MLDS HW2-1

TAs
ntu.mldsta@gmail.com

Outline

- Timeline
- Task Descriptions
- Q&A

Timeline

Two Parts in HW2

- (2-1) Video caption generation
  - Sequence-to-sequence model
  - Training Tips
- (2-2) Chat-bot

Schedule

- 3/30：
  - Release HW2-1
- 4/13：
  - Release HW2-2
- 4/27：
  - Midterm
  - HW1 上台分享
- 5/4：
  - All HW2 due (including HW2-1, HW2-2)

Task Descriptions

HW2-1: Video caption generation

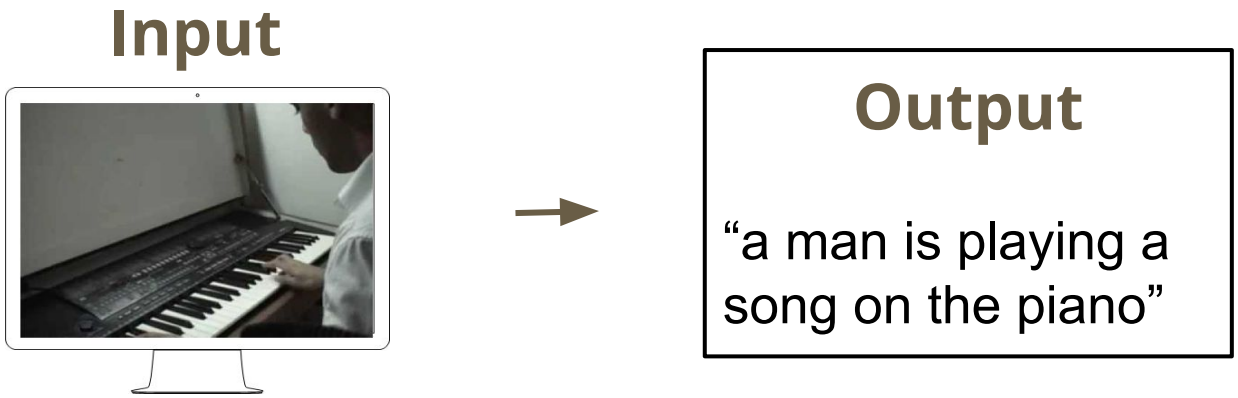
- Introduction
- Sequence-to-sequence model
- Training Tips
  - Attention
  - Schedule Sampling
  - Beamsearch
- How to reach the baseline ?

HW2-1: Video caption generation

- Introduction
- Sequence-to-sequence model
- Training Tips
  - Attention
  - Schedule Sampling
  - Beamsearch
- How to reach the baseline ?

HW2-1 Introduction

- Video Caption Generation
  a. Input : A short video
  b. Output: The corresponding caption that depicts the video

