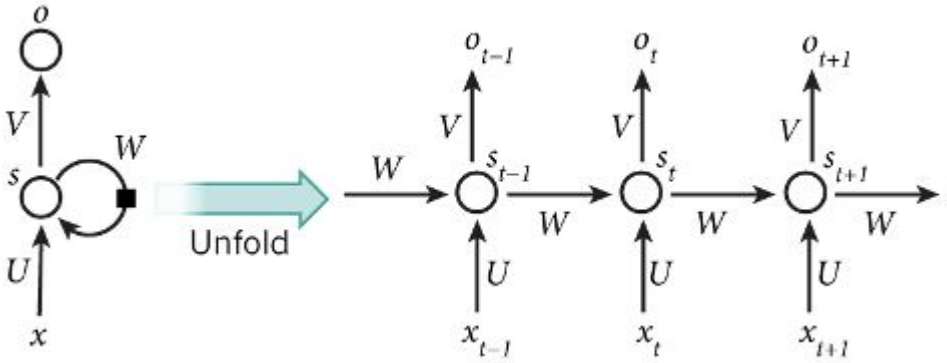
Natural Language Processing (CS5803)

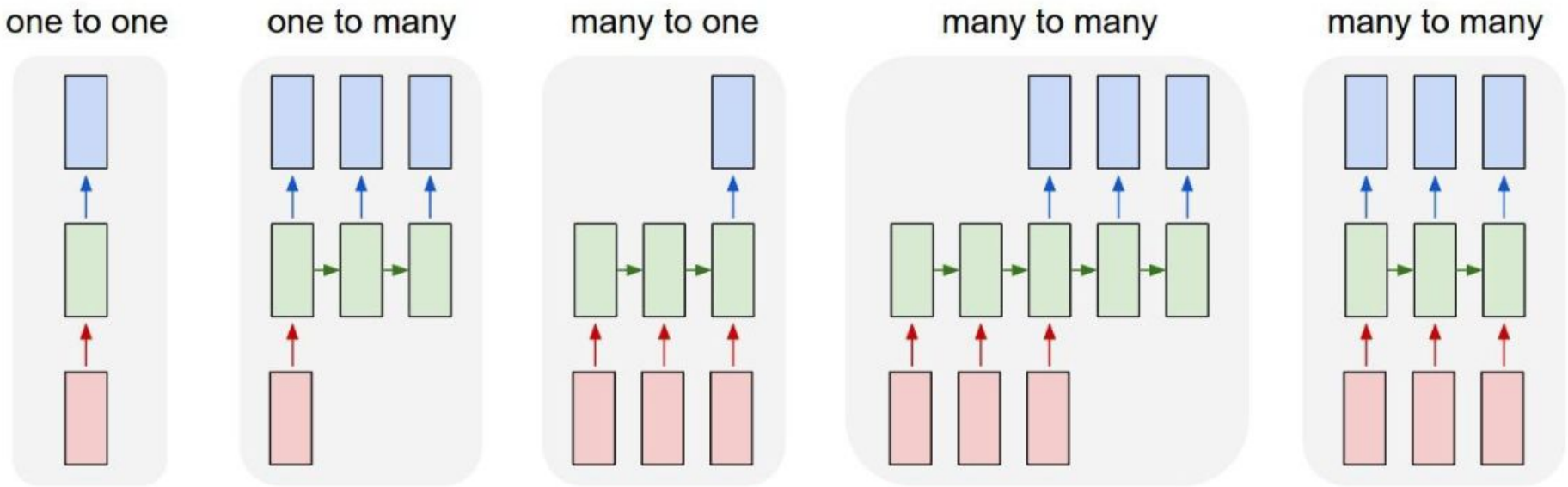
Lecture 6
(Recurrent Neural Networks)

RNNs

- A neural network architecture for modeling recurrence
- Input (previous state s_{t-1}, current observation x_t)
- Produces (current state s_t, current output o_t)
- Can be unrolled through time
- Useful for sequential data

