GRP-TA: Multiple Choice Questionnaire (MCQ) System

Supervisor: Dr Thomas Anberree

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Write a complete system which allows a teacher to write and submit a test (At least MCQ, but also possibly other kinds) to be completed by students online and marked automatically, with mark reports produced for the teacher and possibly some kind of automatic feedback given to students.

The principles behind such an applications should be simple enough to understand, so students are expected to come up with their own specifications, possibly through speaking with users (teachers and students) and propose a set of useful features that would make such a software better than existing ones.

The team should work using a standard software engineering method to organise the development of the application, to be chosen in agreement with the supervisor, and keep a detailed diary of what they are doing. A complete test suite should be build.

The project should be developed in a modular, extensible manner, internally documented and programmed in a standard way so that any other keen programmer may take over the project and extend it without major difficulty.

A full documentation should be made available for end users.

Security and reliability should be a major concern when developing the application.

GRP-RB: Super Bike

Supervisor: Dr Ruibin Bai

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City bike has now truly become an important part of our urban transport. However, in many cases, the services are still not satisfactory. Sometimes, the bicycles run out of stock. On other occasions, users are unable to return them at their preferred stations due to a lack of sufficient lockers. In this project, students are encouraged to develop and implement innovative methods and systems to address some of these problems. More specifically, students need to develop a central system to monitor the stock levels of different stations in real time. Once the stock level of a bicycle station falls outside of a predefined range [min_stock, max_stock], the system should alert the bicycle company to re-distribute bicycles. Ideally, the redistribution plan should be optimised to minimise the maintenance cost while maintaining the quality of the service. Students are encouraged to use latest data visualisation, modelling and optimisation tools to achieve this goal. Implementation of existing approaches available in academic fields and/or in practice is acceptable. Real-life data collected from a big international city will be supplied for your study.

GRP-EC: Networked Game Design and Development

Supervisor: Dr Eugene Ch'ng

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The group project involves the entire process of game concept, design, server setup, documentation, modelling, animation, programming, testing and deployment. The requirement for the final game is that it needs to be networked via a game server. The genre of the game is decided by the student group. There are various platforms available which students can use, but the Unity3D IDE is recommended.

Requirements - which the students can easily learn:
• 3D modelling and animation
• Material mapping - Photoshop/GIMP
• C# programming
• Unity3D IDE

GRP-PD: Advanced Xiangqi

Supervisor Paul Dempster

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Advanced Chess is is a variant of chess in which a human and a computer work together as a team against another human and computer team. The human is in control of the team and can use the computer to analyze moves, look-up positions, check strategies, etc. As a result, the team should perform better by the computer removing the human's weaknesses (eg, overlooking a possible move) and the human removing the computer's weaknesses (eg, lack of overall strategy and innovative play).

Xiangqi is also known as Chinese Chess and is very similar to International Chess. Many pieces play very similarly although there are a few special rules that give the game a unique flavour.

This project is to create a Xiangqi program which can be used for Advanced Xiangqi. A player should be able to use this program to check threats to and opportunities for their side given the current state of the game board. The program must therefore know the rules of Xiangqi, allow the player to enter their and the oppositions moves, and facilitate user-driven querying and exploration possible moves in the future.

Things to consider:

• Are there any chess programs specific to Advanced Chess and, if so, what features do they offer?
• Since the player will need this program while playing, should it be an Android app rather than a desktop program?
• Xiangqi games have a time-limit so the user interface will have to be fast and intuitive.

- Would interfacing with an existing Xiangqi engine be more effective than writing custom search functions?

How would you evaluate the usefulness of the program? Would the Chess Society be a useful contact?

