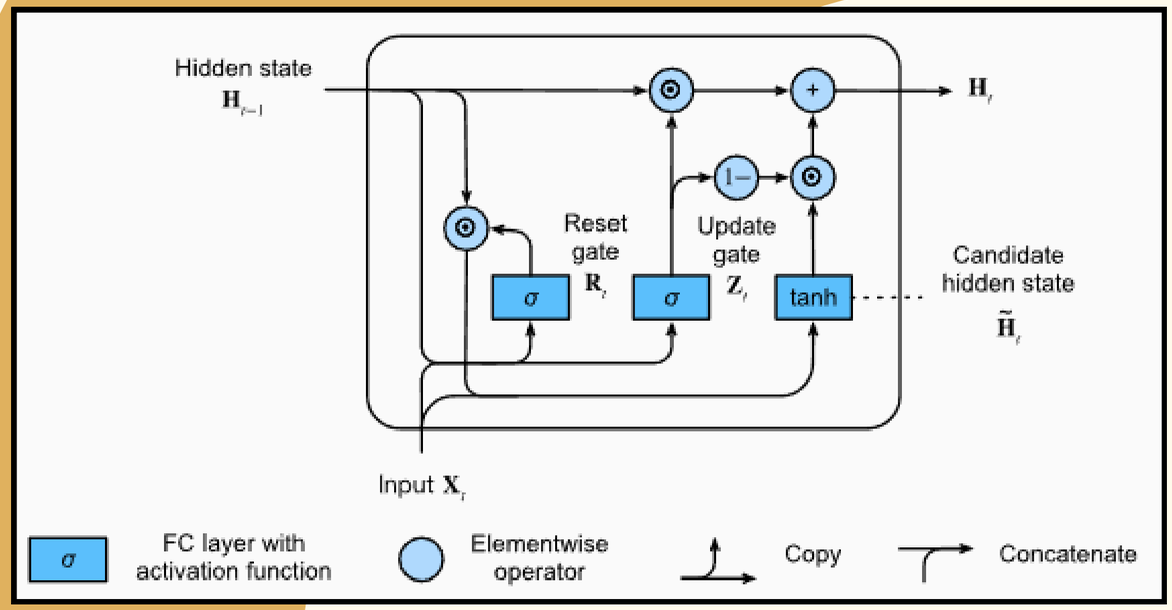
Gated Recurrent Unit

- As RNNs and particularly the LSTM architecture rapidly gained popularity during the 2010s, a number of researchers began to experiment with simplified architectures in hopes of retaining the key idea of incorporating an internal state and multiplicative gating mechanisms but with the aim of speeding up computation.
- In summary, GRUs have the following two distinguishing features:
  - Reset gates help capture short-term dependencies in sequences.
  - Update gates help capture long-term dependencies in sequences.



Hyperparameter Report

LSTM en-fra	GRU en-fra	GRU en-vn
1. Dataset: fra.txt **2. Number of Samples:** 20000 **3. Batch Size:** 64 **4. Epochs:** 10 **5. Encoder Latent Dimension:** 256 **8. Optimizer:** rmsprop **9. Loss Function:** categorical_cross entropy **10. Metrics:** accuracy, f1_score **11. Validation Split:** 0.2	**1. Dataset:** fra.txt **2. Number of Samples:** 20000 **3. Batch Size:** 64 **4. Epochs:** 10 **5. Encoder Latent Dimension:** 256 **8. Optimizer:** rmsprop **9. Loss Function:** categorical_cross entropy **10. Metrics:** accuracy, f1_score **11. Validation Split:** 0.2	**1. Dataset:** vie.txt **2. Number of Samples:** 20000 **3. Batch Size:** 64 **4. Epochs:** 10 **5. Encoder Latent Dimension:** 256 **8. Optimizer:** rmsprop **9. Loss Function:** categorical_cross entropy **10. Metrics:** accuracy, f1_score **11. Validation Split:** 0.2

Comparison Results

Comparison between LSTM and GRU on English - France dataset:

	LSTM	GRU
Loss	0.4851	0.3802
Accuracy	0.8562	0.8852
F1 score	0.8774	0.9006
Training time	8m 22.5s	6m 28.6s
Validation loss	0.5743	0.4808
Avalidation accuracy	0.8311	0.8576
Validation F1 score	0.8551	0.8773

GRU outperformed LSTM in term of efficency. Not only it has higher accuracy, but F1 score also suggests better overall precision and recall balance in a shorter time.

