



Workshop 6

COMP90051 Machine Learning

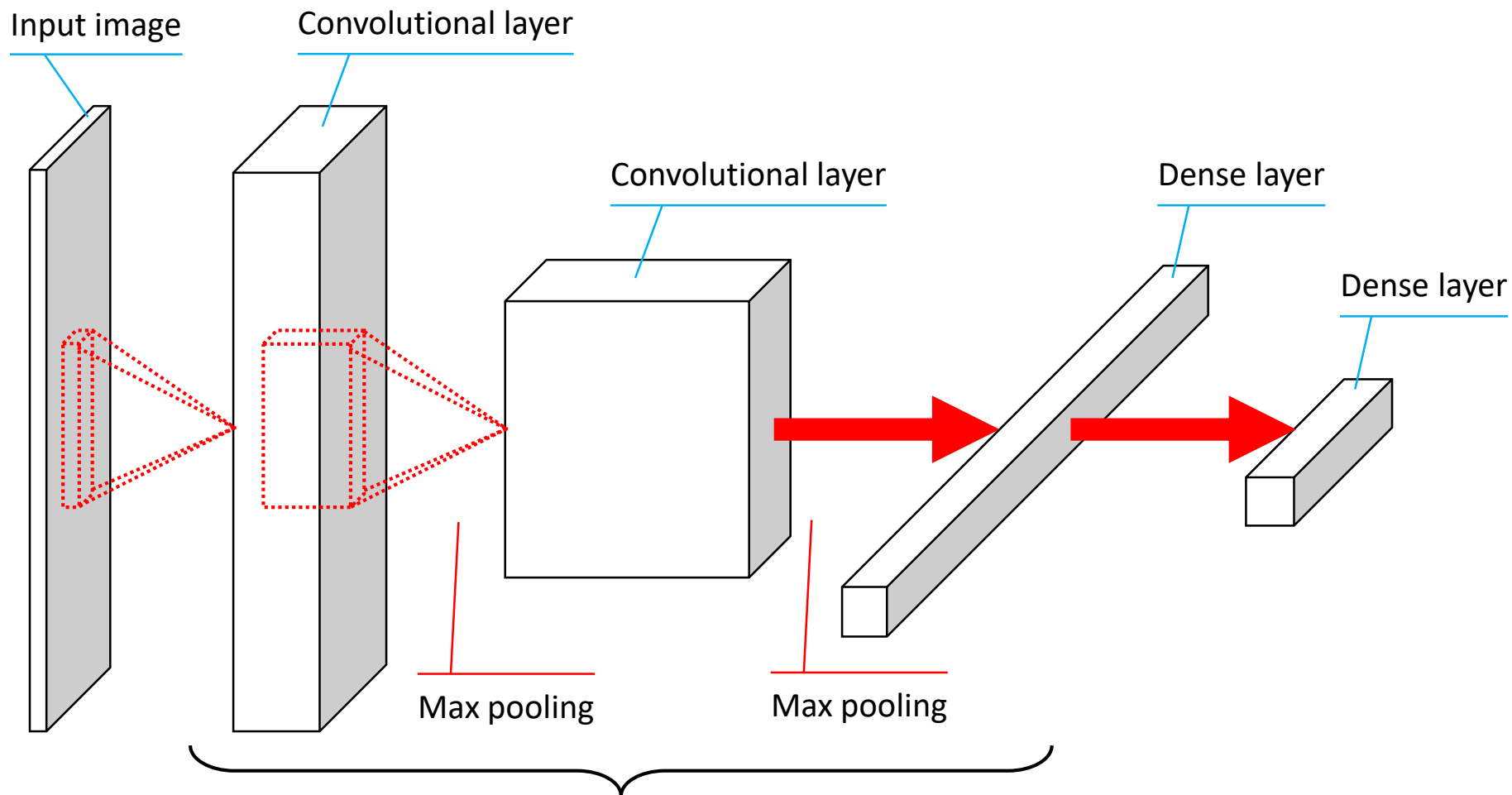
Semester 2, 2018

Learning Outcomes

By the end of this workshop you should be able to:

1. Explain how **convolutional** and **max pooling** layers operate
2. Implement a **convolutional neural net** (CNN) in TensorFlow
3. Monitor your TensorFlow session in **TensorBoard**