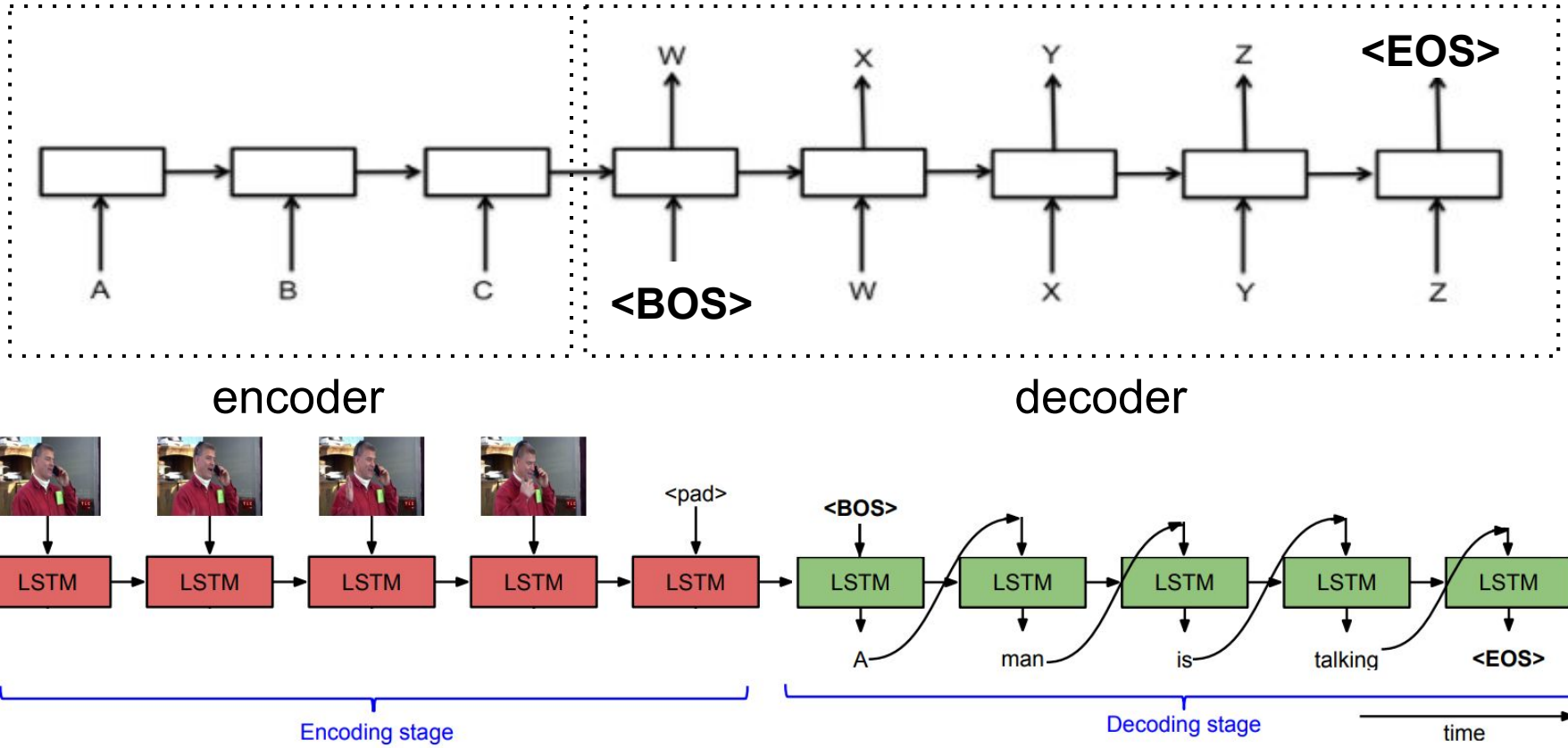


- There are several difficulties including:
  a. Different attributes of video (object, action)
  b. Variable length of I/O

  (In this task, video features will be provided)

HW2-1 Sequence-to-sequence 1/5

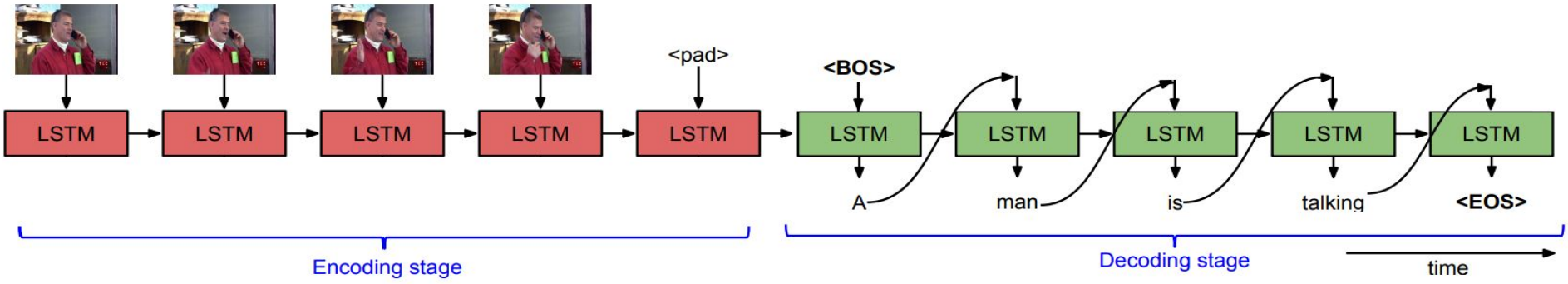
- **Two recurrent neural networks (RNNs)**
  an encoder that processes the input
  a decoder that generates the output



