**SHF: SMALL: CROWDSEER: Automatically finding and repairing malfunctioning software engineering communities**

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**OVERVIEW:** Technical documentation is an essential tool for communicating knowledge to developers and ensuring that platforms and APIs can be widely adopted. In recent years, developers have shifted away from consuming traditional sources of documentation (official guides and books) and instead consume community-created resources. For Android, not only can more examples be found on Stack Overflow, a question and answer site, than the official documentation guide, developers may be getting as much as 50% of their documentation from community resources. While there are many benefits to these community resources, two main also problems exists: 1) Poor and insecure advice can propagate quickly and become a liability for the platform and ecosystem. 2) Barriers, and failing community mechanics threaten the accessibility and long-term viability of these resources. In this project, we describe a set of tools that help API and platform stakeholders with tools that automatically detect and repair incorrect, insecure, and ill-advised content and harmful interactions for the community.

**INTELLECTUAL MERIT:** Our proposal describes a new platform for automated repair of community resources using novel detectors that discover problematic content and interactions. One sign of a malfunctioning developer community is the failure to generate sufficient examples relevant to the developer community. Our platform supports the ability to detect low levels of community coverage of particular API content in order to make targeted recommendations for new community contributions.

Broken community resources that no longer work with newer versions of APIs and platforms present problematic learning experiences and signal instability in a platform. However, manually repairing all community resources is too time consuming for community stakeholders and shifting responsibility to the community is often unsuccessful. Our platform supports the ability to automatically refactor, test, and repair community resources. Monitoring unstable code changes can be time consuming for community stakeholders. Our platform provides mechanisms for automating the repair of community resources with repair bots.

Another sign of a malfunctioning developer community occurs when the community fails to attract new members or maintain core members that serve as experts of the community. Presently, females are virtually absent from online programming communities. Our platform supports the ability to detect unhealthy communities and reduce participation barriers that prevent new users from making contributions. Monitoring negative online behaviors can be time consuming for moderators. Our platform provides interventions that maximize accessibility and inclusiveness of development knowledge and resources while reducing toxic, unwelcoming behavior with community bots.

**BROADER IMPACTS:** The broader impacts of this project relate to the integration of important software engineering problems, dissemination of work, and targeted efforts to recruit students who are from underrepresented groups or who might otherwise be unable to participate in academic research. The research will enhance the infrastructure by providing better learning resources and online communities for software engineering and STEM fields. Our research results will be disseminated in software engineering conferences and journals, including software engineering and computer science education conferences. Our platform will disseminated as shared infrastructure for supporting the Github Community & Safety Team and Stack Overflow Community Team. Our work will improve the ability of practitioners to more effectively manage and curate community resources and limit negative community behaviors while maximizing the accessibility and inclusiveness of development knowledge and resources.

**KEYWORDS: automated community repair, community resources, online communities**