CNN architecture

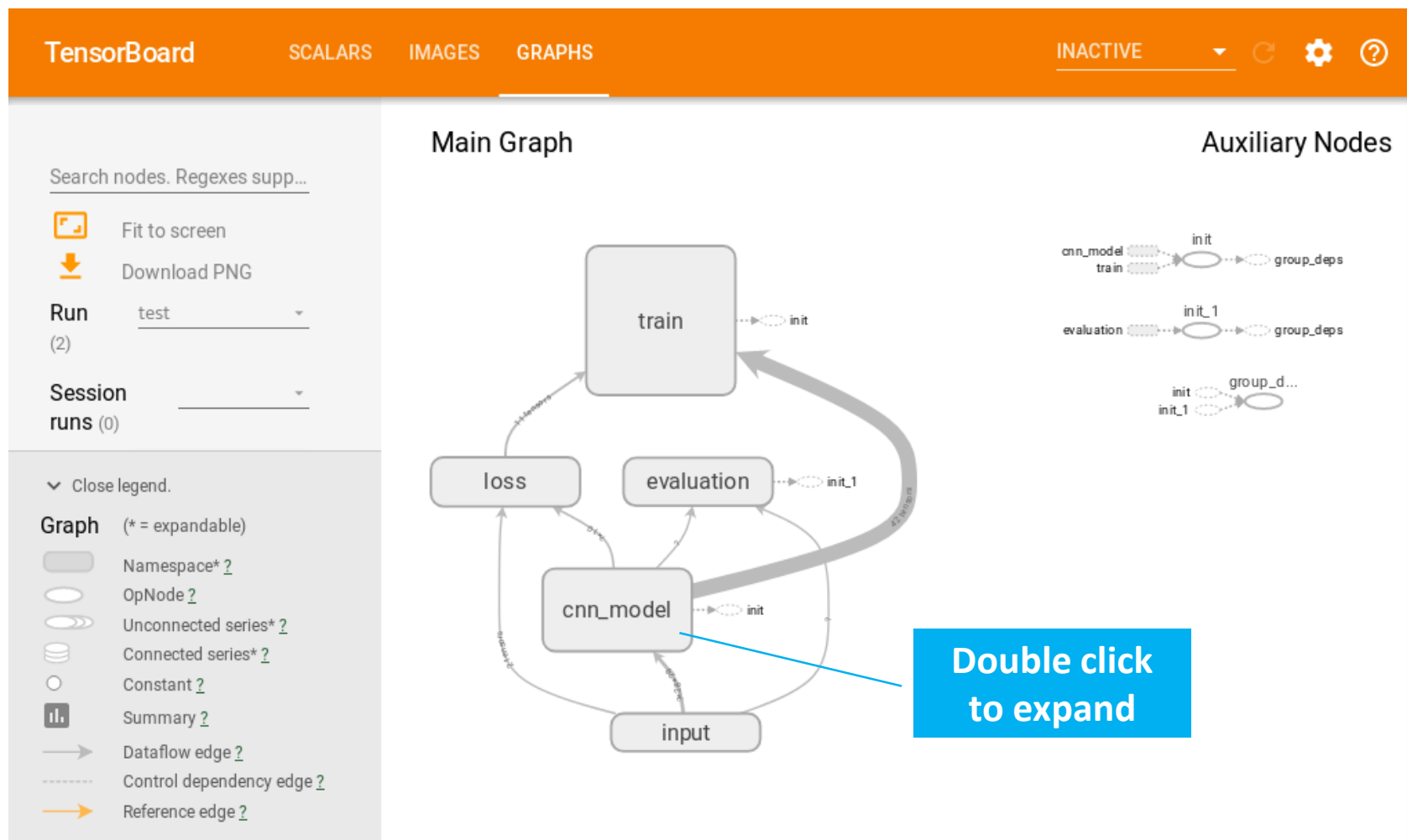


New this week

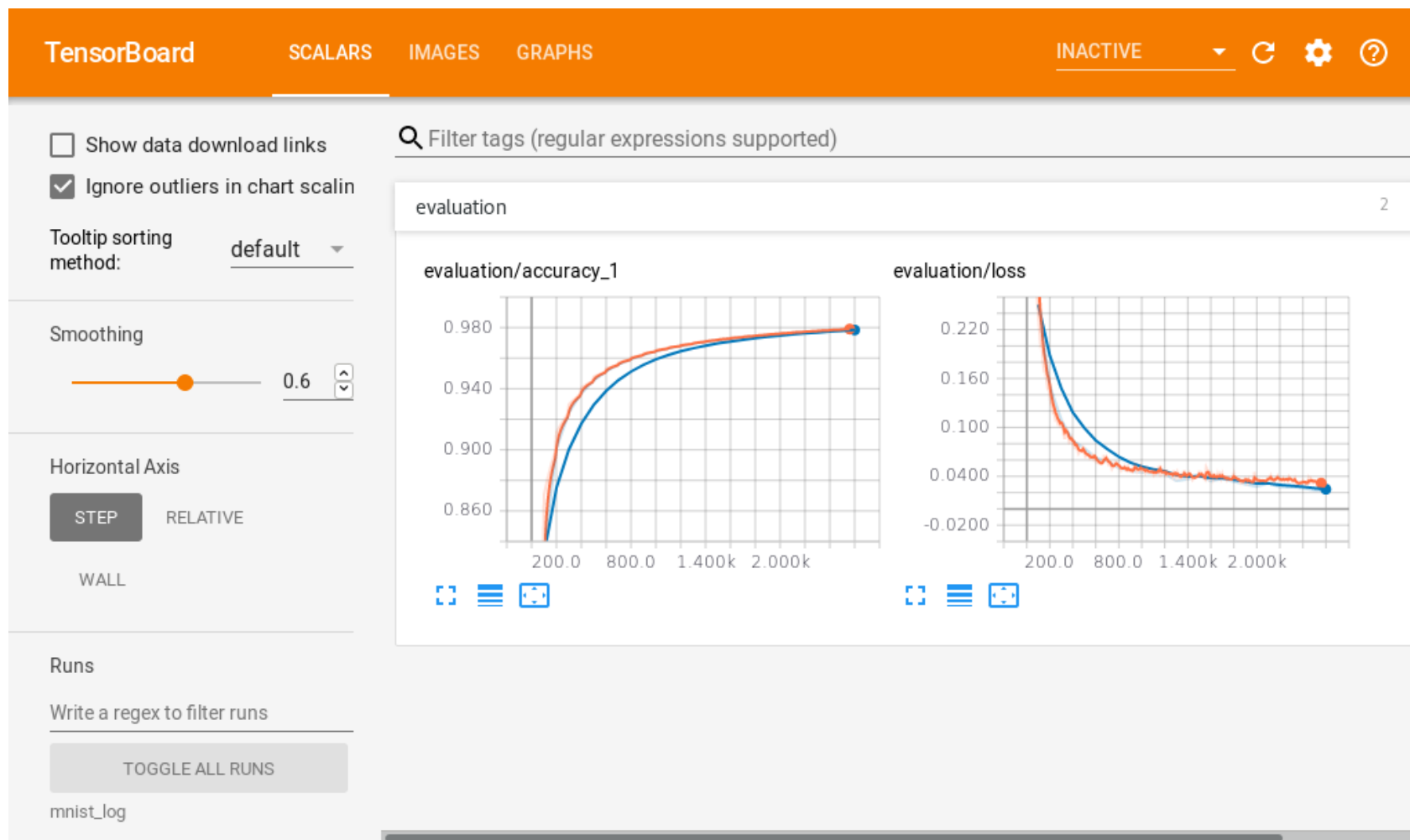
Monitoring TensorFlow programs

- Use **TensorBoard** – a web app bundled with TensorFlow
- Presents data in **event files** which are generated while TensorFlow is running
- You can add to these event files:
 - * Define **Summary ops** for quantities you want to monitor
 - * Request the Summary ops in a `tf.Session`
 - * Write to disk using a `tf.summary.FileWriter`
- Code written for you in Worksheet 6

Explore the computation graph



Monitor scalar summaries



Monitor image summaries

The screenshot displays the TensorBoard web application. The top navigation bar is orange and contains the 'TensorBoard' logo, tabs for 'SCALARS', 'IMAGES', and 'GRAPHS', and a status indicator 'INACTIVE' with refresh, settings, and help icons. The left sidebar is light gray and includes a 'Show actual image size' checkbox, sliders for 'Brightness adjustment' and 'Contrast adjustment' (each with a 'RESET' button), and a 'Runs' section with a regex filter and checkboxes for 'test' and 'train'. The main content area has a search bar 'Filter tags (regular expressions supported)' with the tag 'cnn_model' entered. Below the search bar, the path 'cnn_model/conv_layer_1_1/visualization/filters/image/0' is shown, along with a 'train' status, 'step 2,500', and a timestamp 'Sat Aug 25 2018 12:22:06 GMT+1000 (AEST)'. A progress bar is visible. The central part of the main area shows a 5x5 grid of grayscale images representing filters. A blue callout box with the text 'A filter in the first CNN layer' points to one of the images in the grid. At the bottom of the sidebar, there is a 'mnist_log' entry and a 'TOGGLE ALL RUNS' button.