https://www.tensorflow.org/tutorials/seq2seq

HW2-1 Sequence-to-sequence 2/5

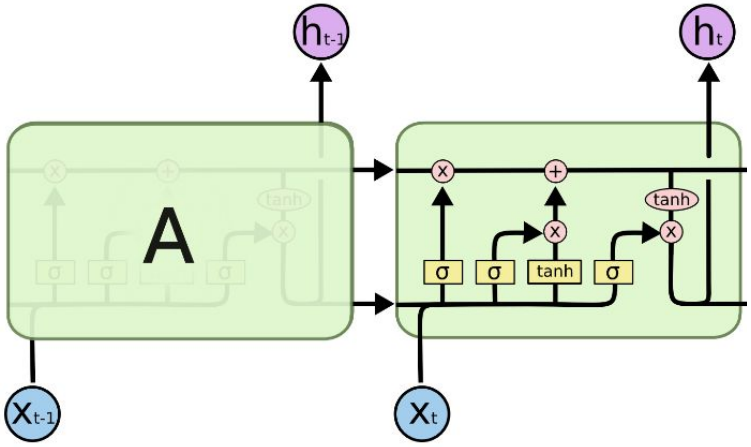
- **Data preprocess:**
  - Dictionary - most frequently word or min count
  - other tokens: <PAD>, <BOS>, <EOS>, <UNK>
    - <PAD> : Pad the sentencen to the same length
    - <BOS> : Begin of sentence, a sign to generate the output sentence.
    - <EOS> : End of sentence, a sign of the end of the output sentence.
    - <UNK> : Use this token when the word isn't in the dictionary or just ignore the unknown word.



HW2-1 Sequence-to-sequence 3/5

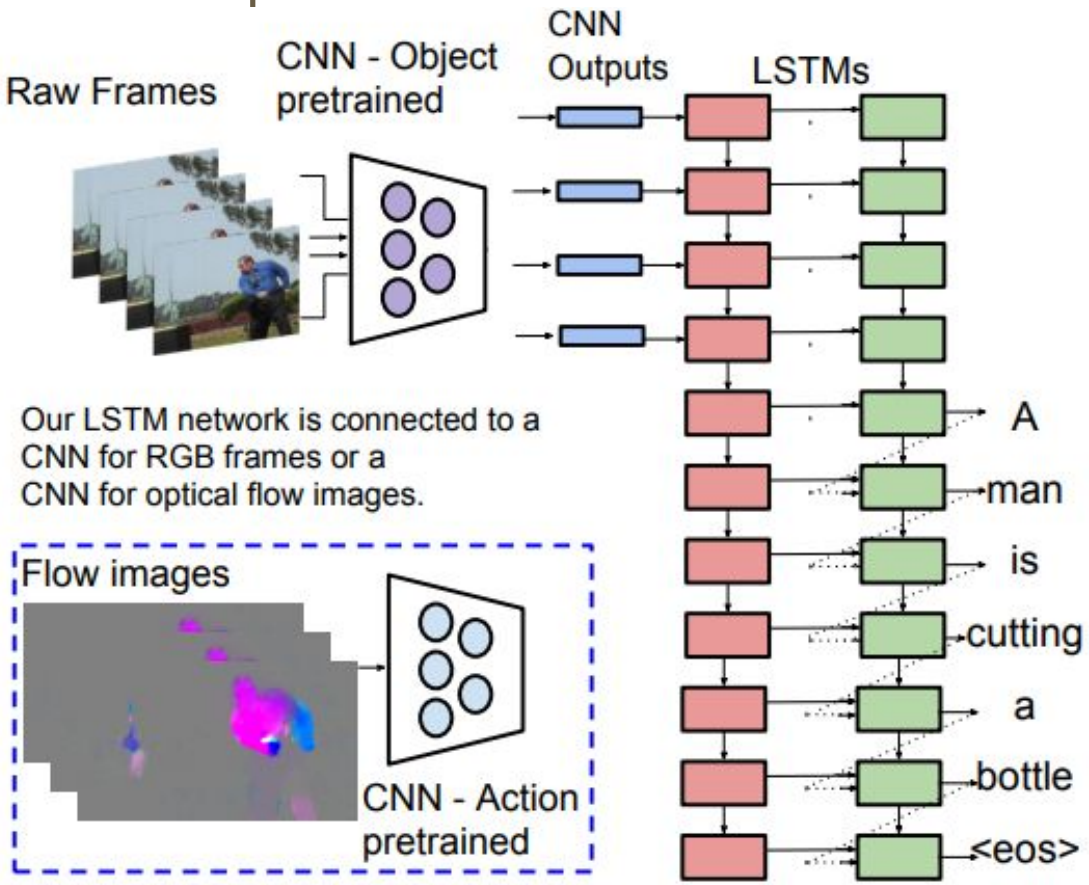
- **Text Input:** reference
  - One-hot Vector encoding
    (1-to-N coding, N is the size of the vocabulary in dictionary)
  - e.g.
    - neural = [0, 0, 0, ..., 1, 0, 0, ..., 0, 0, 0]
    - network = [0, 0, 0, ..., 0, 0, 1, ..., 0, 0, 0]

