A Curated Dataset of Security Defects in Scientific Software Projects

Hot Topics in the Science of Security (HotSoS) 2020
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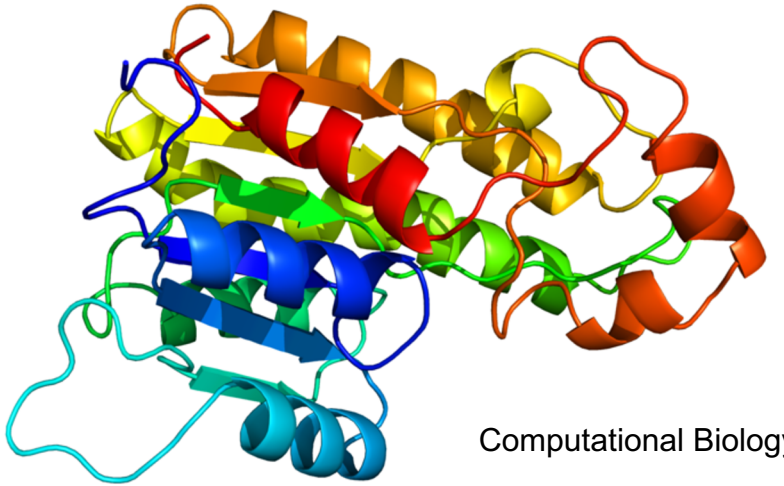
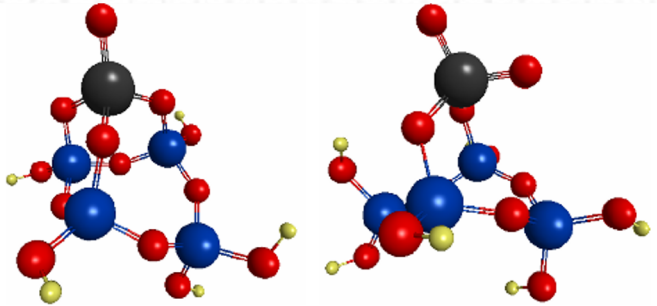
Scientific Software

