戦略的国際共同研究プログラム(SICORP) 日本-オーストラリア共同研究 終了報告書 概要

- 1. 研究課題名:「ソフトウェアエコシステムに潜むプロテストウェア検出のためのAI技術」
- 2. 研究期間:令和4年2月~ 令和6年3月
- 3. 主な参加研究者名: 日本側チーム

	氏名	役職	所属	研究分担
研究代表者	Raula Gaikovina Kula	Associate Professor	Nara Institute of Science and Technology	PI
研究参加者	Fan Youmei	PhD Student	Nara Institute of Science and Technology	Research Exchange
研究参加者	Supatsara Wattanakriengkrai	PhD Student	Nara Institute of Science and Technology	Research Exchange
研究参加者	Hathaichanok Damrongsiri	Master student	Nara Institute of Science and Technology	Data Analysis
研究参加者	Dong Wang	Assistant Professor	Kyushu University	Data Analysis, Mentoring
研究参加者	Hideaki Hata	Associate Professor	Shinshu University	Mentoring
研究期間中の全参加研究者数 6名				

相手側チーム

	氏名	役職	所属	研究分担
研究代表者	Christoph Treude	Associate Professor	University of Melbourne (Singapore Management University)	Partner PI
研究参加者	Marc Cheong	Associate Professor	University of Melbourne	Mentoring, Collaborator
研究期間中の全参加研究者数 2名				

4. 国際共同研究の概要

Software is eating the world, and open source is at its heart. There is a growing concern related to maintainers using their influence to make political stances (i.e., referred to as protestware). The key goal of this research is to bring together AI (Artificial Intelligence) technologies to help detect and understand how this protestware can impact our society as a whole. The research has expanded beyond AI, with outcomes that include characterizing developer reactions to protestware, a framework of AI ethics with protestware, and extensions on the impact of government sanctions on open

source projects.

5. 国際共同研究の成果

Outcomes of the research include a journal publication [1], one poster presentation [4], and two journal submissions (1 with major revisions) [2, 3]. All publications are to the top venues in software engineering. The poster presentation was at the flagship IEEE/ACM International Conference on Software Engineering. The research was completed with potential for future work.

5-1 国際共同研究の学術成果および実施内容

Key scientific outputs include a full taxonomy of the responses to protestware, with a dataset that is available for future usage and potential tool support development. Additionally, a framework for AI ethics explains why developers would turn their open source projects into protestware.

5-2 国際共同研究による相乗効果

Starting with four members, the research attracted additional collaborators and opened up new research avenues. Furthermore, since the partner PI has changed affiliation, there is potential for more collaborations with the new institution. The research has also progressed to include other topics beyond protestware.

5-3 国際共同研究成果の波及効果と今後の展望

As evident by the media reports [5, 6], protestware has had a social impact with media coverage of the outputs. Feedback has been positive, yet it is still unknown whether protestware will become as prevalent as the studied cases. The term "protestware" has also become recognized as a security threat (i.e., CVE-2022-23812).

References

[1] Marc Cheong, Raula Gaikovina Kula, Christoph Treude, "Ethical Considerations Towards Protestware," IEEE Software, IEEE, pp1 -7, 1 Jan. 2024, <u>doi:10.1109/MS.2023.3344778</u>

[2] Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. (2024) Developer responses to protestware in open-source software: The case of color.js and es5.ext, In Springer Empirical Software Engineering. (Major Revisions)

[3] Fan, Y., Hovhannisyan, A., Treude, C., Hata, H., & Kula, R. G. (2024) The Impact of Sanctions on GitHub Developers and Activities (Submitted)

[4] Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. "Going Viral: Case Studies on the Impact of Protestware," International Conference on Software Engineering, ACM, Lisbon, Portugal, 15 Apr. 2024

[5] Online News Article: "Is the future of open source software at risk due to protestware?" <u>https://research.smu.edu.sg/news/future-open-source-software-risk-due-protestware</u>

[6] Online News Article: "Protestware' is on the rise, with programmers self-sabotaging their own code. Should we be worried?"

https://theconversation.com/protestware-is-on-the-rise-with-programmers-self-sabotaging-t heir-own-code-should-we-be-worried-190836

Strategic International Collaborative Research Program (SICORP) Japan-Australia Joint Research Program Executive Summary of Final Report

- 1. Project title : [AI for Protestware Detection within Software Ecosystems]
- 2. Research period : February 2022 $\,\sim\,$ March 2024
- 3. Main participants :
- Japan-side

	Name	Title	Affiliation	Role in the research project
PI	Raula Gaikovina Kula	Associate Professor	Nara Institute of Science and Technology	PI
Collaborator	Fan Youmei	PhD Student	Nara Institute of Science and Technology	Research Exchange
Collaborator	Supatsara Wattanakriengkrai	PhD Student	Nara Institute of Science and Technology	Research Exchange
Collaborator	Hathaichanok Damrongsiri	Master student	Nara Institute of Science and Technology	Data Analysis
Collaborator	Dong Wang	Assistant Professor	Kyushu University	Data Analysis, Mentoring
Collaborator	Hideaki Hata	Associate Professor	Shinshu University	Mentoring
Total number of participants throughout the research period: 6				

