CREST hands-on meeting: MED baseline tutorial

CREST Deep 9th Meeting

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Today's goal

- Learn how our baseline works

  - We show you with slides

- Run the actual baseline system on TSUBAME 3.0

  - We will ask you to do several exercises

Agenda

1. MED introduction

   – Repeated: same as in 4th meeting

2. How to use GitHub

   – Clone the repository, throw an issue

3. How to extract features with Caffe

   – Use the baseline system, use a different CNN model, evaluate

4. How to train and test LSTM with Torch

   – Construct an LSTM net, extend the net, train the net, evaluate

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1. MED introduction

  – Repeated: same as in 4th meeting

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MED introduction

Agenda

1. MED introduction

2. How to use GitHub

   – Git / GitHub introduction

   – Clone the repository into a TSUBAME workspace

   – Throw an issue

3. How to extract features with Caffe

4. How to train and test LSTM with Torch

GitHub: Git / GitHub introduction

- Git is a version control system for codes

  - Briefly, it will detect differences between versions and recognize them as changes

- GitHub is a web service for developing a software with Git

  - We use it as just a code host

  - We update the code rarely

  - We maintain our code on our local Git, not on GitHub
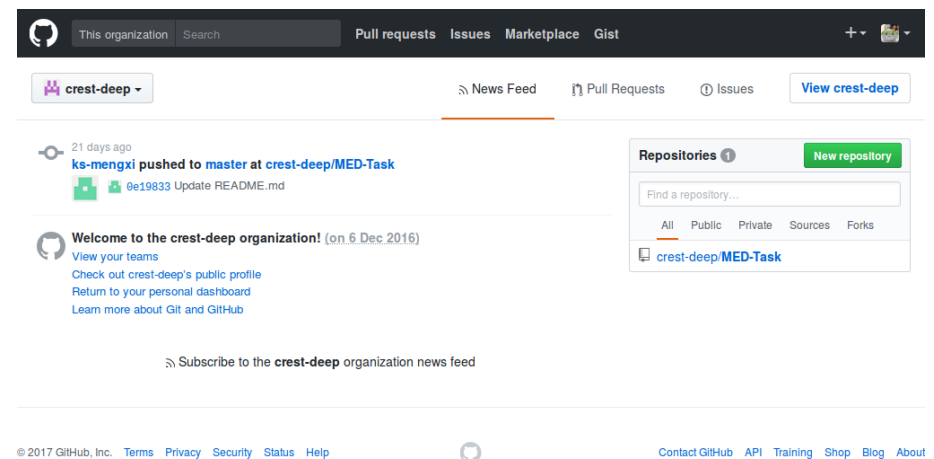
GitHub: Clone the repository

- Our repository is on https://github.com/crest-deep/MED-Task

- You can clone the repository by the following command:

```
> git clone https://github.com/crest-deep/MED-Task.git
```

- Unfortunately, TSUBAME 3.0 doesn't have git environment

  - You'll need the following command to get a copy of the repository:

```
> wget
https://github.com/crest-deep/MED-Task/archive/hands-on.zip
> unzip hands-on.zip
```

GitHub: *Exercise*

- Clone our repository into your TSUBAME workspace

- Our repository is on https://github.com/crest-deep/MED-Task

- Log-in to TSUBAME 3.0:

```
> ssh -Y -i [rsa_key] [id]@login.t3.gsic.titech.ac.jp
```

- You can create your workspace by the following:

```
> cd /gs/hs0/tga-crest-deep/
> mkdir $USER
> cd $USER
```

- Use the following command to get a copy of the repository:

```
> wget https://github.com/crest-deep/MED-Task/archive/master.zip
> unzip master.zip
```

GitHub: Throw an issue

- You can notify us of issues such as bugs, typos and unclear points of the repository by GitHub Issues feature