Astrophysics



Computational Biology



Computational Chemistry

Scientific Software in Julia

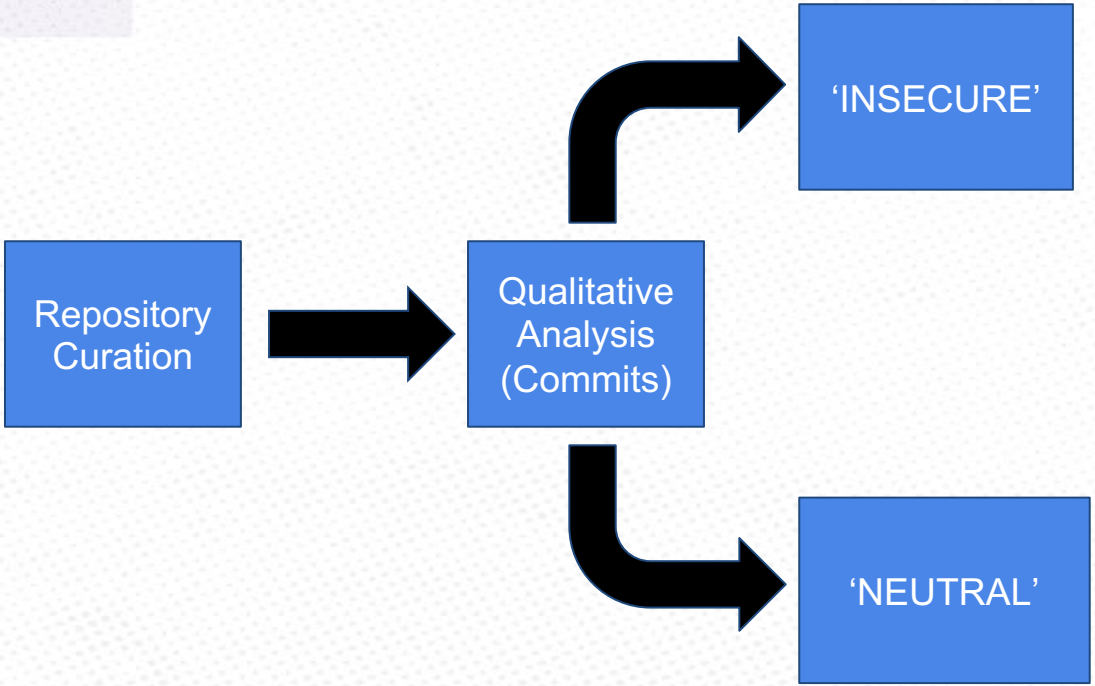
julia

CANCER RESEARCH UK

Research Question

- RQ: How frequently do security defects appear in scientific software projects?

Methodology



Nuthan Munaiah, Steven Kroh, Craig Cabrey, and Meiyappan Nagappan. 2017. Curating GitHub for engineered software projects. Empirical Software Engineering (2017), 1–35. https://doi.org/10.1007/s10664-017-9512-6

Curated Dataset (Repository Curation)

Initial Repo Count	3,405,303
Criteria-1 (1% Julia files)	3,866
Criteria-2 (Available)	3,115
Criteria-3 (Not a clone)	2,173
Criteria-4 (Commits/Month $\geq$ 2)	2,173
Criteria-5 (Contributors $\geq$ 5)	253
Criteria-6 (CI)	20
Final Repo Count	20

Curated Dataset (Qualitative Analysis)

Identifying the Characteristics of Vulnerable Code Changes: An Empirical Study

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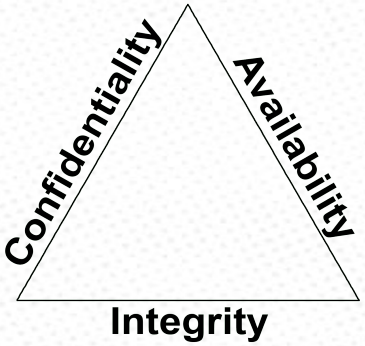
22nd ACM SIGSOFT International Symposium FSE 2014

Example commit message labeled ‘INSECURE’
:
“exploit utf16 support in julia 0.3 if available for proper utf16 conversion”



Results

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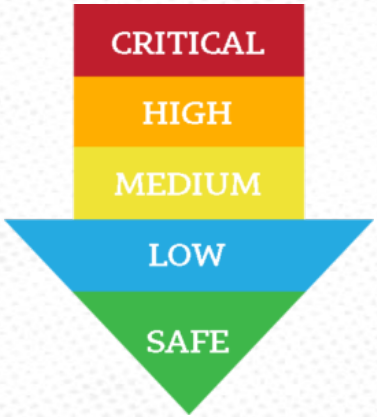
308/7024 = 4.4%
'INSECURE'

Cohen's Kappa = 1.0

Future Work

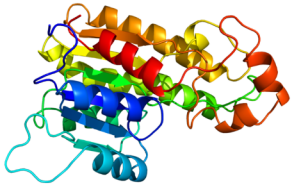
SECURITY DEFECT CATEGORIZATION & PREDICTION RESEARCH

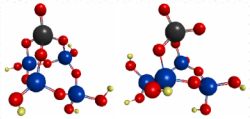


FIND UNDISCLOSED SECURITY DEFECTS

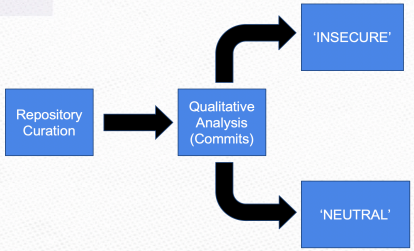
Summary

Scientific Software





Methodology



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