Comparison Results

Comparison of GRU on English – French and English – Vietnamese dataset:

	eng-fra	eng-vie
Loss	0.3802	0.3584
Accuracy	0.8852	0.9021
F1 score	0.9006	0.9232
Training time	6m 28.6s	18m 52.1s
Validation loss	0.4808	0.6553
Avalidation accuracy	0.8576	0.8239
Validation F1 score	0.8773	0.8501
Number of tokens	98	163

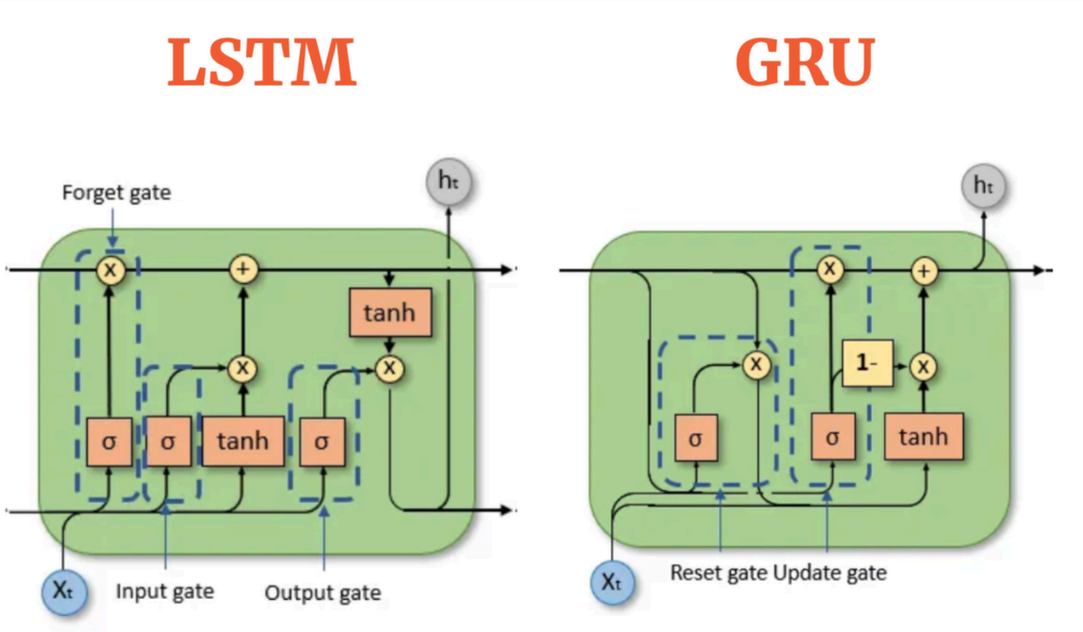
This model works better on English – Vietnamese dataset, as it has higher accuracy and F1 score. But please note that the time taken to train is also longer due to wider token range.

Next Steps

- Our next step is to source and integrate additional datasets with our original one, ensuring they align with our data features and goals. This enriched dataset will then be used to train a GRU RNN model.

- Once we have these new datasets, we will proceed with merging them with the original dataset, ensuring that the integration is seamless and maintains data integrity.

- By incorporating a wider range of data, we aim to enhance the model's performance and accuracy, leveraging the strengths of GRU RNNs in handling sequential and time-series data.



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Thank's For Watching