Thesis Ideas

A presentation made for Lotte

Contents

***Clear vision of academic relevance**

***Great software product idea - but difficulty arguing academic relevance**

00. Architectural Compliance System

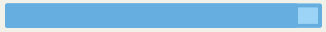
Draft Problem Statement

“

As systems evolve, they often drift away from their original architecture, introducing bugs, performance regressions and security holes. This project aim to - in an automated way - measure “how close” code is to its intended architecture...

”

Feasibility:



Notes: Very architectural

Objectives

- Define a architecture specification language (e.g. components, allowed dependencies).
- Build a tool that maps artifacts (packages, classes, modules) to specification.
- Compute compliance metrics
- Provide visual reports/feedback.

Academic Angle

- Test on open sources libraries
- Compare metrics to existing “architecture erosion” studies.

03. Automated Test Generation Tool

Draft Problem Statement

“

Writing unit and integration tests is labor-intensive and boring, leading to under-tested codebases. Multiple frameworks has been developed to motivate testing, because of its many benefits. This project will, given a (sub-) system and its backlog, automatically develop tests for the code.

”

Feasibility:

Notes: Similar to my BSc;

Objectives

- Analyze code structure/Task description
- Generate test cases with assertions
- Integrate into existing CI/CD pipelines or unit tests
- (We could do similar project but for security testing)

Academic Angle

- User test with TDD
- Devops

04. Live Security-Threat Crawler

Draft Problem Statement

“

Across the web, a sea of bots are deployed with various tasks - some of which are malicious. This project would aim to identify these malicious bots, document and summarize detected behaviour displaying them on a UI.

”

Feasibility:

Notes: I have no idea if this is possible

Objectives

- Continuously crawl and infiltrate communication.
- Extract indicators of malicious behavior
- Dashboard showing trending threats by volume, etc.

Academic Angle

- Networking, communication
- Security, Algorithms

05. (Mobile) Forensic Timeline Reconstruction

Draft Problem Statement

“

Security incidents span multiple systems—application logs, network flows, container orchestrators—and stitching them into a coherent timeline is manual and error-prone.

”

Feasibility:

Notes: I have no/little experience with forensics; But its interesting

Objectives

- Collect logs across utilized platforms
- Normalize timestamps, correlate events, detect related actions
- Visualize a unified incident timeline with forensic annotations.

Academic Angle

- Formal evaluation of correlation accuracy vs. manual reconstruction.
- Novel graph-based algorithms for event linking.

Other

- Monitoring: baseline anomaly detection & alerting
- NGO architecture