Loopcake: Learning Management System with Version Control

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1 Introduction and Motivation

Software engineering education is essential for the current era. However, throughout software development and programming education, students and instructors face many problems, some of which are caused by the technical reasons, whereas some are due to the collaboration problems. We aim to address these challenges with our project.

Course Management for large classes is difficult [1,7]. On professional stage, industry uses version control systems to handle the programming challenges [1,5,7]. Some research claims that using VCS can also be beneficial for computer science education [1,2,7]. However, current VCS solutions focus on a more general stage with production and industry optionality. That causes them to become hard to learn and use for beginners and small-scale projects. We believe that integrating VCS to education with an easy to use wrapper can address the educational challenges better.

Most of the time students learn general concept of version control systems with introductory level information [4]. Hence, they do not tend to use advanced features of VCS [5,7]. Even, recruiters from industry state that most of the interns they worked with have limited or no knowledge about the version controlling [6,7].

Gaining sufficient knowledge over these systems is very crucial and beneficial for students. For instance, it enhances the collaborative effectiveness of student project groups in programming education [1,4,6,7]. When this approach is considered from an instructor perspective, using VCS can ease handling of course projects [7], and gives the opportunity to track students' progress on projects continuously. This can be essential to identify individual student efforts and give feedbacks on student projects [4,5,6,7]. Furthermore, there exist many other side benefits for using a VCS in education. For instance, instructors and researchers can observe development cycle of students, and gain insight into students' code development styles [5,6].

2 Loopcake: System Description

We designed and developed Loopcake, a learning management system with version control integration to enhance current programming education quality for universities. Additionally, beginners of VCSs tend to acquire bad user habits with current solutions and Loopcake is developed to prevent these habits to originate. For example, studies show that students do not use committing and branching functionalities efficiently and try to learn with blind testing [2,4,5,7]. Loopcake encourages the correct use of version control by rewarding users with gamification such as giving badges, rating and daily bonuses to encourage frequent use. To prevent blind testing, Loopcake gradually increases the use of advanced features and provides visual hints along the way. Therefore, students would be able to confidently use other aspects of Git rather than pull, push and commit when they graduate. It also has features that are implemented with respect to the current understanding of what is beneficial for the education. For example, studies claim that specifying milestones for projects improves incremental progressing [5], rather than rushing the project as the deadline gets closer. We plan to provide a task management tool and milestone mechanics along with the system. By this way, Loopcake would encourage the equal workload distribution in student groups and simplify tracking student progress for instructors.

We take advantage of open source Git VC library. Git provides disconnected operations, experimental branching, and easier collaboration. Furthermore, it is more reliable than the centralized systems because students cannot make the repository unusable by mistake [3,4,6].

3 Results

Loopcake is an ongoing project started in Fall 2016, as a senior design project in Computer Engineering. Then, its development continued with the enthusiasm of the crowd, and our vision. We have completed the prototyping phase. The current stage of the project is to build a sufficient product to serve pilot experiments on some universities. Meanwhile, we are attending software design contests, and presentations to get feedback and gain recognition. Our project has won the second-place prize on a national entrepreneurship contest and is invited to the pre-accelerator program in KWORKS incubation center. It is also selected as the best senior design project of the academic year 2016-2017, Computer Engineering Department at Koç University.

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