

Lab 6: RNN

Lab Objective:

In this project, you are going to build a LSTM structure to do the copy experiment.

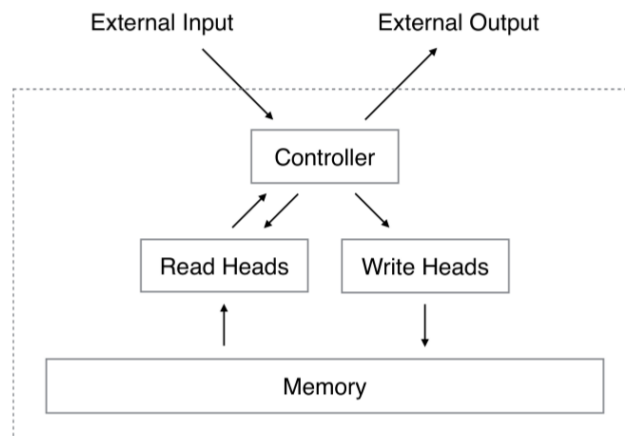
Turn in:

Report: 4/18(二) 18:00

Demo: 4/18(二) 下課後

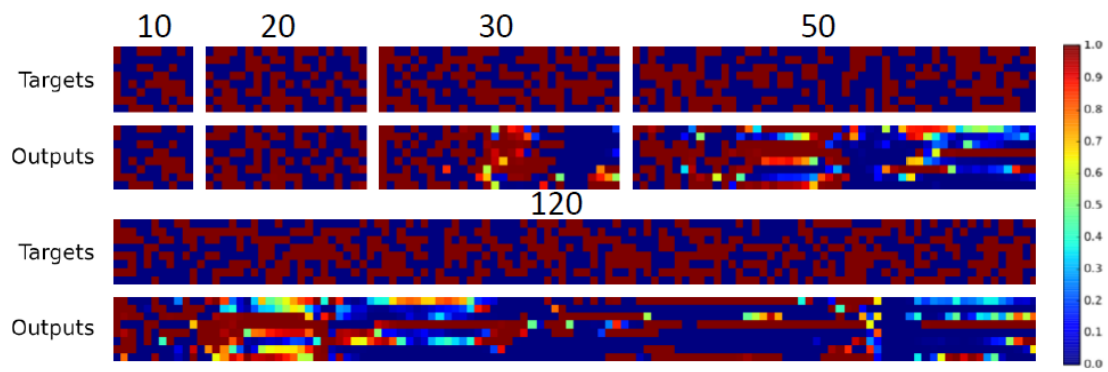
Lab Description:

- LSTM is a RNN-based network
 - Please see L10 lecture note.
- Neural Turing Machine(NTM)
 - NTM combines recurrent neural network controller and external memory resources.
 - Controller: the controller interacts with the external world via input and output vectors. It also interacts with a memory matrix using selective read and write operations.
 - Read and Write heads: the way controller interacts with memory matrix.



● Copy task:

- The input of the network is a sequence random integer (numpy.random.randint()).
- After encode input sequence, the output is exactly the same sequence.
- LSTM experiment shown below (graphical result).



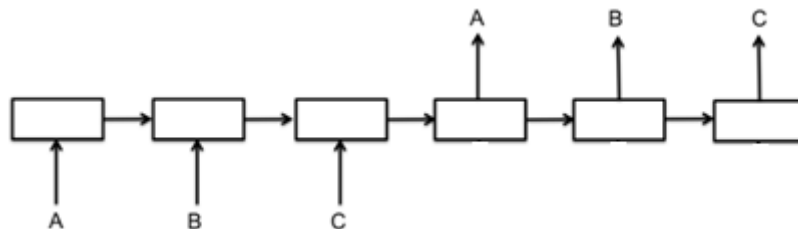
Implementation Details:

■ Parameter

- ◆ Sequence length: see the table below.
- ◆ Word size = 256.
- ◆ Batch size: 64
- ◆ Hidden size: 500
- ◆ Embedding size: 100
- ◆ Iteration: 10000

■ LSTM

- ◆ You can use sequence-to-sequence model (embedding_rnn_seq2seq).
- ◆ You should not give the decoder input.



- ◆ You need to implement padding or bucket.

Requirements:

1. Please show the accuracy rate table.

Training length		20	Training length		30
Testing length	10	99%	Testing length	20	99%
	20	99%		30	99%
	30	10%		50	10%

2. You need to use encode-decode structure.
3. Word size = 256.

References:

- [1] Graves, Alex, Wayne, Greg, and Danihelka, Ivo. Neural turing machines. arXiv preprint arXiv:1410.5401, 2014.
- [2] <https://www.tensorflow.org/tutorials/seq2seq/>
- [3] https://www.tensorflow.org/api_docs/python/tf/contrib/legacy_seq2seq/embedding_rnn_seq2seq

Report Spec: [black: Demo, Gray: No Demo]

1. Introduction (15%, 15%)
2. Experiment setup (15%, 15%)
3. Result (30%, 40%)
4. Discussion (20%, 30%)

Demo (20%) [抽 20 人]

-----實驗結果標準-----

Training length \geq Testing length

Accuracy 97~100% = 100%

Accuracy 95~97% = 90%

Accuracy 90~95% = 80%

Training length < Testing length

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Extra Bonus:

- Visualize the LSTM experiment results. (you can use any other tools) 5%
- You have reasonable accuracy rate when training length < testing length 10%
- Use NTM to implement the experiment. 20% (demo)