Griffin Schneider

Professor Karl Lieberherr

Algorithms and Data

28 April 2012

Reflections on the Quantifier Game

When used correctly, the Quantifier Game is a powerful tool that can encourage learning. In the first half of this course, the Quantifier Game generally did a good job of providing a structure in which students could propose claims, discuss claims, and eventually arrive at optimal solutions. Students who did not have the best algorithm in the class were able to gain more insight into the problem they were solving by looking at solutions posted by groups with better algorithms. In this half of the course, the claims made were mathematical facts that could theoretically be proven or disproven.

However, in the second half of the course, students were often asked to make claims about the running times of programs they had written. These types of claims do not fit well into the structure of the Quantifier Game, as it is difficult for other teams to decide whether to oppose or agree with a running-time claim when the program the claim is made about must be kept secret. For running-time claims, the Quantifier Game was an unnecessary burden and produced very little online discussion, and thus did little to aid learning.

The Quantifier Game and Running-Time Claims

In the second half of this course, a number of claims that students were instructed to post were of the form "I have an algorithm that can solve a problem of size x in at most y milliseconds/JVM instructions." For claims of this type, there was little or no back-and-forth conversation between students on Piazza. For many of these claims, students simply posted their own running time and then wrote "We agree with this claim" on a few other groups' claims. This was likely due to the fact that it is very difficult to determine whether a running-time claim is likely to fall to opposition.

When opposing a running-time claim, the opposer is essentially guessing that the proposing group does not actually have an algorithm that is as fast as they claim. Since the opposer cannot know this for certain (except in the case of an impossibly low proposed running time), running-time claims were opposed very infrequently, leading to a lack of Piazza discussion.

Furthermore, it was somewhat unclear what it means to agree with a running time claim. By the rules of the Quantifier Game, an agreement would mean "I agree that you have an algorithm that is as fast as you claim." However, this seems strange - the agreeing group cannot know whether the opposing group actually has a fast enough algorithm, so how can the agreeing group agree that they do? Based on a number of Piazza posts, some students took agreement to mean "I have an algorithm that is about as fast as yours," but this type of agreement conveys no new information, since the agreeing group should have already posted their own claim, which would have a similar running time to the claim they are agreeing with.

The Quantifier Game is not an appropriate format for a running-time competition amongst multiple groups. A better format would be a simple leaderboard, where groups are ranked by number of JVM instructions. The leaderboard could be automatically generated (have

students submit their code) or just a simple list maintained by students.

The Quantifier Game on Piazza

Piazza is designed for students to post questions which are then answered collaboratively by other students (or the instructor). This format does not fit well with the Quantifier Game, which is a turn-based conversation between students. On Piazza, whenever a pair of students wants to take a turn, they have to edit the students' response. Using this method, it's easy for students to forget to include their names, forcing the graders to look through Piazza's edit history to determine who made the response. Also, students can accidentally put their response at the wrong place in the conversation or not leave enough space between responses, causing the thread of conversation to become difficult to read.

The quantifier game would likely be better served by a forum system or newsgroup with user accounts, where students simply create a new thread for each claim, and then the quantifier game is played by adding posts to the thread. This makes it easy to see who posted responses and ensures that the responses stay in order and well-formatted. Also, having a separate post for each quantifier game turn makes the exchange easier to read. Piazza does not have any useful functionality for the class that isn't supported by most forum systems (besides LaTeX support, but Piazza's LaTex support was not used at all this semester).