- **LSTM unit:**
  cell output than project to a vocabulary-size vector



HW2-1 Sequence-to-sequence - S2VT 4/5

- Sequence-to-Sequence Based Model: S2VT

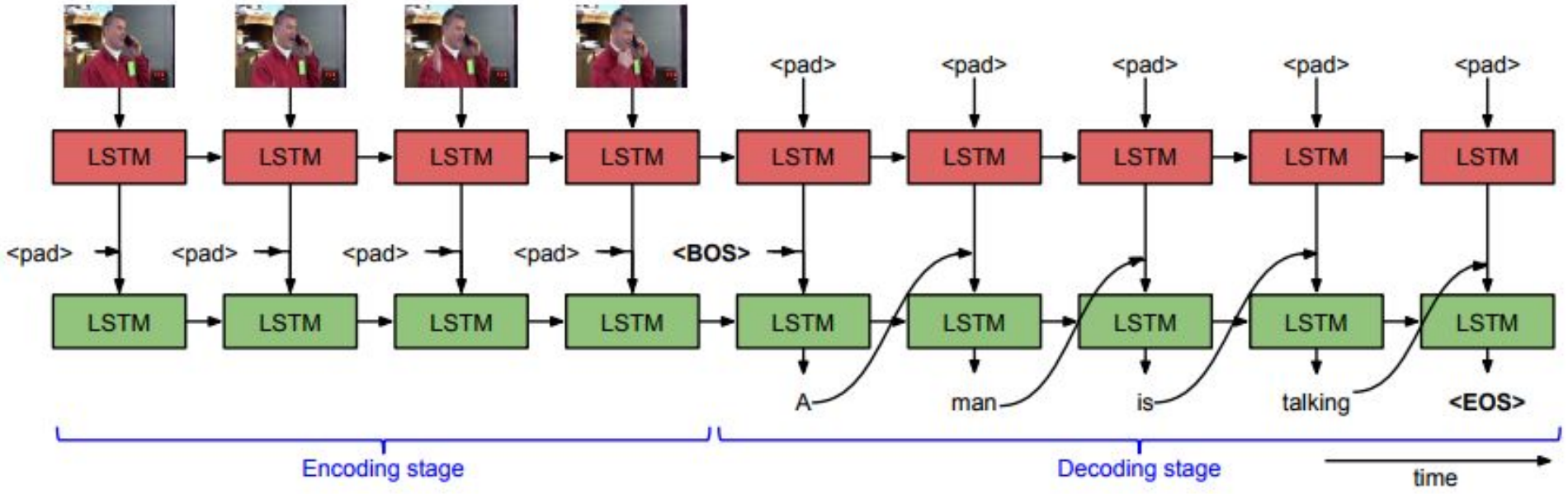


Refer to the following paper for detailed info:

http://www.cs.utexas.edu/users/ml/papers/venugopalan.iccv15.pdf

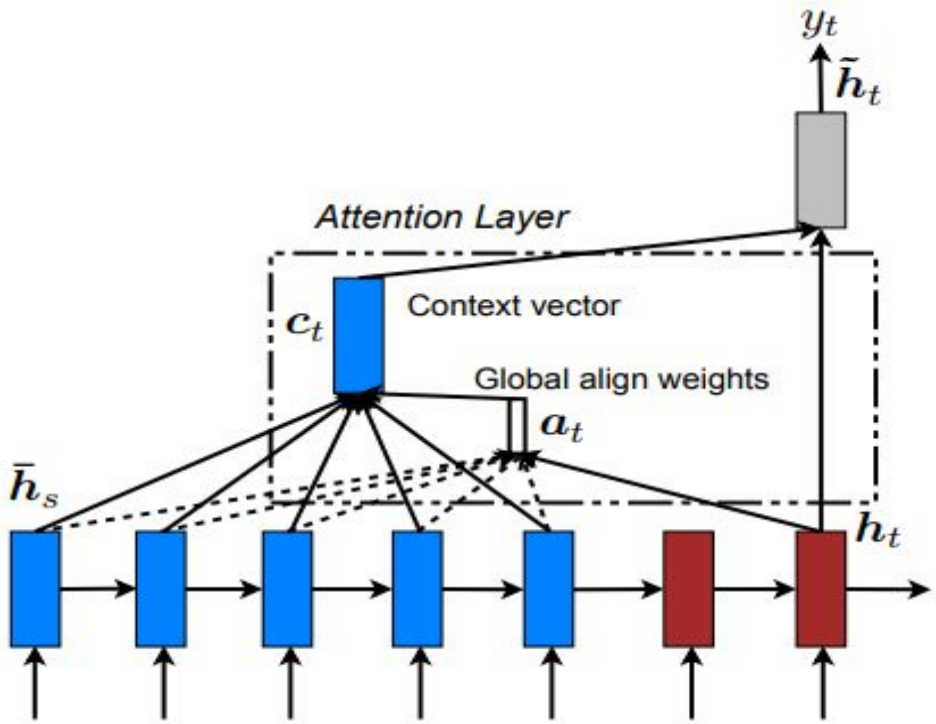
HW2-1 Sequence-to-sequence - S2VT 5/5

- Sequence-to-Sequence Based Model : S2VT
  - Two layer LSTM structure



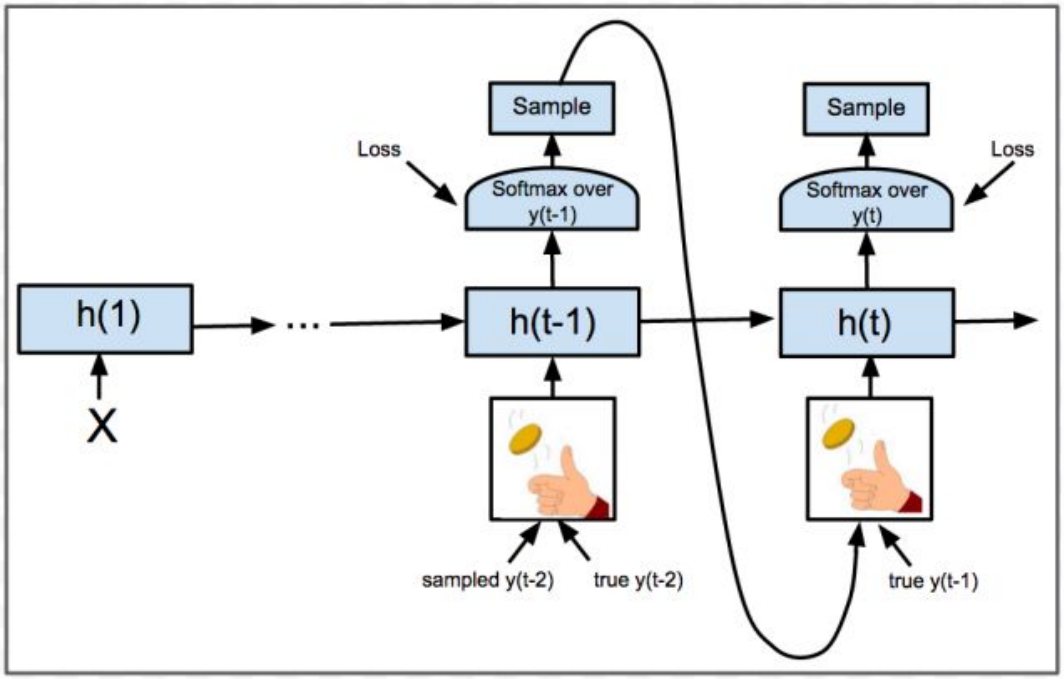
HW2-1 Training Tips - Attention 1/3

- Attention on encoder hidden states :
  - Allow model to peek at different sections of inputs at each decoding time step