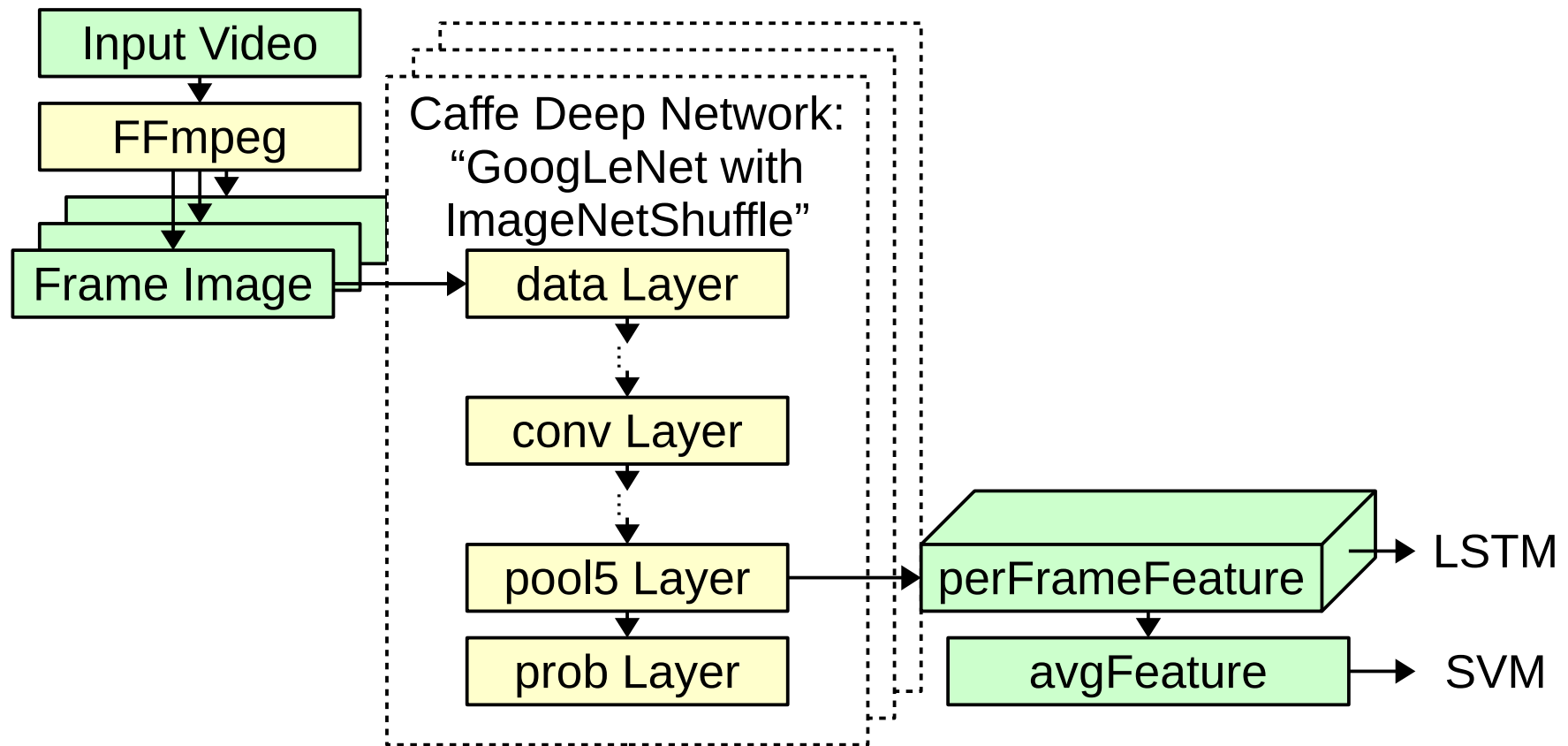 - You'll need a GitHub account in order to throw an issue
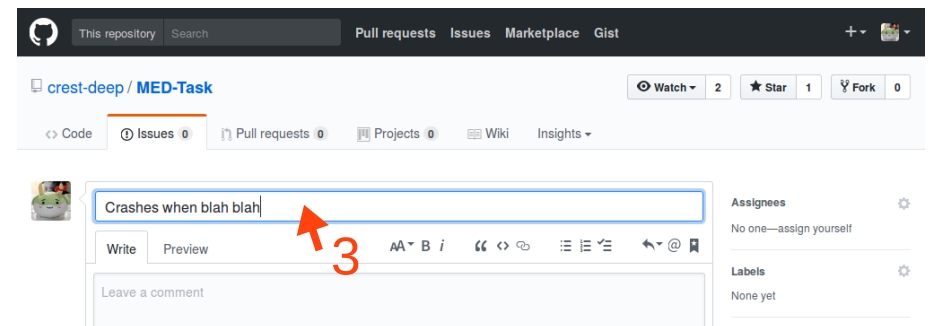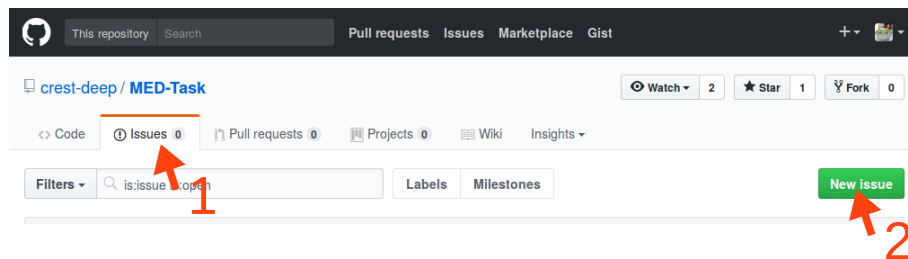
- You can also ask us any questions via Slack CREST team

