Lectures of September 4th, 2004
Scribe: Yongyi Mao

1 Opening

The reason we are here is to learn deep learning, because

1. Deep learning is cool
2. Deep learning is useful

The logo of the course is shown in Figure 1. The course requires some math and lots of programming. The framework you need to use can be either one of the following two:

1. TensorFlow
2. Pytorch

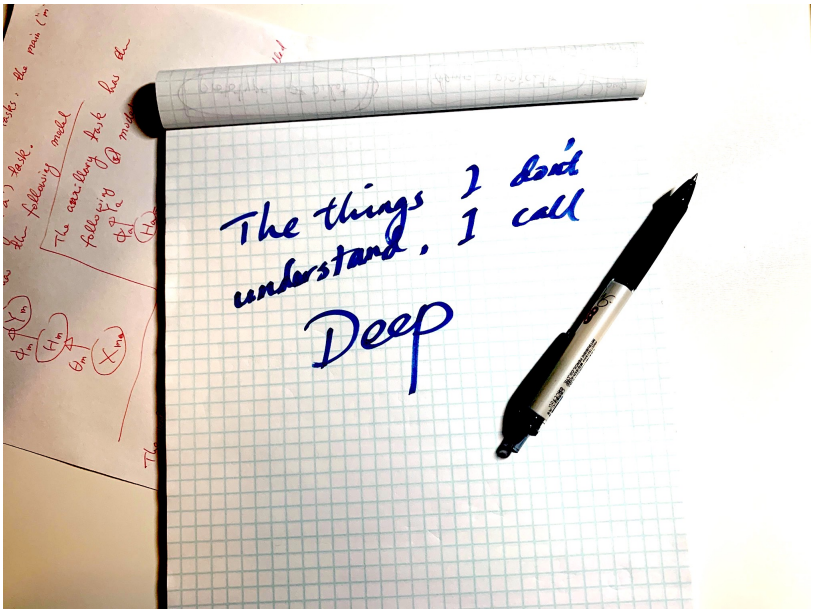

Figure 1: The logo of the course

2 Syllabus

We will use a strange way to grade.

$$y = x_0 \cdot x_1 + x_2 + x_3$$

3 Math

Consider the following example.

Example 1 *Suppose that p_X is the Bernoulli distribution defined as in the previous example and that random variable Y is defined by*

$$Y = p_X(X).$$

Find the PMF of Y.

Answer:

First we identify p_X as a function mapping $\Omega_X := \{0, 1\}$ into $\Omega_Y := \mathbb{R}$.

If $\mu = 0.5$, then

$$p_Y(y) = \begin{cases} 1, & \text{if } y = 0.5, \\ 0, & \text{otherwise.} \end{cases}$$

That is, Y is deterministically 0.5. If $\mu \neq 0.5$, then

$$p_Y(y) = \begin{cases} \mu, & \text{if } y = \mu, \\ 1 - \mu, & \text{if } y = 1 - \mu, \\ 0, & \text{otherwise.} \end{cases}$$

Appendix: LaTeXing Your Lecture Script

Some extra commands are provided by the `scribe` package, which may not be used in the above notes. You may open the `scribe.sty` file to see this if you have known quite a bit about LaTeX; alternatively, you may open the LaTeX source file of this document to see how the following formatted text is generated.

⋆ **Definition:** A software is said to be *OK* if it is free.

⋆ **Definition:** An OK software is said to be *good* if it is bug-free.

⋆ **Definition:** A good software is said to be *excellent* if it provides user-desired functionalities.

⋆ **Lemma:** Microsoft WORD is not OK.

Proof:
This follows immediately from the definition of OK. ∎

⋆ **Lemma:** LaTeX is OK.

Proof:
This follows immediately from the definition of "OK". ∎

⋆ **Proposition:** LaTeX is good.

Proof:
This follows immediately from the definition of "good". ∎

⋆ **Theorem:** LaTeX is excellent.

Proof:
This follows immediately from the definition of "excellent". ∎

⋆ **Corollary:** LaTeX is better than Microsoft WORD, with the metric of goodness defined as above.

Proof:
This is a consequence of the first lemma and the above theorem. ∎

Homework Problem 1 *Remove WINDOWS from your PC, and install Linux. LaTeX is there.*

Homework Problem 2 *Learn LaTeX.*