HW2-1 Training Tips - Schedule Sampling 2/3

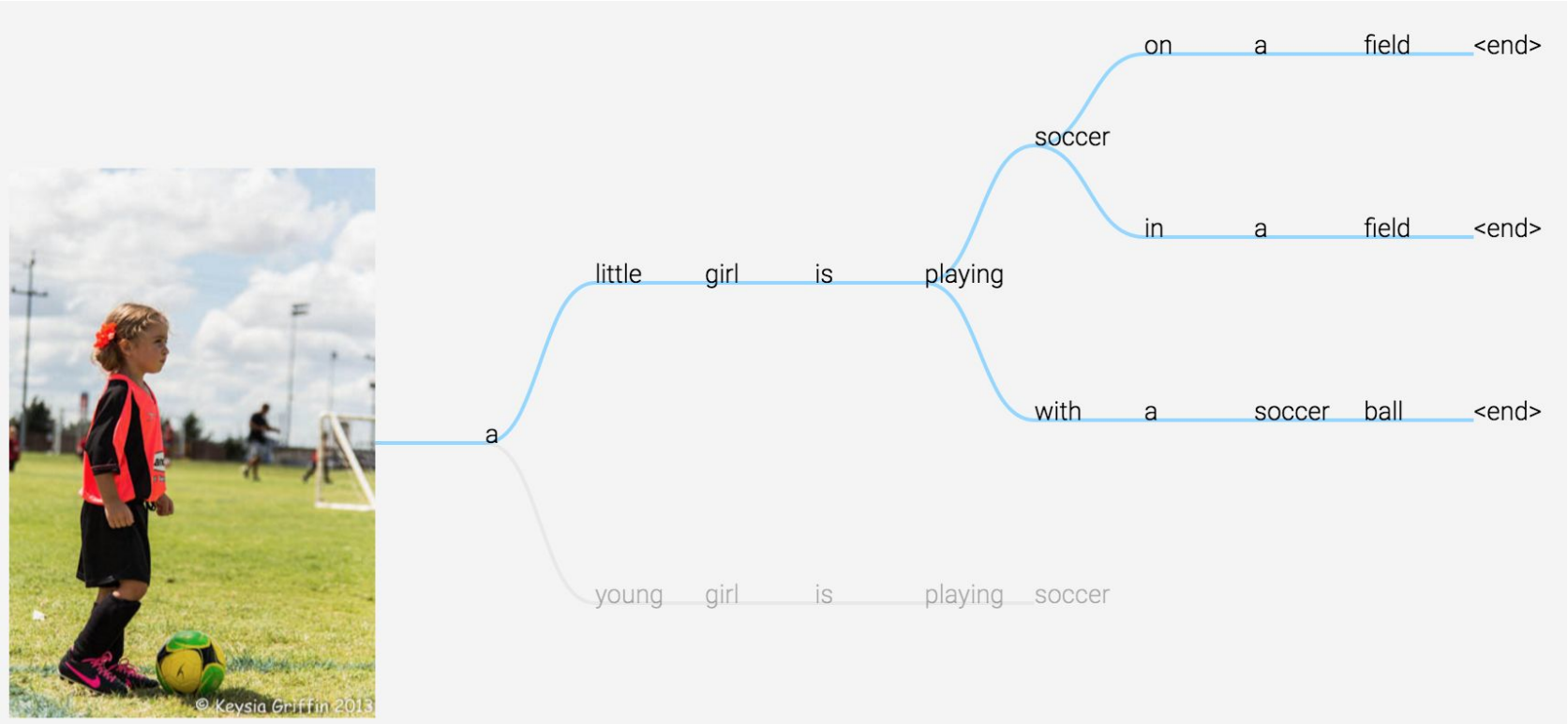
- Schedule Sampling:
  - To solve “exposure bias” problem,
    When training, we feed (groundtruth) or (last time step’s output) as input at odds



