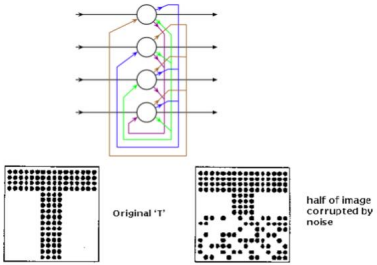
Chapter 6: The Curious Case of Sequences

Sequences

- They are everywhere
- Time series, speech, music, text, video
- Each unit in the sequence interacts with other units
- Need models to capture this interaction

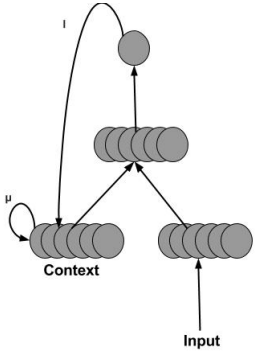
Hopfield Network

Content-addressable memory systems for storing and retrieving patterns[1]



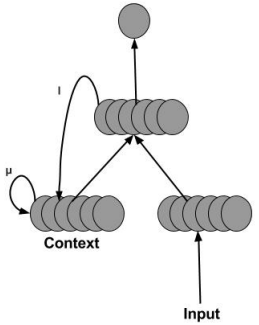
Jordan Network

The output state of each time step is fed to the next time step thereby allowing interactions between time steps in the sequence



Elman Network

The hidden state of each time step is fed to the next time step thereby allowing interactions between time steps in the sequence



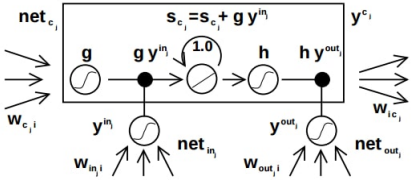
Elman

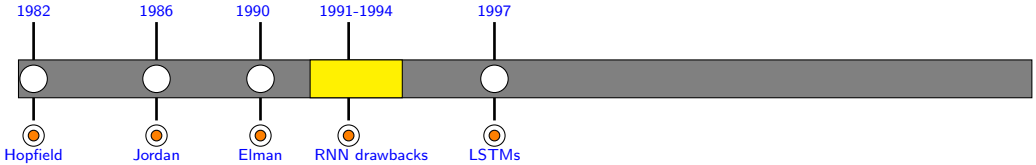
Drawbacks of RNNs

Hochreiter et. al. and Bengio et. al. showed the difficulty in training RNNs (the problem of exploding and vanishing gradients)

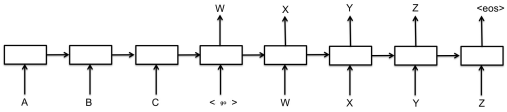
Long Short Term Memory

Showed that LSTMs can solve complex long time lag tasks that could never be solved before

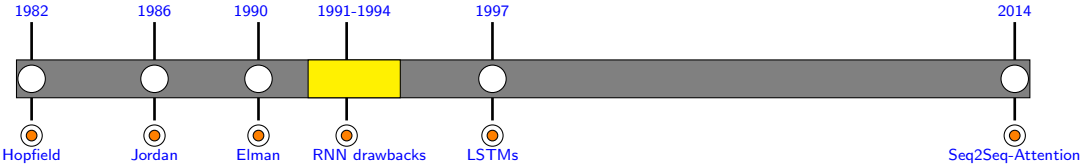




Sequence To Sequence Learning

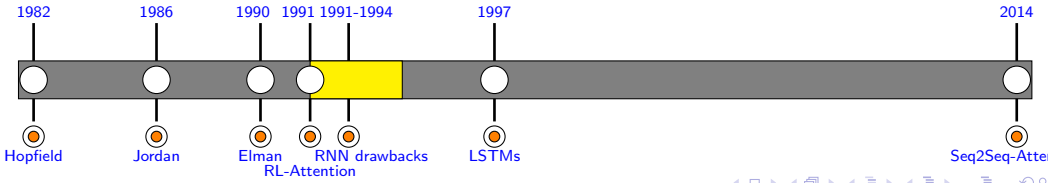


- Initial success in using RNNs/LSTMs for large scale Sequence To Sequence Learning Problems
- Introduction of Attention which inspired a lot of research over the next two years



RL for Attention

Schmidhuber & Huber proposed RNNs that use reinforcement learning to decide where to look



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