A Template for Technical Papers

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ABSTRACT

This is a template project for writing technical papers for system/security/SE papers. If you are writing a paper about a new technique, you may first try to fill the blanks in the paper for the first draft and then polish the language later. Before you write the paper, please first make clear the topic sentence of your paper by filling blanks in the next paragraph.

By introducing a novel, non-trivial, reasonable strategy (), we address a challenging technical problem () that existing techniques have not well addressed. Therefore, we can better satisfy an important technical requirement ().

() are slots that you need to fill. In your first draft, please keep the brackets and directly put your answers in the blank. Then, people can quickly track your answers and tell you which part should be strengthened.

() are some comments and explanations that helps you to understand to blanks.

ACM Reference format:
Anonymous Author(s). 2022. A Template for Technical Papers. In *Proceedings of ACM Conference, Washington, DC, USA, July 2017 (Conference'17),* 4 pages.
https://doi.org/10.1145/nnnnnnn.nnnnnnn

1 INTRODUCTION

The technique requirement () is important for () reasons. (These are a few possible ways to prove the requirement is important. Below are a few examples.) First, (governments or big companies say it is important [][][][]). Second, (Big companies invest a lot of money in the requirement. The market worthes XXX billion dollars [][][][]). Third, (A lot of previous papers say this is an important requirement [][][][]). Fourthm (A lot of techniques are built upon this requirement [][][][]).

There are () types of solutions that aims to meet the requirement (), but the cannot satisify the requirement well. The first type is (), it cannot well satisify the requirement due to the limitation (). The second type is (), it cannot well satisify the requirement due to the limitation (). The second type is (), it cannot well satisify the requirement because (). (more if needed, add references if needed)

Existing techniques cannot well satisfy the requirement because they fail to address a technical problem (), which is important to the requirement for () reasons. First,(). Second, (). Third, (). (Sometimes the reasons are abvious, then you may not list the reasons explicitly and you can merge this paragraph to the previous one).

Addressing the technical problem is challenging because of (term 1), (term 2), and (term 3). (summarize the challenging with a few terms/words). Specifically, the technical problem is difficult because of () reasons. (These are a few examples.) First, (Term 1 is diffucult because it requires solving an NP-hard problem XXX. Existing solutions to XXX can only provide an approximation. For example, A solves XXX with a B technique, that over/under-approximate the result. For our problem, it is particularly challenging to balance the accuracy and run-time overhead.) Second, (Term 2 is difficult because it requires a lot of engineering effort. For example, we need to reverse engineer a large binary code. Unfortunately, the document of the binary is not available/clear. We need to analyze the assemblly manualy.) Third, (Term 3 is difficult because there are constraints on energy/overhead/time-limit. In practice, the technique requirement is about mobile/IoT/Cloud environments that have strict constraints on energy/money. Existing techniques, such as XXX and XXX, cannot address term 3 because they cannot meet the requirements of energy/money.) Fourth, (Term 3 is difficult because there is a conflict between A and B. On the one hand, satisfying A is important because of X. On the other hand, satisfying A is important because of Y. How to balance A and B is very difficult.)

In this paper, we propose a novel strategy () that addresses the technical problem () for the first time. Our strategy consists of () steps. First, (). Second, (). Third, ().

Our strategy is reasonable because it is motivated by () valid insights/observations. (These are a few examples.) The first insight is (). It is valid because (paper A, B, and C have reported it.) The second insight is (). It is valid because (we provide experiment to support it.) The third insight is (). It is valid because (we have a solid reasoning about it.) The fourth insight is (). It is valid because (we can provide a mathmatical proof.)

Our strategy is novel for () reasons. First,(we are the first who find the insights). Second, (insight 1 is old, but we are the first who apply it to the technical problem. Then we made necessary non-trivial adjustments to it). Third, (we are the first ones that provide the reasoning about the insights).

Our strategy is non-trivial because it encounters () technical/engineering challenges. (These are a few examples.) First, (the data volume is high. We need to efficiently process the data). Although there are (a few related solutions, such as A and B,), they cannot be used to solve our problem easily because (). We handle this challenge by (using a novel cache strategy that keeps hot data in memory.) Second, (there is not unified data format.) Although there are (a few related solutions, such as A and B,), they cannot be used to solve our problem easily because (). We address this challenge by (using a novel NLP model that automatically embeds words into vectors. Our model is particularly efficient for our problem because of A). Third, (we do not have enough labels in the training dataset). Although there are (a few related solutions, such as A and B,), they cannot be used to solve our problem easily because (). To address this challenge, we uses (a novel semi-supervised model that automatically learns labels of unlabbeled data points. Our model is particularlly effetive for our problem becauseXXX)

We show our strategy satisfies the requirement better and addresses the technical problem with valid insights with a realistic experiment environment (). Our datasets are realistic because (). Our system configuration is realistic because ().