Agenda

1. MED introduction

2. How to use GitHub

3. How to extract features with Caffe

 – Extract features by using the baseline system

 – Extract features with a different CNN model / layer

 – Evaluate performance with SVM

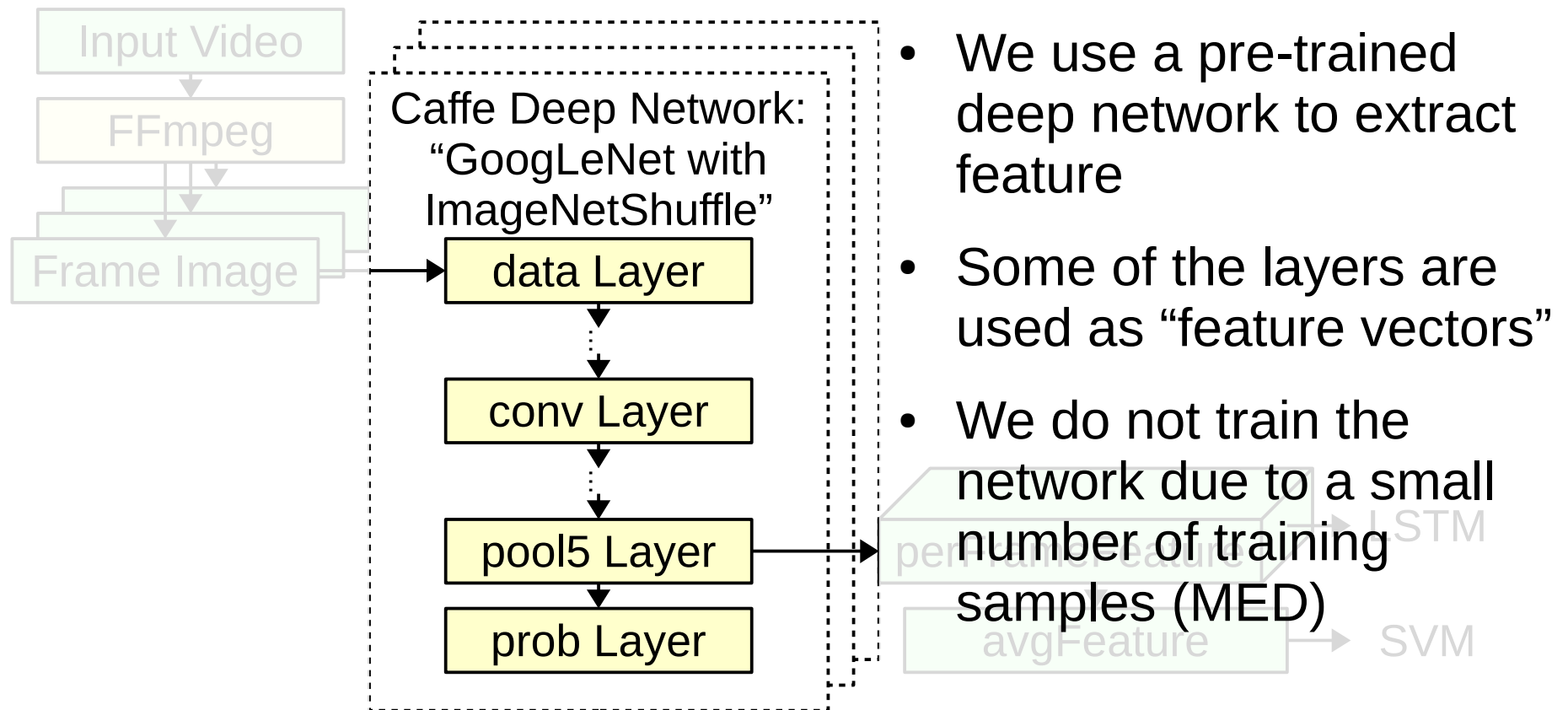4. How to train and test LSTM with Torch

Extract feature: Overview
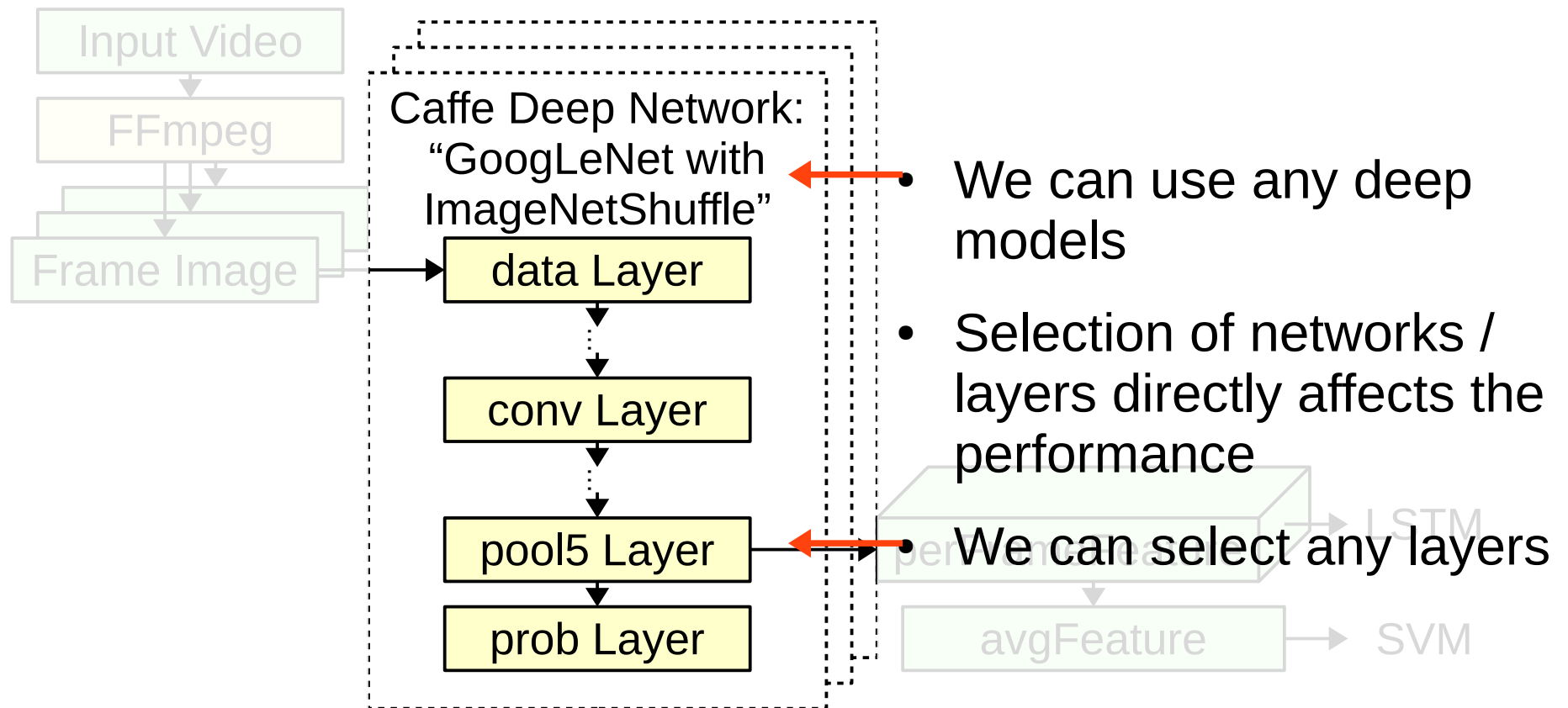
- Extract feature step overview

