CSE 543 - Fall 2017 - Assignment 3: Identifying Open Research Problems

1 Dates

- **Out:** *November 9, 2017*

- **Due:** *December 7, 2017*

2 Introduction

In this team project, your team will study a set of research papers that I select to identify an open research problem as concretely as possible for your particular topic. The outcome of this project will be a position paper of **10 pages maximum** in which you build an argument for studying the open research problems that you advocate investigating — identify why this problem is important and why you believe it is solvable in the near future.

The choice of topics includes those covered in class, listed below:

1. Software-Defined Network Security

2. Network Anonymity

3. Adversarial Machine Learning

4. Hardware Security

5. Host Intrusion Detection

6. Cloud Computing Security

7. Android System Security

8. Programming Language Security

9. Password Security

3 Process

Based on polling each member of the course for their three preferred topics, the project team assignments are shown below.

1. **Cloud Computing Security**: Huang, Mehta, Ding

2. **Programming Language Security**: Lee, Mohammed, Dayananda

3. **Adversarial Machine Learning**: Wu, Lin, Anderson

4. **Android System Security**: Davis, Wang, Kim

5. **Password Security**: Norris, Zhang, Paranjpe

6. **New Hardware Security**: Iyengar, Shiqing, Hutton, Li

7. **Network Anonymity**: Cheng-Kai, Gorecha, Cong

I will then assign each team a set of 3-4 papers (one per person) specific to their topic. As you read the papers, you will need to identify the problems that each aims to address and the effectiveness of their solution.

Your challenge is to identify an open research problem not addressed by the proposed solutions these three papers. Papers often identify limitations, but in many cases these are orthogonal to the solution or are intractable problems.

What we are looking for are research problems that would be the next experiment that one would do given what was learned. These may not be the limitations identified in the paper — perhaps because the authors want to work on that problem. In same cases, the efforts of one paper may imply that a limitation of another paper could be solved.

Thus, you can identify an open research problem that spans all three papers or identify an open research problem in one paper that may be addressed when leveraging some feature of another paper or some other combination.

4 Report

Introduction The introduction to a research paper has a common format. You should write paragraphs that answer the following questions.

1. Area: What is the technical area encompassing the three papers?

2. Problem: What is the open research problem you identify?

3. Prior Work: Why don't the prior papers you were assigned address this research problem?

4. Insight: Why do you believe that a solution to this research problem may be possible?

5. Contributions: What are your contributions in this report relative to arguing for addressing the open research problem and plan(s)?

Prior Research: Problems and Their Contributions For each of the papers, there should be a section devoted to each that describes the problem it aims to solve and their contributions in aiming to solve the problem. Specifically, the section should consist of two subsections: (1) identifying one key problem addressed in each paper and (2) outlining the solution, its results, and the pros/cons of the solution.

Overview of Open Research Problem One high-level section motivating why you chose the open research problem that you chose and why you believe it is important and solvable.

Detailed Argument for Open Research Problem   One section identifying results from assigned papers that indicate the importance of the selected open research problem and its tractability.

Results from other papers may also be included, but please include references should you cite other work.

Research Plan   One section outlining your suggested research plan and its efficacy. First, identify a "claim" regarding what what you think could be proven positively or negatively for the open research problem. Then, please sketch the steps that a research plan to evaluate that claim may include. Each step should identify a task necessary to evaluate the claim, such as building a particular software component and/or designing an algorithm to compute a value. For each step, assess how easy or hard you think it would be to complete the proposed task. Every task should be at least potentially possible. If you need to solve the Halting Problem or some other problem known to be undecideable as a step that would not be acceptable. If you need to solve a problem that is intractable (exponential time), then you should suggest that an approximation will be necessary. Let me know if you have questions.

5   Deliverables

Please submit your report in PDF format.

6   Grading

The assignment is worth 100 points.

The grade that I assign will depend on the quality of the summary of problems solved and unsolved in the papers, the clarity of vision of the open research problem, and plan for addressing the open research problem.