To show that our strategy satisfies the technique requirement better with () aspects and compare them to () baselines. For the first aspect, we measure the metric (). Our strategy is (X%) better

than the baselines. For the second aspect, we measure the metric (). Our strategy is (X%) better than the baselines. For the second aspect, we measure the metric (). Our strategy is (X%) better than the baselines.

To show our strategy addresses the technical problem, we measure metric (). This metric can prove that the technical problem is addressed because (). The result is (), which proves that the problem has been addressed.

To show our strategy is reasonable, we measure the metric () to validate the insight (). The metric can prove the validity of the insight () because (). The result is ().

(Optional, sometimes you are not lucky enough to have this) We further validate the usefulness of our strategy in a production environment (). This environment is from (). Our strategy detects bugs/attacks/optimizes in commercial software or network environment.

We summarize our contributions as follows (Below are a few examples):

- We propose a novel strategy ().
- We propose find () new insghts, which are ()
- We implement the strategy as a tool,(), and integrate it into a commercial enviroment.
- We thoroughly evaluate our strategy with commercial dataset and real production environment.

2 MOTIVATING EXAMPLE AND BACKGROUND

We use a realistic example to discuss why existing techniques cannot satisfy the technical requirement well, why the technical problem is important, the basic idea of our strategy, and the insights behind our strategy.

Our example is from (a realistic source). It contains () components/steps. First, (some basic introduction to the example). Second, (some basic introduction to the example).Third, (some basic introduction to the example).

2.1 Why Existing Techniques Cannot Satisfy Technical Requirement Well

(More details than the intro) Existing techniques cannot satisfy the requirement because they fail to consider (). There are () types of existing techniques, but none of them can satisfy the requirement. (Here is an example.) The first type is (), which cannot satisfy the requirement because (). For example, in Figure 1, (the first type of technique cannot handle the code in lines 73-76. Therefore, it cannot do A that satisfy the requirement).

2.2 Why the Technical Problem Is Important

The technical problem is important because (). Failing to address the problem well cause (). (Here is an example.) For example, in Figure 1, the technical problem is critical to (solve the constraints in the red box, so the requirement is not satisfied because of A).

2.3 Why the Technical Problem Is Challenging

The technical problem () is challenging because of (term 1), (term 2), and (term 3). (Here is an example.) (Term 1) is challenging because (). For example, in Figure 1, (term 1) introduces challenges in (solving the constraints in the blue box). Unfortunately, addressing (term 1) is (an NP-hard problem). Existing techniques (can only provide an approximate,)which is not sufficient to address the technical problem because ().

2.4 Our Insights

Our strategy is based on () insights, which are (),(), and (). (Here is an example) For (insight 1), it is valid because (). For example, in Figure 1, (the code in lines 81 - 88) they meet the (insght 1) becuase ().

2.5 Core Idea

The core idea of our strategy consists of () steps. (Here is an example.) First, based on (insight 1), it does (). For example, in Figure 1, our strategy first (identifies the code that meets requirement A, such as the code in lines 85-87). This step is good because (). Second, based on (insight 2), it does (). For example, in Figure 1, our strategy does (). This step is good because ().

3 THEAT MODEL AND ASSUMPTIONS

(This is for security papers only. please check [1]. Here is an example) We follow the same threat model used in previous work []. Specifically, we assume the OS/hardware is uncompromised. We do not consider side-channel attacks.

4 APPROACH OVERVIEW

We realize our strategy as a framework/tool, NodLink, of which workflow is shown in Figure 2. The input of NodLink is (). The output of NodLink is (). NodLink has () components/steps. The first component is (), which accepts () and outputs (). Intuitively, the first component does (). We do this because (). The second component is (), which accepts () and outputs (). Intuitively, the second component does (). We do this because (). The third component is (), which accepts () and outputs (). Intuitively, the third component does (). We do this because ().

5 DESIGN

In this section, we discuss the design details of the components of NodLink. (I will make an example for one component, add more based on your need)

5.1 Component 1

The goal of (the name of component 1) is (). We use (the name of component 1) because ().

On the high-level, (the name of component 1) is a (a few sentences for high level description). We need to address () engineering problems in component (), which are (), (), and ().