Extract feature: Overview

- Extract feature step overview

Input Video

FFmpeg

Frame Image

Caffe Deep Network: "GoogLeNet with ImageNetShuffle"

data Layer

conv Layer

pool5 Layer

prob Layer

per frame feature

avgFeature

LSTM

SVM

- We use a pre-trained deep network to extract feature

- Some of the layers are used as "feature vectors"

- We do not train the network due to a small number of training samples (MED)

Extract feature: Overview

- Extract feature step overview

- We can use any deep models

- Selection of networks / layers directly affects the performance

- We can select any layers

Extract feature: Requirements

- FFmpeg —— Built by us

- Caffe

- Python 2.7

  - numpy

  - h5py   Pre-installed on TSUBAME 3.0

  - scikit-image

```
> module load python-extension/2.7
```

  - sk-video —— Installed in a job script

```
> pip install --user sk-video
```

Extract feature: *Exercise*

- Run the actual feature extraction script

- You can edit the script by one of the following:

```
> cd MED-Task-master/extractFeature/
> gedit extractDeepFeaturesStarterFromVideo.sh
> emacs -nw extractDeepFeaturesStarterFromVideo.sh
> emacs extractDeepFeaturesStarterFromVideo.sh
```

- You can a job by the following:

```
> qsub -g tga-crest-deep extractDeepFeaturesStarterFromVideo.sh
```

- You can check the progress of the job by the following:

```
> qstat
> less eval.*
```

- You will get AP 0.931 for E023, 0.731 for E027

Extract feature: *Exercise*

- SVM is used for evaluation

- Run the SVM train / test and evaluation script

```
> cd ../svm/
> qsub -g tga-crest-deep svm.sh
```

