TJHSST Computer Systems Lab Senior Research Project
tjTalk School Question Forum
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Abstract

All students have had that evening when they don't understand how a carbon lattice works, or they need a succint efficient explanation of Riemann sums. What is worse, is the class's chemistry or calculus whiz may not be available to call upon at that moment. This results in long nights spent trying to ask friends, parents, and whoever else to try to get some satisfactory response... which is sadly sometimes unsuccessful. tjTalk aims to connect the questioners and the whizzes. Using a tree-based structure to focus on specific subject matters, it will provide a way for students to ask questions and get quick answers from other students or teachers. It will create an information sharing community that will push peer education forward in the school it is deployed. For efficiency and ease of use, tjTalk will also bypass the trouble students have to go through to put their question in the right place, and for the whiz to look for the question. The questions asked will be automatically be filed in the tree-based system by intelligently generated keywords, and will be assigned quickly to a person who has a particularly high score in that part of the forum. tjTalk will also be integrated with the SchoolTool school administration infrastructure, and will be able to intelligently provide teachers with information about the students' level of knowledge in their classes, based on peer ratings of answers to questions.

Keywords: artificial intelligence, machine learning

1 Introduction - Elaboration on the problem statement, purpose, and project scope

1.1 Scope of Study

The result of this project will be a web service available on the Zope development platform. It will be written in Python and configured in ZCML (Zope Configuration Markup Language - an extenstion of XML). It will feature an intuitive user interface, and easy asking and sorting of questions. The structure will be a large tree, branching into subjects, classes, and other mini-topics for the efficient delivery of question to responder. The answers will be easy to rate up and down, and the question asker and the teachers will have more weight in grading the answers than the other users. The answers will not appear in order of date submitted, but rather in order of rating, and, as a tiebreaker, the scores of the authors of the answers. The

authors will get the same score boosts that the answers get. Artificial Intelligence methods will stand behind all of this.

There is another requested feature for tjTalk to generate grades for the students involved. As tjTalk will be coded as a module to the SchoolTool school administration system, this will be a simple extra "button" and the action associated with it.

This project will be machine tested for objective accuracy in object functions (using Zope unit tests) and also machine tested for proper webpage rendering (using Zope functional tests). I will also require one or more alpha and beta user bases to test the user friendliness and usefulness of the features I code. I also will stick by the concept of eXtreme Programming, always open to new user stories and bug reports. These will be tracked via Launchpad.

1.2 Expected results

The end result will be either a beta version, a release candidate, or a release of tjTalk as a free and open source module to provide a school question forum functionality to SchoolTool and schools using it. It will be efficiently artificially intelligent, able to make decisions and process queries in quick website-rendering time, while not letting any of the convolutedness through the user interface, which will be sleek and intuitive.

1.3 Type of research

This project will be almost purely user-centric application of development methods to provide a stable product.

2 Background and review of current literature and research

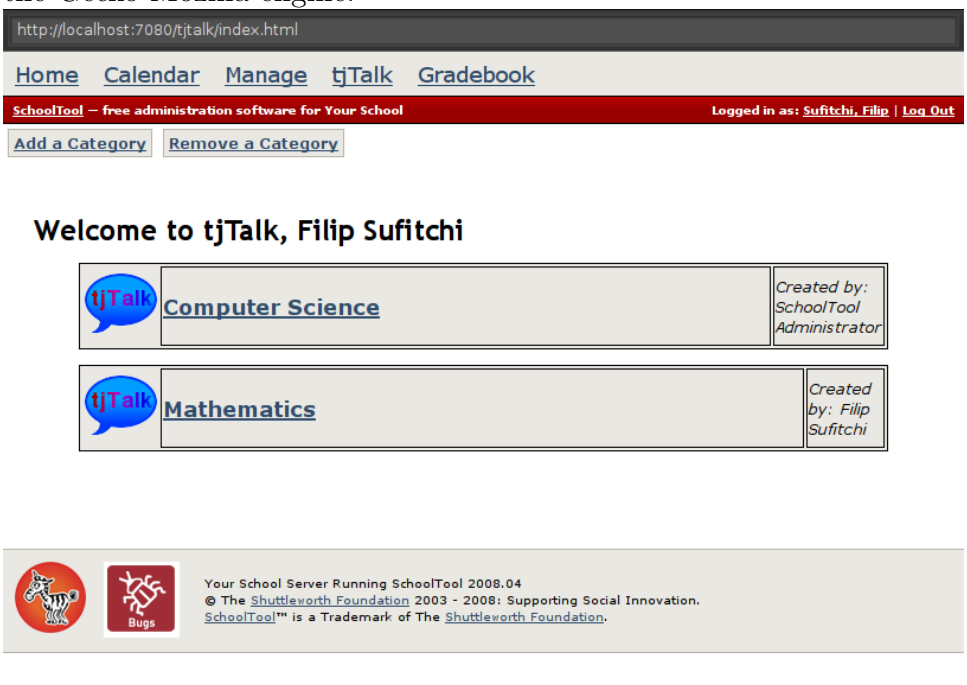
There is no previous research directly pertinent to this project, because it is written in a fringe way: artificial intelligence for a web server with an object-oriented database. Methods will be adapted from previous research on artificial intelligence and machine learning on other applications, or on relational databases.

