

Exercise 4

Neural Turing Machines

Reliable and Interpretable Artificial Intelligence 2017
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Problem 1.

1. What parts of RNNs are reused in NTMs, and what is new in the NTMs?
2. On what tasks the NTMs would perform better than vanilla RNNs?
3. What makes the NTMs more interpretable than RNNs?
4. What tasks would be difficult for NTMs?

Problem 2.

1. Run the copy example from the lecture's Slide 7 through an NTM. Note down the dimensions of the vectors and matrices involved. You can fabricate the values that the controller network uses to control the memory.
2. Assume that initially the head locations are concentrated around location 1. Show how the head locations might become unconcentrated, and also the effect that losing concentration has on the NTM output.
3. Explain how the information gathered at Phase 1 (writing phase) propagates to Phase 2 (reading phase).

Problem 3. Give explicit formulas for the expectations in the NTM equations.