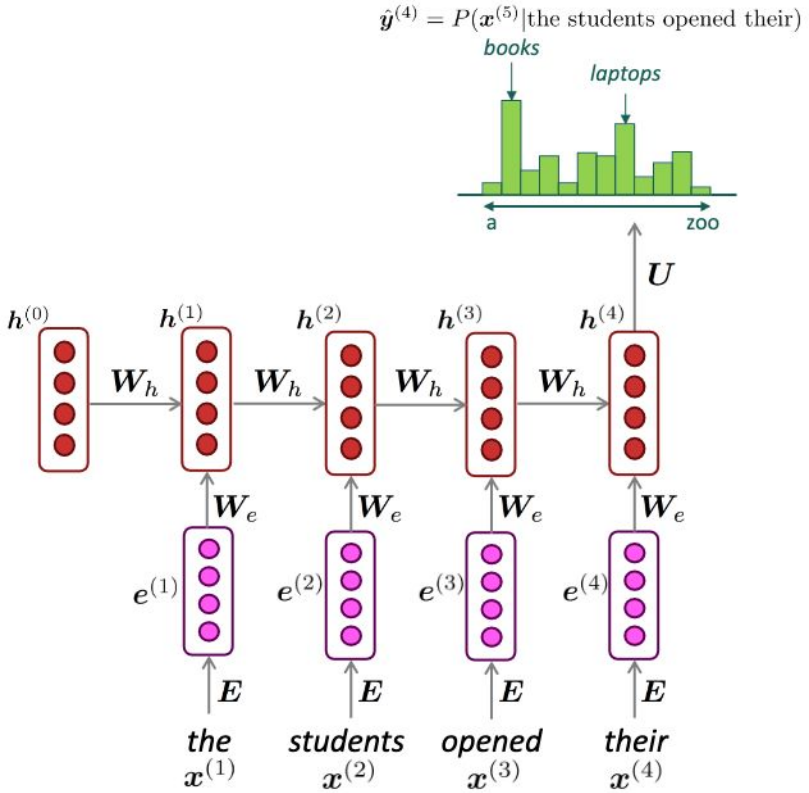


Different Flavors of Sequence Modeling



RNN for language modeling

- Input: tokens in sequence
- Output: next token

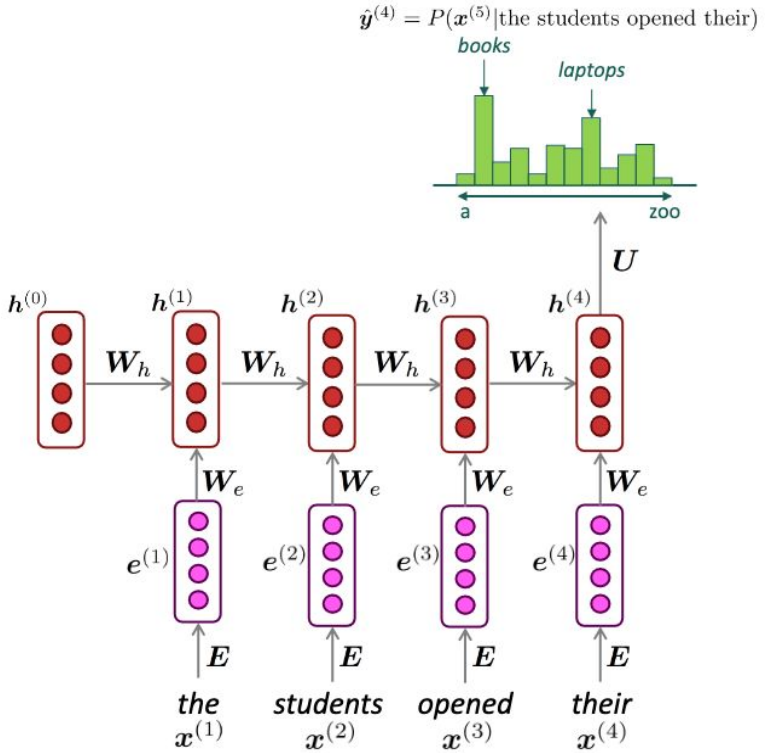


How to Train?

- Get a large collection of documents
- Train for predicting next words for each sequence from the corpus
- Predict the next word, given the words seen so far
  - Do it for every word
- Loss function?

$$J^{(t)}(\theta) = CE(\boldsymbol{y}^{(t)}, \hat{\boldsymbol{y}}^{(t)}) = -\sum_{w \in V} \boldsymbol{y}_w^{(t)} \log \hat{\boldsymbol{y}}_w^{(t)} = -\log \hat{\boldsymbol{y}}_{\boldsymbol{x}_{t+1}}^{(t)}$$

- This objective is called Language Modeling Objective



RNN and LSTM

Will use this reference.