Workshop 5

COMP90051 Statistical Machine Learning

Semester 2, 2024

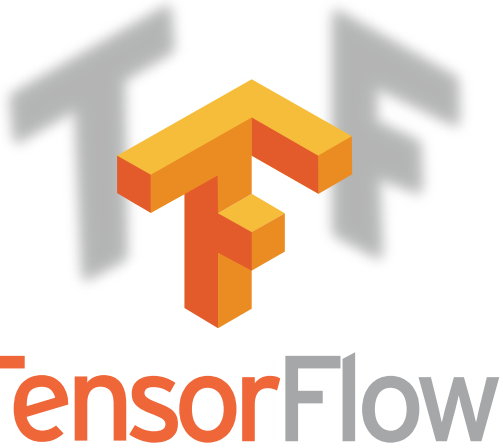
Learning Outcomes

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

1. Learn the basic ops of PyTorch
2. be familiar with autograd
3. Be familiar with multiclass classification, implement multiclass logistic regression with automatic differentiation

Popular frameworks for neural nets

- Dominant frameworks are TensorFlow (Google) and PyTorch (Facebook AI Research)
- Both are written in C++/CUDA and provide Python APIs
- With the release of TensorFlow 2.0, both frameworks support an imperative programming style—i.e. they work like NumPy



PyTorch

- In workshops we'll mainly use the PyTorch
- PyTorch library built on top of C++ backend of computational library torch
- Designed for efficient tensor operations on CPU/GPU
- We will use PyTorch to implement logistic regression today, the NN model will come in the future.

Install PyTorch

1. Start -> Anaconda3(64-bit) -> Anaconda Prompt
2. Enter the following at the prompt:

```
conda install pytorch torchvision cpuonly –c pytorch
```

3. Launch jupyter

```
jupyter notebook
```

Tensor

- Tensors are basic object of PyTorch
- A tensor is a multi-dimensional array of values, similar to a matrix but with an arbitrary number of dimensions.
- E.g. an image can be represented as a 3d-tensor: 2 dimensions for horizontal/vertical pixels + 1 dimension for the RGB channels

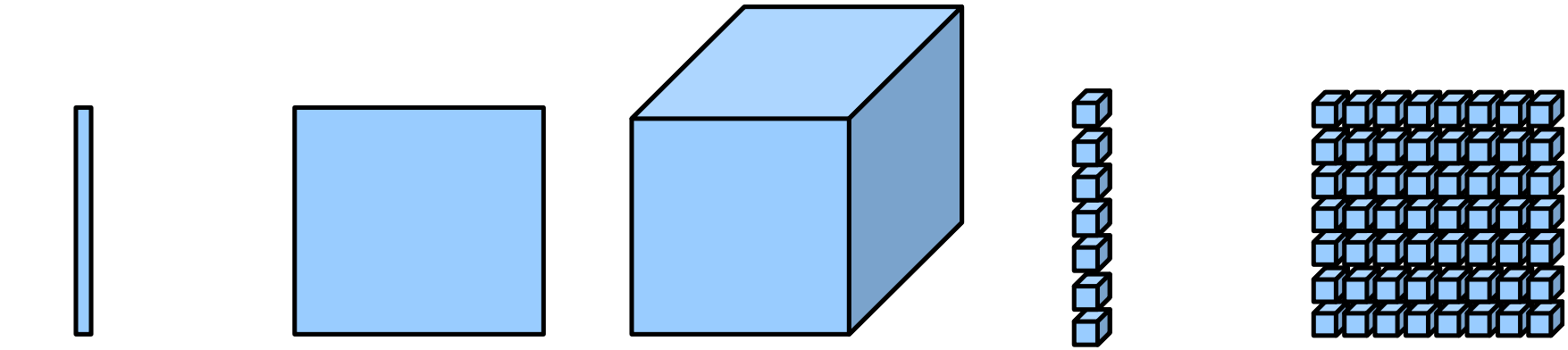


Image source: Tatsuya Yokota (2012). *Tensor Analysis for EEG data.*

Worksheet 5