https://arxiv.org/abs/1506.03099

HW2-1 Training Tips - Beam search 3/3

- Beam search:
  - keep a fixed number of paths



Demo: http://dbs.cloudcv.org/captioning

HW2-1 How to reach the baseline ? 1/2

- Evaluation : BLEU@1
  - Precision = correct words / candidate length
  - $$\mathrm{BP} = \begin{cases} 1 & \text{if } c > r \\ e^{(1-r/c)} & \text{if } c \leq r \end{cases}$$

    where c = candidate length, r = reference length
  - BLEU@1 = BP * Precision
  - e.g. :

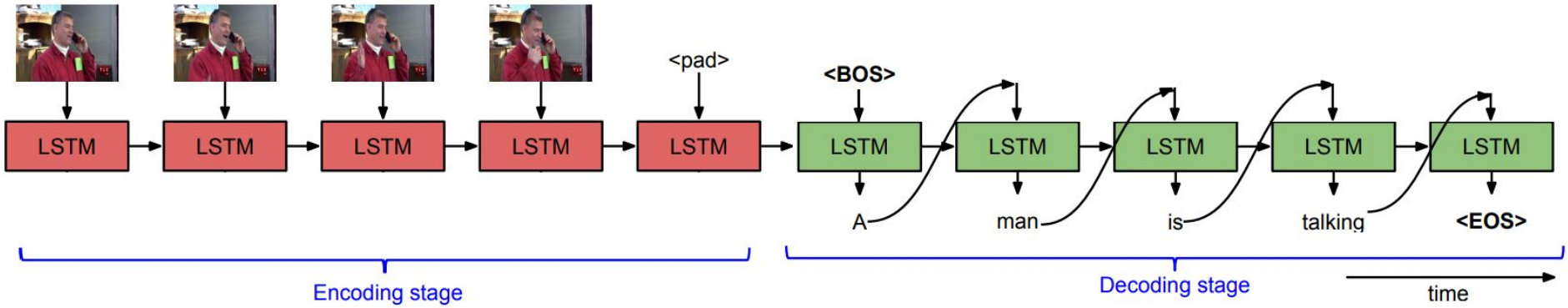
    Ground Truth : *a man is mowing a lawn*

    Prediction : *a man is riding a man on a woman is riding a motorcycle*

    BLEU : 1 * 4/13 = 0.308
  - paper

HW2-1 How to reach the baseline ? 2/2

- **Baseline: BLEU@1 = 0.65 (Captions Avg.)**
- baseline model:

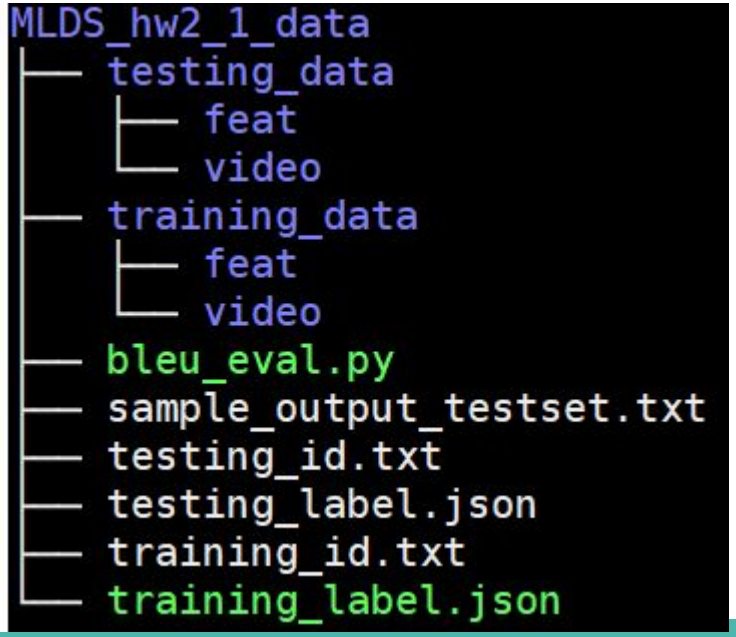


- Training Epoch = 200
- LSTM dimension = 256
- Learning rate = 0.001
- vocab size = min count > 3

