Exercises #14 - Recurrent Neural Network

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1.Can you think of a few applications for a sequence-to-sequence RNN? What about a sequence-to-vector RNN? And a vector-to-sequence RNN?

A:

- **sequence-to-sequence:** Can be used with time series, like predict the weather, machine translation, using an encoder-decoder architecture. Other possiblities include video captioning, speech to text, music generations..

- **sequence-to-vector:** Outputs a vector, can be used to classify music samples by genre, analyzing the sentiment of a book review, predict the probability of a user watch a movie based on her watch history (netflix FTW)

- **vector-to-sequence:** Image captioning, music playlist creation based on an embedding of the current artist, locating pedestrians in a picture

2. Why do people use encoder-decoder RNNs rather than plain sequence-to-sequence RNNs for automatic translation?

A: A plain sequence-to-sequence RNN will translate the sentence immediately after reading the first word, which can lead to problematic results. On the other hand, an encoder-decoder RNN will translate the sentence only after reading it whole, which will lead to more reasonable results, since in most sentences the translation of one word depends on the translation of the others.

3. How could you combine a CNN with a RNN to classify videos?

A: The CNN can be used to run on each frame of a video it will be fed to a sequence-to-vector RNN, which can provide the class probabilities, with the softmax usage at the output.

4. What are the advantages of building an RNN using $dynamic\_rnn()$ rather than $static\_rnn()$?

A:

5. How can you deal with variable-length input sequences? What about variable-length output sequences?

A: