

Personalized Education Environment Considering Progress in C Programming Skill Acquisition

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Abstract

Many of college students learning in C language programming courses suffer from difference of their own acquisition level of programming skills from progresses of the courses. Some of them feel difficulties to catch up the progress. On the contrary, who are eager for programming are not always satisfied with slowness of the progress.

The main reason seems that a few tutors have to teach too many students. Since each tutor takes in many students of various levels, he or she cannot avoid teaching various ways of thinking and techniques related to C programming in a standardized manner. It is not realistic to consider every student on the same level. Everyone should be taught in a personalized way. During a course, a learning plan for each student should be rebuilt many times using exercises and explanation methods which are suitable for understanding level of the student on that time. Such personalized way, however, needs tremendous cost.

For personalization of programming course, we consider that a learning plan plays vital roles. We regard a learning plan as a combination of explanation methods of examples and the order of exercises to be given. Examples and exercises are collected from several C primers. Students who feel difficulties in programming should be given visual explanation based on animation technologies. Examples are explained in a character-based way to who seem to understand concepts in programming. If any student fails to make a right program for a given exercise, another exercise should be imposed on the student. The extra exercise

would be a different one from original exercise, but the same technique can be applicable to solve it. Students can achieve the technique, by solving more than one exercises with the technique.

We try to realize a personalized programming course, by supporting the flexible construction of learning plans with computers. We provide the following environment.

1. Learning plans are prepared so that they can fit with various understanding levels.
2. Each student submits program source codes and his confidence for the codes. His or her tutor evaluates the source codes. These personal data are recorded for each exercise in a database system.
3. According to the personal data, a learning plan is rebuilt for each student using a recommendation engine we have developed.

In this paper, we illustrate learning plans and personal data. We explain a personalized programming course system based on the recommendation engine. In this course, the recommendation engine selects an explanation method of examples and exercises suitable for each student. The recommendation engine consults personal data of many students who have been taught in the course. It searches past students whose tendency is similar to the concerned student, assuming that they stay in a similar acquiring level of C programming skill.