- AdamOptimizer
- Training time = 72 mins, using 960 TX

Data & format

- Dataset:
  - MSVD
    - 1450 videos for training
    - 100 videos for testing
- Format:
  - Download MLDS_hw2_1_data.tar.gz（4/9 update）



Submission & Rules

- Please implement one seq-to-seq model (or it's variant) to fulfill the task
- Extra dataset is allowed to use.
- Allow package:
  - python 3.6
  - **TensorFlow r1.6 ONLY** (CUDA 9.0)
  - PyTorch 0.3 / torchvision
  - Keras 2.0.7 (TensorFlow backend only)
  - MXNet 1.1.0, CNTK 2.4
  - matplotlib, Python Standard Library
  - If you want to use other packages, please ask TAs for permission first!
  - new allowed package:

Submission & Rules

- Deadline : **2018/5/4 23:59 (GMT+8)**
- Upload **code** and **report** of HW2-1, HW2-2 to Github in **different** directory.
- For HW2-1 :
  - Your github must have directory hw2/hw2_1/, and there should be :

    (1) report.pdf (2) your_seq2seq_model **(3) hw2_seq2seq.sh**

    (4) model_seq2seq.py (*training code should include*)
  - If your model are too big for github, upload to a cloud space and **write it in your script to download the model.**
  - Please write shell script "**hw2_seq2seq.sh**" to run your code and follow the script usage below :
    - ./hw2_seq2seq.sh $1 $2
    - $1: the data directory, $2: test data output filename (format : .txt)
    - Example ./hw2_seq2seq.sh testing_data/ sample_output_testset.txt

    Your script should be done within **10 mins** excluding model donwloading.
  - Please do not upload any dataset to Github (include external dataset).

Grading Policy

- HW2-1 : 15%
  - Baseline (4%):

    - BLEU@1 = 0.65 (Captions Avg.)
  - TAs review (4%):

    - Grammar score (2%)

    - Relative score (2%)
  - Report (7%)
- HW2-2 : 10%
- 分工表 : 0.5%
- 上台分享 : 1%
- 上台分享前三名 : 1%

Grading Policy - Report (7%)

- Do not exceed **4** pages and written in Chinese.
- Model description (3%)
  - Describe your seq2seq model
- How to improve your performance (3%)

  (e.g. Attention, Schedule Sampling, Beamsearch...)
  - Write down the method that makes you outstanding (1%)
  - Why do you use it (1%)
  - Analysis and compare your model without the method. (1%)
- Experimental results and settings (1%)
  - parameter tuning, schedual sampling ... etc

- README : please specify library and the corresponding version in README

Grading Policy - NOTICE

- Late submission (link):
  - Please fill the late submission form first only if you will submit HW late.
  - Please push your code before you fill the form
  - There will be 25% penalty per day for late submission, so you get 0% after four days
- Bug:
  - You will get 0% in Baseline and TAs review if the required script has bug.
  - If the error is due to the format issue, please come to fix the bug at the announced time, or you will get 10% penalty afterwards.

Q&A

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Q1: 請問助教會跑training的程式嗎？

A: 不會。我們所規定的十分鐘只包含testing。除非我們認為有必要就會請你們來跑training的code。

Q2: 有推薦上傳model的平台嗎？

A：dropbox, google drive都是大家常用的平台。不過推薦大家可以使用gitlab, 操作方法與github類似, 但是可以上傳大容量的檔案。

p.s. github 單一檔案上傳上限為100MB, 若超過50MB則會出現警告, 但依舊能上傳。也可參考網路上的教學 (ref) 。

Q3: test set 的答案怎麼一起給了？

A:因為沒有Kaggle, 方便大家validation 和測準確率, 因此也給大家testset 的答案。

Q4: data 裡的feature是怎麼抽的呢？

A：pretrain在ILSVRC的VGG19。

80*4096維的feature，是指每個影片抽80個frame，每個frame有4096維feature。

Q5: Average bleu score 是怎麼算的呢？

A:對於每個影片，你的答案會對他的所有的字幕算bleu score。將所有影片的分數取平均後，就是你的總bleu score。

p.s. 詳細演算法請見 bleu_eval.py