GRP-JD: A Client-Server Based 2D Blob Capturing Game

Supervisor Dr John Drake

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This project will involve developing a 2D blob-capturing game, in the same vein as popular examples such as agar (http://agar.io). The development of the game should follow the client-server model. The server will house the core game logic, maintaining the state of the game and resolving synchronisation issues between clients. The client components of the application will provide a graphical user interface to the game. I would expect this project to be implemented in Java, with Swing used to implement the GUI however I am willing to listen to alternative implementation suggestions from the group. Many extensions to the project are possible and within scope. The group may wish to implement a client operating on a mobile device capable of interacting with clients written for a desktop platform. Modifications to the original game could also be made, adding 'team' modes based on popular FPS game modes such as 'capture the flag', 'team deathmatch' etc. The development of 'bots' may also be interesting in order to both test the system and from an AI perspective.

GRP-GQ: A Sketch-based Image Retrieval Mobile APP

Supervisor: Prof Guoping Qiu

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Finding a particular photo on the mobile phone can be difficult. In this project, you will develop an APP to enable users to sketch a query to find the photos they are looking for. For example, if a user knows that she is looking for an outdoor photo taken in the countryside in a sunny day, then she can draw/paint a query image with some blue colours at the top to represent sky, some green colours at the bottom to represent grasses/trees, and perhaps some yellow colours to represent earth/sands. The image search engine will then query your photo album, find images that are similar to your query and return to the user. Similarly, if the user is looking for a sunset or sunrise photos, then she can sketch some golden yellow, pink and red colours, to find sunset/rise photos.

The project will develop the following

- o A mobile app (Android/iOS systems)
- o An image search engine/software
- o A Sketch GUI
- o A result presentation GUI
- o Other appropriate functions

GRP-DT: Enhanced Multimedia Note-taking Research & Support App Development

Supervisor: Dr Dave Towey

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Background
In 2014, a number of leading researchers at The University of Nottingham Ningbo China (UNNC) embarked on a project to examine how well the university will be able to support student learning in the future. Their belief being that, as module lecture and learning materials increase in multimedia content, sophistication, and complexity, traditional styles of note-taking may no longer suffice. They wanted to examine student note-taking practices, and explore how these evolve as multimedia-heavy resources are included.
Over the 2014-2015 a team of UNNC CS and CSM students worked as a software engineering (SE) team (called gp-dave) and, following the course of the SE lifecycle, investigated the challenge and implemented a solution for the research team.
Now, in 2015-2016, a new SE team is required to look again at the needs of the research team; and examine and evolve the software produced by gp-dave.

Project Outline
The selected students will form a software engineering team (called GRP-DT), and work together to complete a full cycle (several full cycles?) of the software engineering process, resulting in delivery of a revised tool (and accompanying artefacts), as requested by the research project team.
The SE team will need to go through a complete requirements engineering process to identify the revised SE project requirements. Part of this will involve applying an appropriate requirements elicitation methodology.
The documents and code from last year's team will be made available to the new SE team, and a first stage of the project will be a thorough evaluation of the current software and documentation.
The team will need to make informed decisions about which SE process approaches or methodologies to apply to this project. The experience from gp-dave in 2014-2015 should be included in the decision-making.
Over the course of the SE project, the SE team will need to produce several artefacts, including (but not limited to): a report on the current software, a system requirements specification, design documentation, team management and planning documentation, prototypes, progress reports, verification and validation plans, code, code documentation, and instructions manual.
The target goal of the SE project will be to deliver, on time, a new tool which can support the research team's project. An informal description of this tool, from a student's or teacher's perspective has been proposed as follows:
"If a student uses this tool to take notes during a class, then perhaps it should be an app on a tablet device. Or maybe something else. The student should be able to easily integrate various content (like pictures, video, sound, text) into a single place, in such a way that it should represent a clear record of the notes for that class session. Later, sharing and collaborating on, for example, revision for an exam, should be easy to do. I think, as a teacher, I'd also like to be able have some kind of archive or database with the notes. I wonder if there might some way of connecting it to MOODLE, too ..."

The SE team is reminded that a target use of this tool is to support not only students taking notes, but, more importantly, the research team's research project: the tool has the dual purpose of both assisting student note-taking, and facilitating the research.