3 Procedures and Methodology

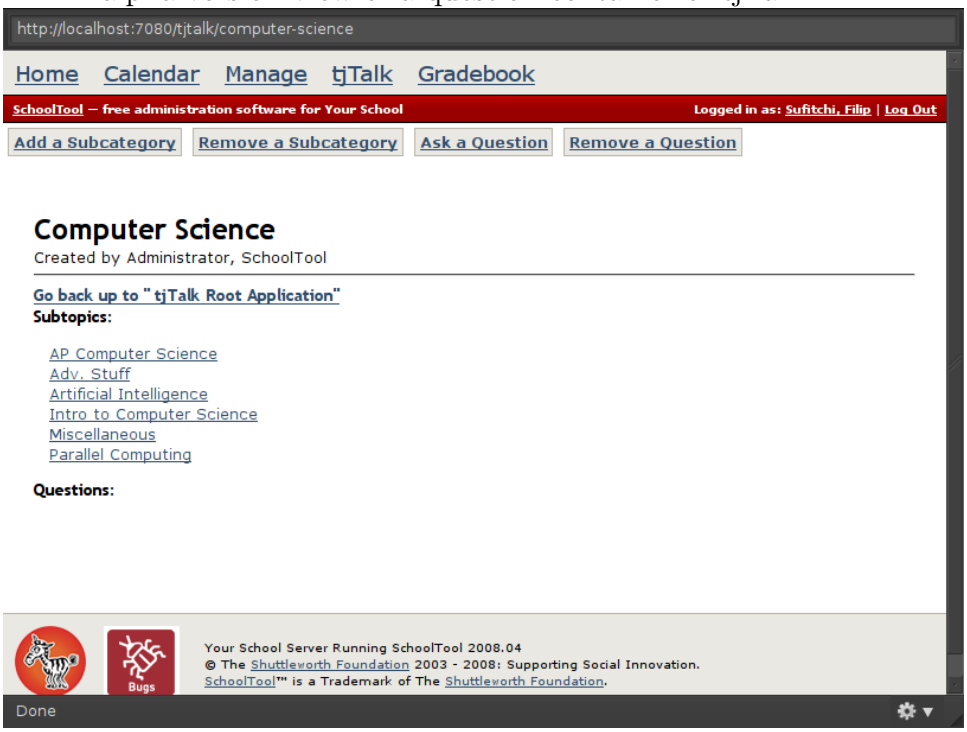
Goals to accomplish all the features of tjTalk have been set. First quarter was dedicated to getting a bootstrapped SchoolTool instance set up and running, and to the start of development on the basic interface and functionality of a question forum. Second quarter will be dedicated to writing more advanced features, such as notifications of answers to questions, question assignment, intelligent question placement, and scoring. Third and fourth quarter will be dedicated to implementing these, the gradebook extension, and to actual deployment and testing of tjTalk. It will be at this time that I will address third party user stories from individual students or teachers, as well.

tjTalk will be written on on the Zope 3 appplication server. Hence, it will use the Python programming language for the main code, ZCML for the configuration files, and ZPT (Zope Page Templates) to render pages or other on-the-fly resources. It will get to the user in the form of a website with HTML, Javascript, and CSS.

An alpha-version view of the root tjTalk page, rendered in the Prism web browser using the Gecko Mozilla engine:



An alpha-version view of a question container of tjTalk:



Testing will be written during second quarter, after the main featuers are finished. The tests will be written in Python using the unit tests and functional tests packages provided by Zope. They will test that the code and views work properly, while also providing documentation for possible future developers as well.

The actual methods of artificial intelligence that will be used are uncertain as of now.

4 Expected Results

The results will not be a research paper, but rather a deployed and working product. It will be open-source so any person, including later seniors interested in Zope could take it up and write extra features for it, as well as, if approved, to work on the trunk version of tjTalk, which will be kept in development and will be fully built into SchoolTool at a later time.