

Affinity Space Full-stack Development

Ruimin Zhao (rz2390), Neng Chen (nc2734)

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Chapter 1

Abstract

This report is a brief proposal for the research project. In this project, the main focus would be to elaborate the full-stack development work related to the Affinity Space portion of the Intelligent Tutoring System module of the system built by the lab.

The main technologies involved would include Angular, NodeJS, CI/CD pipeline. And our main targets would be first to fix the existing graphical display bugs and improve the overall graphical display quality within this module, and second to improve the features by creating more endpoints transferring more meaningful recommendation result onto the front-end display to actually help students and teachers plan the learning path.

Chapter 2

Introduction

2.1 Motivation

Social Addictive Gameful Engineering (SAGE) lab is working on developing a "collaborative game-based learning and assessment system which infuses computational thinking (CT) in grade 6 - 8 curricula". [1]

The idea that we would game serves as a tool which helps students learn is quite exciting. Research indicates that Game-based learning (GBL) activates students to make better academic outcomes [2], and this is why The initial motivation of this system itself is already attractive. This system itself is an interesting idea and to take participate into the teamwork development on such a sophisticated system is a good practice and learning opportunity.

2.2 Affinity Space

Our project mainly lies in the Intelligent Tutoring System (ITS) portion within the SAGE lab. And the area name for our work is called Affinity Space. Basically, the ITS module operates like a one-on-one tutor which is adaptive to personalized needs. The affinity space mainly lies in the outer loop of the ITS work flow, where full-stack development is involved.

In the Gameful Affinity Space area, there are quite a few continuous full-stack development work going on. For example, for the learning metrics learning metrics display to students and teachers, there are some debugging tasks related to graphs to start with.

Chapter 3

Related Work

3.1 SAGE

Currently, SAGE already has plenty of functions implemented as an interactive system. Two primary roles are supported as login users. They are instructor and student respectively. After the user login, the page shown is right the affinity space module.

The Affinity space is where teachers and students could find the learning resources. And the curricula are arranged in mission management where learning quests could be managed as games. Here is where the teacher could design a learning game for students. For example, the teachers could design some puzzles and defined the solutions with detailed instructions.

3.2 Other Learning Tool

On-line learning tools like khan Academy [4] is existing counterparts to our system especially from the full-stack development perspective. It allows a personalized space where learning progress could be monitored and learning path could be designed based on different needs. Another example is Grade Craft. It provides gameful learning resources to help manage and design the learning path taking the advantage of gamefullization [3].

Chapter 4

Proposal

4.1 Background

The platform used for team work is Visual Studio Team Service (VSTS). And the repository management is achieved using Git.

As for the repository structure, the sage-frontend repository is the one which we would be primarily working on. And the sage-node repository is where we could communicate with database and create endpoint using NodeJS. There are quite a lot build definitions within as well (Each repository has its own matched build definition with different steps. And there are different release definitions for different purposes after each successful build).

Also, for the sage-devops repository, the puppet folder is expected to be able to generate the proper local environment with "on-click" once downloaded to local machine by developers, which hopefully would be my very first development step.

4.2 Objectives

The overall high-level objectives set for now are mainly the full-stack development work on two features as suggested.

- Step One: We would focus on fixing the existing UI display bugs and improving the graph display quality as the first step. The work is mostly expected to be about front-end work. And understanding the legacy code would be our first challenge.
- Step Two: After we complete the user stories left with existing bugs and improvement space, we should be more familiar with the system and the framework overall. And we might more ideas about how to improve the learning metrics user story. For example, how to display the students' learning progress, how to communicate with the database more reasonably so as to provide more valuable information to the users. The initial plan is to maintain a historical record about every students' learning frequencies (more personalized records) and visualize them in an interactive way with the work done in both data storage and data transfer using cloud service.

Chapter 5

Time line

Week	Target
Sprint One	Get familiar with the team development background and tool Set up the development environment and learn existing code
Sprint Two	Work on existing user stories of Learning Metrics requirement Continue onto the graph display improvement
Sprint Three	Start work on new learning metrics user stories Design and implement the student progress record
Sprint Four	Maintain student progress record with more types of statistics Maintain historical records and create endpoints for data retrieving
Sprint Five	Make improvement on previous works Complete code review and fix any missing parts

Table 5.1: Brief Timeline

Comments: Objectives might be updated with more detailed version during the development.

Bibliography

- [1] *cu-sage*, available at https://github.com/cu-sage/About/blob/master/sage_pri
- [2] *A gameful change: How Gamification Can Be Used as a Communication Tool in Change Management*, available at <http://uu.diva-portal.org/smash/record.jsf?pid=diva2%3A1127783&dswid=>
- [3] *khan academy - You can learn anything.*, available at <https://www.khanacademy.org/>.
- [4] *gradecraft*, available at <https://www.gradecraft.com/>.