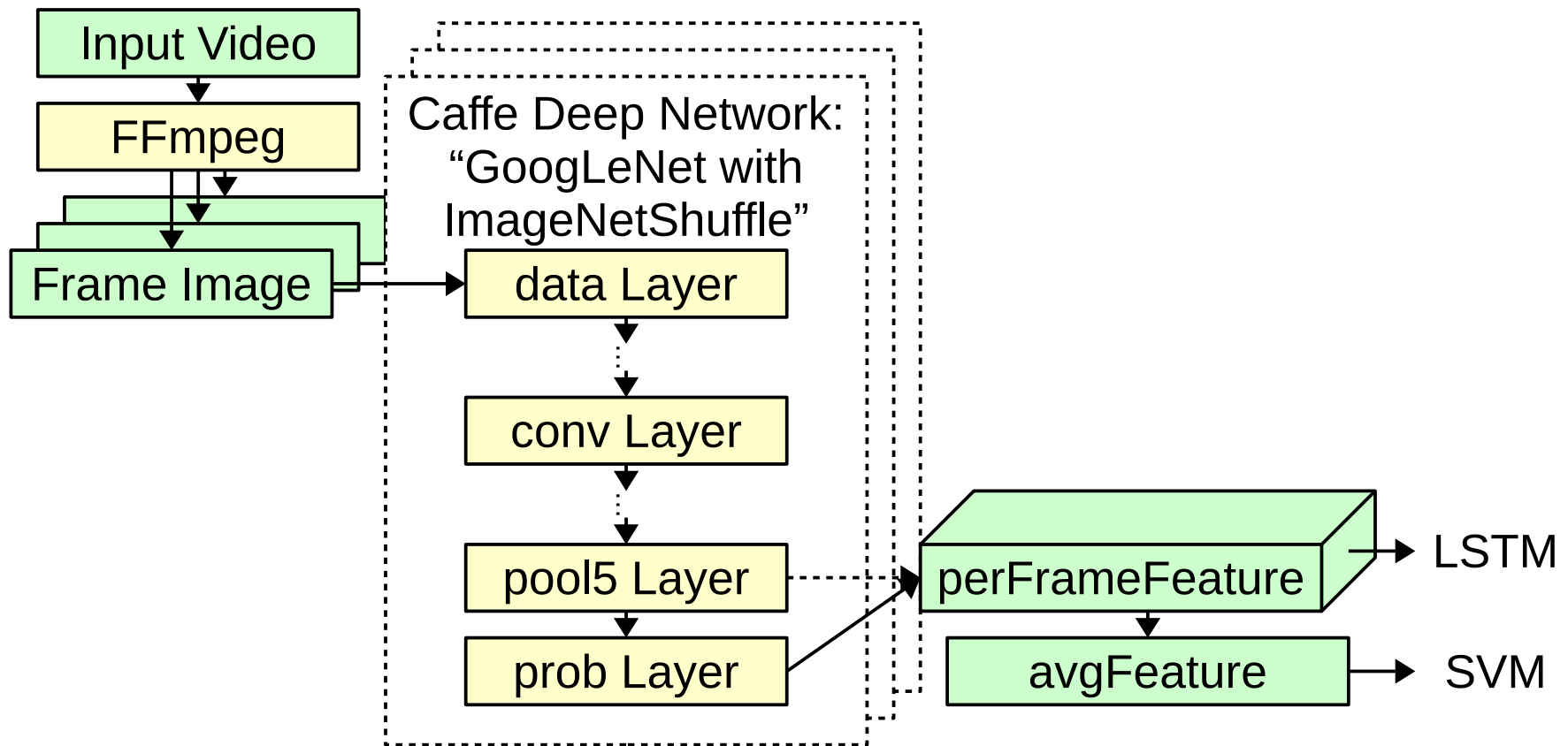- You can check the progress of the job by the following:

```
> qstat
> less feature.*
```

- You can check the result by:

```
> less TokyoTech_MED16_KINDRED_PS_100Ex_SML_DCNN-pool5-
STRICTREF_1/ap.csv
```

Extract feature: Modify

- We can select another layer to extract feature

Extract feature: *Exercise*

- Edit the actual feature extraction script to extract feature from a different layer

- You can edit the script by one of the following:

```
> cd ../extractFeature/
> gedit extractDeepFeaturesStarterFromVideo.sh
> emacs -nw extractDeepFeaturesStarterFromVideo.sh
> emacs extractDeepFeaturesStarterFromVideo.sh
```

- Edit line #17 as follows to switch to prob layer:

```
  @@ -17,1 +17,1 @@
- LAYER_NAMES=pool5/7x7_s1
+ LAYER_NAMES=prob
```

- Run

```
> qsub -g tga-crest-deep extractDeepFeaturesStarterFromVideo.sh
```

Extract feature: *Exercise*

- Edit the SVM script to use features from the different layer

- You can modify the script by one of the following:

```
> cd ../svm/
> sed -e 's/pool5/prob/g' svm.sh > svm_prob.sh
```

- Run

```
> qsub -g tga-crest-deep svm_prob.sh
```

- Check

```
> less TokyoTech_MED16_KINDRED_PS_100Ex_SML_DCNN-prob-
STRICTREF_1/ap.csv
```

- How is the result?

Agenda

4. How to train and test LSTM with Torch

- – Construct an LSTM network with Torch

- – Extend the network to Bi-LSTM

- – Extend the network to two layers

- – Train the network

- – Evaluate performance of the network

LSTM