10-725: Optimization **Fall 2012**

Lecture 1: August 28

Lecturer: Geoff Gordon/Ryan Tibshirani *Scribes: scribe-name1,2,3*

Note: *LaTeX template courtesy of UC Berkeley EECS dept.*

This lecture's notes illustrate some uses of various LaTeX macros. Take a look at this and imitate.

1.1 Some theorems and stuff

We now delve right into the proof.

Lemma 1.1 *This is the first lemma of the lecture.*

Proof: The proof is by induction on .... For fun, we throw in a figure.

Figure 1.1: A Fun Figure

This is the end of the proof, which is marked with a little box. ■

1.1.1 A few items of note

Here is an itemized list:

- this is the first item;
- this is the second item.

Here is an enumerated list:

1. this is the first item;
2. this is the second item.

Here is an exercise:

Exercise: Show that P $\neq$ NP.

Here is how to define things in the proper mathematical style. Let f_k be the $AND - OR$ function, defined by

$$f_k(x_1, x_2, \ldots, x_{2^k}) = \begin{cases} x_1 & \text{if } k = 0; \\ AND(f_{k-1}(x_1, \ldots, x_{2^{k-1}}), f_{k-1}(x_{2^{k-1}+1}, \ldots, x_{2^k})) & \text{if } k \text{ is even;} \\ OR(f_{k-1}(x_1, \ldots, x_{2^{k-1}}), f_{k-1}(x_{2^{k-1}+1}, \ldots, x_{2^k})) & \text{otherwise.} \end{cases}$$

Theorem 1.2 *This is the first theorem.*

Proof: This is the proof of the first theorem. We show how to write pseudo-code now.

Consider a comparison between x and y:

if x or y or both are in S **then**
  answer accordingly
else
  Make the element with the larger score (say x) win the comparison
  if $F(x) + F(y) < \frac{n}{t-1}$ **then**
    $F(x) \leftarrow F(x) + F(y)$
    $F(y) \leftarrow 0$
  else
    $S \leftarrow S \cup \{x\}$
    $r \leftarrow r + 1$
  endif
endif

This concludes the proof. ■

1.2 Next topic

Here is a citation, just for fun [CW87].

References

[CW87] D. Coppersmith and S. Winograd, "Matrix multiplication via arithmetic progressions," *Proceedings of the 19th ACM Symposium on Theory of Computing*, 1987, pp. 1–6.