CS 521/621
Idea Proposal Assignment

Due: **Wednesday, Oct 7, 2015, 9:00 AM EDT** via Moodle.
This assignment must be completed by every 621 student. 521 students may optionally complete this assignment if they are interested in doing a research project. This assignment is to be submitted via the **Idea Proposal Assignment** on Moodle).

Research idea write-up and presentation

The assignment consists of:

1. Coming up with a creative new research idea.
2. An up to 1-page write-up describing your research idea.
3. A 5-minute presentation, given in class on Wednesday, October 7.

Overview

Your primary job in this assignment is twofold:

1. To describe your proposed research goal so that people understand what it is and why it is valuable. This must include a *research question* you will try to answer.
2. To describe how you will accomplish your research goal and how you will evaluate it so that it is clear how a team of up to four students can answer the research question in approximately 10 weeks.

   You will present your idea to the class. Everyone will then have the opportunity to review the presentations and form groups of up to four students to actually explore the research idea! These groups may be made up for CS 521 or CS 621 students. Any mix is OK.
   One of the purposes of identifying the research idea is to find an area of software engineering research that is interesting to you. The idea will evolve over time, especially as you read the related work. While this initial idea may differ significantly from the final research question you tackle, the initial idea will serve an important role in focusing you on a particular area of software engineering.

Guidelines and examples

The **research idea** written description **and** the presentation must **each** contain:

- Research question. This must be in the form of a question and describe what you will know after this project is finished that the world does not know today. Examples of reasonable research questions include: "RQ1: Can mutations used in mutation testing generate the kinds of bugs observed in real, open-source development?" and "RQ2: Can the k-tail algorithm for model inference be augmented with information about pre- and post-conditions (inferred by dynamic analysis) to improve the inferred models' precision and recall?"
- The key idea behind the new technique you will develop. For example, for RQ2, the idea may be "Preventing k-tail from merging states if the pre- and post-conditions do not match."

- A concrete evaluation plan that you will use to determine when answering your research question is a success. For example, for RQ1, the plan may be "We will survey the mutation testing literature to enumerate at least 10 top mutation operators. We will then find, on `github.com`, at least 6 open-source programs. Each program will have at least 10K lines of code, 100 actively maintained tests, and at least 1000 commits in its history. We will analyze the commit history to find regression bugs (times when a test that previously was passing but then started failing), isolate the changes that resulted in each of these bugs, and determine whether these changes could be been generated automatically using the mutation operators we identified."

Deliverables

Again, this assignment is for all the 621 students, and optionally, for any 521 student who wishes to do a research project.

Using the **Paper Selection Assignment** on Moodle, submit:

- An up to 1-page description of the research idea, in a .pdf. Don't forget to put your name on it.
- A digital presentation (keynote, powerpoint, or pdf). Don't forget to put your name on it.
- An in-class presentation. The delivery should take a maximum of 5 minutes. You will be cut off after 5 minutes! Prepare and rehearse your presentation.

You may use any resource you wish in this assignment but you must list your collaborators and cite all your sources. Failure to do so will result in a grade of 0.