Partner-side

	Name	Title	Affiliation	Role in the
				research
				project
PI	Christoph Treude	Associate	University of	Partner PI
		Professor	Melbourne	
			(Singapore	
			Management	
			University)	
Collaborator	Marc Cheong	Associate	University of	Mentoring,
		Professor	Melbourne	Collaborator
Total number of participants throughout the research period: 2				

4. Summary of the international joint research

Software is eating the world, and open source is at its heart. There is a growing concern related to maintainers using their influence to make political stances (i.e., referred to as protestware). The key goal of this research is to bring together AI (Artificial Intelligence) technologies to help detect and understand how this protestware can impact our society as a whole. The research has expanded beyond AI, with outcomes that include characterizing developer reactions to protestware, a framework of AI ethics with protestware, and extensions on the impact of government sanctions on open source projects.

5. Outcomes of the international joint research

Outcomes of the research include a journal publication [1], one poster presentation [4], and two journal submissions (1 with major revisions) [2, 3]. All publications are to the top venues in software engineering. The poster presentation was at the flagship IEEE/ACM International Conference on Software Engineering. The research was completed with potential for future work.

5-1 Scientific outputs and implemented activities of the joint research.

Key scientific outputs include a full taxonomy of the responses to protestware, with a dataset that is available for future usage and potential tool support development. Additionally, a framework for AI ethics explains why developers would turn their open source projects into protestware.

5-2 Synergistic effects of the joint research

Starting with four members, the research attracted additional collaborators and opened up new research avenues. Furthermore, since the partner PI has changed affiliation, there is potential for more collaborations with the new institution. The research has also progressed to include other topics beyond protestware.

5-3 Scientific, industrial or societal impacts/effects of the outputs

As evident by the media reports [5, 6], protestware has had a social impact with media coverage of the outputs. Feedback has been positive, yet it is still unknown whether protestware will become as prevalent as the studied cases. The term "protestware" has also become recognized as a security threat (i.e., CVE-2022-23812).

References

[1] Marc Cheong, Raula Gaikovina Kula, Christoph Treude, "Ethical Considerations Towards Protestware," IEEE Software, IEEE, pp1 -7, 1 Jan. 2024, <u>doi:10.1109/MS.2023.3344778</u>

[2] Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. (2024) Developer responses to protestware in open-source software: The case of color.js and es5.ext, In Springer Empirical Software Engineering.(Major Revisions)

[3] Fan, Y., Hovhannisyan, A., Treude, C., Hata, H., & Kula, R. G. (2024) The Impact of Sanctions on GitHub Developers and Activities (Submitted)

[4] Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. "Going Viral: Case Studies on the Impact of Protestware," International Conference on Software Engineering, ACM, Lisbon, Portugal, 15 Apr. 2024

[5] Online News Article: "Is the future of open source software at risk due to protestware?" <u>https://research.smu.edu.sg/news/future-open-source-software-risk-due-protestware</u>

[6] Online News Article: "Protestware' is on the rise, with programmers self-sabotaging their own code. Should we be worried?"

https://theconversation.com/protestware-is-on-the-rise-with-programmers-self-sabotaging-t heir-own-code-should-we-be-worried-190836

国際共同研究における主要な研究成果リスト

1. 論文発表等

*原著論文(相手側研究チームとの共著論文)発表件数:計3件 ・査読有り:発表件数:計3件

Marc Cheong, Raula Gaikovina Kula, Christoph Treude, "Ethical Considerations Towards Protestware," IEEE Software, IEEE, pp1 -7, 1 Jan. 2024, <u>doi:10.1109/MS.2023.3344778</u>

Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. (2024) Developer responses to protestware in open-source software: The case of color.js and es5.ext, In Springer Empirical Software Engineering.(Major Revisions)

Fan, Y., Hovhannisyan, A., Treude, C., Hata, H., & Kula, R. G. (2024) The Impact of Sanctions on GitHub Developers and Activities (Submitted)

2. 学会発表

*ポスター発表(相手側研究チームとの連名発表)

Fan, Y., Wang, D., Wattanakriengkrai, S., Damrongsiri, H., Treude, C., Hata, H., & Kula, R. G. "Going Viral: Case Studies on the Impact of Protestware," International Conference on Software Engineering, ACM, Lisbon, Portugal, 15 Apr. 2024

発表件数:計1件

3. 主催したワークショップ・セミナー・シンポジウム等の開催 NA

4. 研究交流の実績(主要な実績)

Weekly Meetings since February 2023, we have Webex online weekly meetings.

Japan Team Travel to Melbourne University:

26/04/2023 to 1/07/2023
22/05/2023 to 3/06/2023
26/04/2023 to 3/06/2023

Fan Youmei Wattankrienkrai Supatsara Kula Raula Gaikovina

5. 特許出願

NA

6. 受賞·新聞報道等

Online News Article: "Is the future of open source software at risk due to protestware?" <u>https://research.smu.edu.sg/news/future-open-source-software-risk-due-protestware</u> Online News Article: "Protestware' is on the rise, with programmers self-sabotaging their own code. Should we be worried?"

https://theconversation.com/protestware-is-on-the-rise-with-programmers-self-sabotaging-t heir-own-code-should-we-be-worried-190836

7. その他 NA