(There are some examples) To address the engineering/technical problem (), we leverage a data structure (). This data structure is a graph whose nodes are () and edges are (). This graph is an attributed graph. Therefore, each node has an attribute that represents (). Formally, we define the graph as (your mathematical equations).

To address the engineering/technical problem (), we leverage a deep learning model (). We choose this deep learning model ()

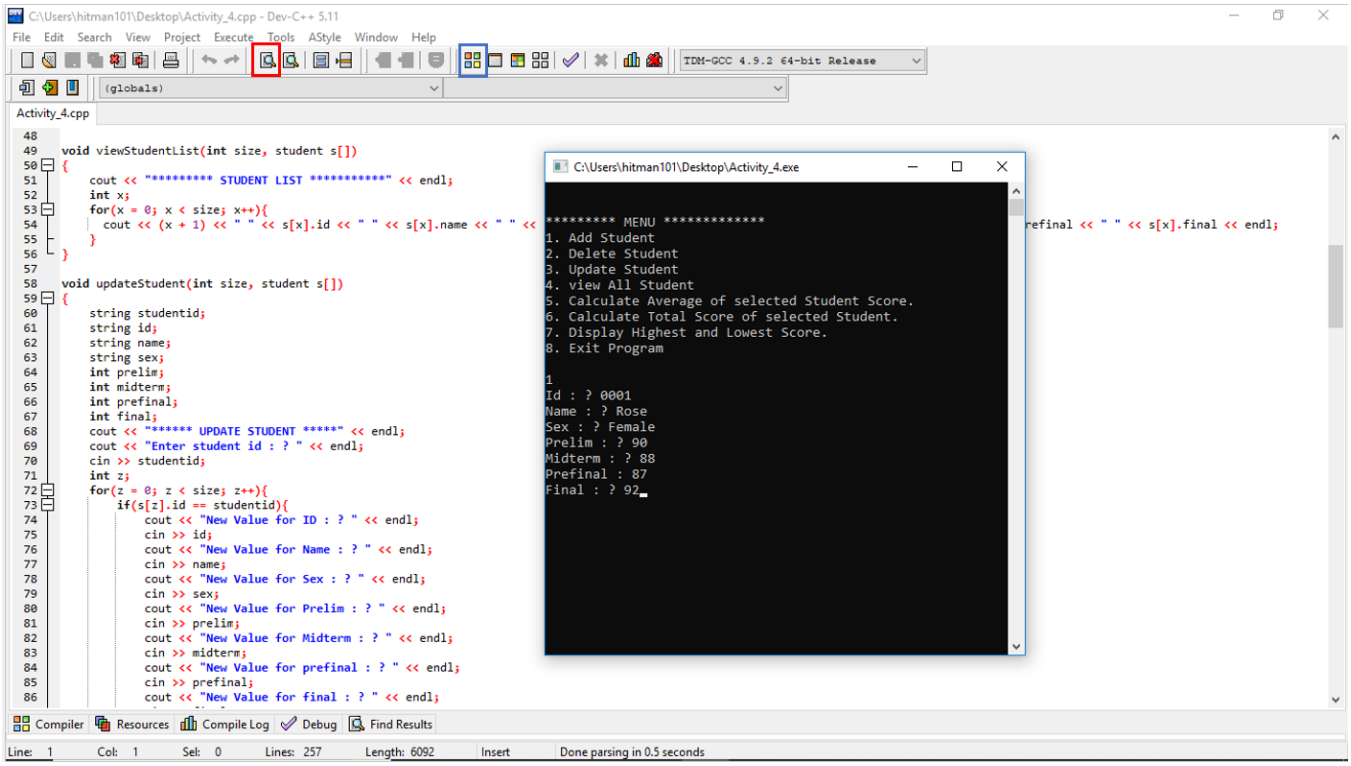

Figure 1: Your beaultiful example picture

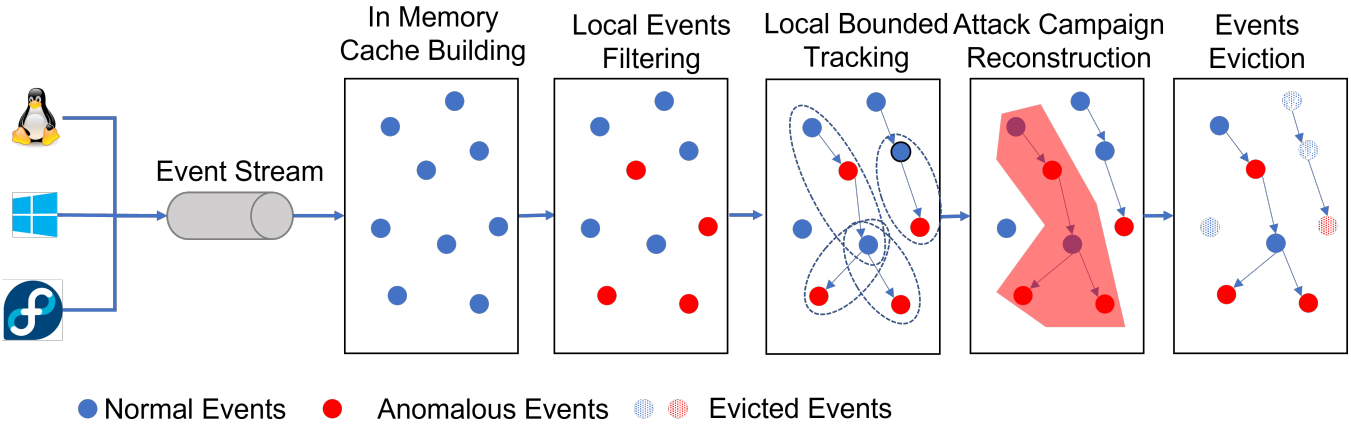

Figure 2: Your beaultiful workflow picture

because it can (). The deep learning model consists of () components, which are (). Formally, the deep learning model is (your math).We choose this deep learning model () because it can (). The deep learning model consists of () components, which are (). Formally, the deep learning model is (your math).

To address the engineering/technical problem (), we propose a heuristic algorithm. On the high level, our algorithm does (). The formal pseudocode is in Algorithm **??**. Specifically, (discuss the critical steps in the Algorithm)

6 EVALUATION

To evaluate NodLink, we focus on answering following research questions

RQ 1: Does NodLink improve the aspect () for the technical requirement? (Add more if you have more than one aspects)

RQ 2: Does NodLink address the technical problem?

RQ 3: Do the insights valid emprically?

RQ 4: Is NodLink useful in read production environment? (optional, if you are lucky, you will have this).

6.1 Experiment Environment and Datasets

The hardware platform of our experiment environment is (). The OS is (). The software environment is ().

We use () datasets because ().

We use () as baselines because ()

6.2 RQ 1: Better Satisfy the Requirement in Aspect 1

We evaluate whether NodLink better satisfies the aspect () of the technical requirement by measuring the metric (). We use this metric because (many other papers use it or other solid reasons.) To measure the metric (), we do (). Our measurement is solid because (). (sometimes the reasons for solid are obvious, then you may omit the discisson).

