4/3/2020

HOMEWORK 2

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CPSC 8810: Deep Learning

CLEMSON UNIVERSITY

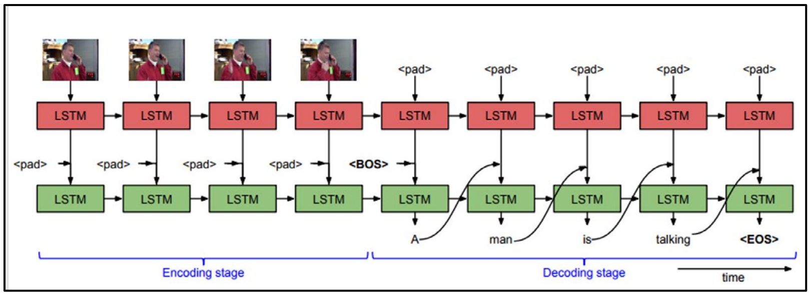
Things Done & learned

Loading and Preprocessing the Data

1) Loading & Preprocessing the data
    - def *getFeatures*(filename): Gives you the features from JSON file
    - def *getLabels*(index): Gives you the Label to corresponding feature given the index of it from JSON file
    - def *getIndicesFromSentence*(sentence): Gives you an array that converts the words of sentences to their indexes
    - def *getSentenceFromIndices* (index): Gives you an array of index that converts to words of sentence
    - def *sample_minibatch()*: This function makes mini-batches default to batch size
2) Creating 2 dictionaries, word_to_count_dict: maps all words in training labels into an index
   word_to_index_dict: maps all indexes to words
   Added BOS,EOS,<pad>,<unk> in these dictionaries.
3) We cannot feed the input data straight to the model. We need to split the sentences into words and then representing those words as number and eventually using one-hot vector. The words are uniquely indexed in the dictionaries.
4) The cleaning of the input is done by removing spaces and special characters. We then normalize the sentence to lowercase.

Network Architecture:

1) Creating the graph
    - Short video(Pre-processed video frames) : Input X- Placeholder
    - Caption that depicts the video: Output Y- Placeholder
    - Padding the input: shape= [batch_size, hidden_units]
    - Word embedding: shape= [vocab_size,embedding_size(which is hidden_units)]
    - Creating 2-layer LSTM cells with 128 hidden units, where each of them is internally divided into 2 stages, Encoding stage & Decoding Stage



2) Best Test Bleu Score: ≈0.76

Model used	
Training Epochs	15000
LSTM Dimension	128
Batch size	128
Learning Rate	0.001
Optimizer used	AdamOptimizer
Vocab Size	Min count > 3

Training the model:

The whole model is a 2-layer LSTM structure, these layers are internally sub-divided as encoding and decoding stage.

Encoding Stage:

1) Input of LSTM1 is pre-processed video frames.

2) Output of LSTM1 is sent as the input to LSTM2 combined with embedding vector <pad>.

Decoding stage

3) Input of LSTM1 is 0 tensor of (batch_size,4096) per time step.

4) Input to LSTM2 is a combination of output of LSTM1 and output of LSTM2 at previous time step.

Testing the model:

The evaluation process begins by checking the model output and the BLEU score. Each pair of sentences will be feed into the model and predicted words will be generated. We will then take the argmax of the values and find the correct index to the value. The last step is to compare our prediction with the true value i.e. true statement.