Engineering Village™

1. **Mining Android API Usage to Generate Unit Test Cases for Pinpointing Compatibility Issues**
Sun, Xiaoyu; Chen, Xiao; Zhao, Yanjie; Liu, Pei; Grundy, John; Li, Li **Source:** *arXiv*, August 29, 2022; **E-ISSN:** 23318422; **DOI:** 10.48550/arXiv.2208.13417; **Publisher:** arXiv

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Abstract:
Despite being one of the largest and most popular projects, the official Android framework has only provided test cases for less than 30% of its APIs. Such a poor test case coverage rate has led to many compatibility issues that can cause apps to crash at runtime on specific Android devices, resulting in poor user experiences for both apps and the Android ecosystem. To mitigate this impact, various approaches have been proposed to automatically detect such compatibility issues. Unfortunately, these approaches have only focused on detecting signature-induced compatibility issues (i.e., a certain API does not exist in certain Android versions), leaving other equally important types of compatibility issues unresolved. In this work, we propose a novel prototype tool, JUnitTestGen, to fill this gap by mining existing Android API usage to generate unit test cases. After locating Android API usage in given real-world Android apps, JUnitTestGen performs inter-procedural backward data-flow analysis to generate a minimal executable code snippet (i.e., test case). Experimental results on thousands of real-world Android apps show that JUnitTestGen is effective in generating valid unit test cases for Android APIs. We show that these generated test cases are indeed helpful for pinpointing compatibility issues, including ones involving semantic code changes.

Main Heading: Data flow analysis **Controlled terms:** Android (operating system) - Semantics - Testing

Uncontrolled terms: Android apps - Coverage rate - Inter-procedural - Prototype tools - Real-world - Runtimes - Test case - Test case coverage - Unit tests - Users' experiences

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