We report the result in Table/Figure X. Particularly, NodLink is XX% better than the baselines. This result proves that NodLink can better satisfy the requirement.

6.3 RQ 2: Does NodLink Address the Technical Problem

We evaluate whether NodLink address the technical problem () by measuring the metric (). We use this metric because (many other papers use it or other solid reasons.) To measure the metric (), we do (). Our measurement is solid because (). (sometimes the reasons for solid are obvious, then you may omit the discisson).

We report the result in Table/Figure X. Particularly, (). This result proves that NodLink address the technical problem.

6.4 RQ 3: Do the Insights Valid

We evaluate whether the insights are valud by measuring the metrics (). We use this metric because (many other papers use it or other solid reasons.) To measure the metric (), we do (). Our measurement is solid because (). (sometimes the reasons for solid are obvious, then you may omit the discisson).

We report the result in Table/Figure X. Particularly, (). This result proves that NodLink address the technical problem.

7 THREATS TO VALIDITY

(This is for SE papers only. Discuss potential threats to your evaluation protocal that may lead to biased measurement and how you address these threats. see:https://mydissertationeditor.com/threats-to-validity/)

8 RELATED WORK

9 DISCUSSION

(This section is for Security papers only. Discuss the limitation of your approach. Note that you should be careful here. You should avoid discussing very lithal bugs in your design. Focus on the open problems or issues related to your threat model and assumption. Below is an example.) Our approach assumes that (). Although this is a practical assumption and used by many academic and industrial solutions, attackers may compromise the assumption by (.) Although it is important to address the possible attacks out of the assumption of this paper, they are beyond the scope of this paper.

10 CONCLUSION

REFERENCES

[1] Victoria Drake. Threat Modeling. (????). https://owasp.org/www-community/Threat_Modeling#:~:text=A%20threat%20model%20typically%20includes%3A%201%20Description%20of,threats%2C%20and%20verification%20of%20success%20of%20actions%20taken