TensorBoard

SCALARS IMAGES GRAPHS

INACTIVE

☐ Show actual image size

Brightness adjustment

Contrast adjustment

RESET

RESET

Runs

Write a regex to filter runs

☒ test

☒ train

TOGGLE ALL RUNS

mnist_log

Filter tags (regular expressions supported)

cnn_model

cnn_model/conv_layer_1_1/visualization/filters/image/0

train

step 2,500

Sat Aug 25 2018 12:22:06 GMT+1000 (AEST)

A filter in the first CNN layer

TensorBoard on the lab machines

Once TensorFlow is installed:

- Open *Start* → *Anaconda3 (64-bit)* → *Anaconda Prompt*
- In the prompt, run the following commands:
 - > `cd "C:\Users\%USERNAME%\Downloads\workshop06"`
 - > `python -m tensorboard.main --logdir mnist_log --host localhost`
- Open <http://localhost:6006> in your web browser

On your own device, you can start TensorBoard by running:

```
> tensorboard --logdir %LOGDIR% --host localhost
```


TensorFlow on the lab machines

- Open *Start* → *Anaconda3 (64-bit)* → *Anaconda Prompt*
- In the prompt, run the following commands:
 - > `cd "C:\Users\%USERNAME%\Downloads"`
 - > `mkdir workshop06`
 - > `cd workshop06`
 - > `pip install -t . tensorflow "protobuf<3.6.1"`
 - > `jupyter notebook`
- Copy Worksheet 6 into the `workshop06` directory
- Open Worksheet 6 from within Jupyter

Note: This is a workaround installation method due to restrictions on the lab machines. On your own device, we recommend following the installation instructions at <https://tensorflow.org/install/>