Detecting False Alarms from Automatic Static Analysis Tools: How Far are We?

Hong Jin Kang, Khai Loong Aw, David Lo

Motivation

- **No guarantees** that the warnings from Static Analyzers are real bugs
- Prior work [A] has identified the Golden Features, the most important features from the literature
- We conduct a replication study to better understand the features

Data leakage and duplication

- Determine if warnings are actionable by checking the reference revision

| Technique                  | Precision | Recall | F1  |
|----------------------------|-----------|--------|-----|
| Golden Features SVM        | 0.84      | 0.94   | 0.88|
| - leaked features          | 0.26      | 0.70   | 0.38|
| - data duplication         | 0.27      | 0.57   | 0.31|
| + reimplemented leaked     | 0.32      | 0.57   | 0.38|

Roadmap

[A] Wang et al. (2018)
- Data collection
- Identified the golden features

[B,C] Yang et al. (2021)
- Active Learning
- Discovered that the data is low dimensional

[D] Our work (2022)
- Investigated issues with the features
- Investigated issues with the dataset
- Features were still predictive! (AUC > 0.5)
- Motivates more work on new techniques and the need to address the lack of labelled data

[E] Yedida et al. (submitted to TSE, preprint available)
- “How to Find Actionable Static Analysis Warnings”
- “reflect more on that data”
- Open and collaboration science

References

[A] Wang et al. “Is there a "golden" feature set for static warning identification? an experimental evaluation.” ESEM 2018

[B] Yang et al. “Learning to recognize actionable static code warnings (is intrinsically easy).” EMSE 2021

[C] Yang et al. “Understanding static code warnings: An incremental AI approach.” ESA 2021

[D] Kang et al. “Detecting False Alarms from Automatic Static Analysis Tools: How Far are We?” ICSE 2022

[E] Yedida et al. “How to Find Actionable Static Analysis Warnings” arxiv (currently under review)