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UIDTECT

Automating User Interface Design Violation Detection for Mobile Applications

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ABSTRACT

User interface (UI) design is an important aspect that affects the user experience and usability of software applications. However, many developers, both experienced and novice, tend to ignore fundamental UI design guidelines. Poor UI design frequently results in users having a negative experience, which discourages return visits. Therefore, a system that can detect UI design violations and give developers suggestions on how to enhance their UI design is required.

To address the issue, this research proposes a system that combines object detection and rule-based methods to detect UI design violations. Specifically, an object detection model will be used to detect UI elements on UI images, and the detected UI element details will be retrieved by a rule-based system that applies UI design guidelines to detect UI violations on the uploaded image.

The results of the evaluation demonstrate that the proposed system outperformed other existing object detection models. The system achieved a mean average precision at a 0.5 intersection over union (mAP@0.5) of 97.2, which is higher than other object detection models. This system is expected to bridge the gap in detecting UI design violations both on Android and iOS mobile application UIs and help developers improve their UI design for better user experience and usability.

Keywords: Graphical User Interface, Object Detection, Deep learning, Rule-base

Subject Descriptors:

- Software Engineering → User Interface Design → Object Detection → Rule-Based Systems
- Artificial Intelligence → Computer Vision → Object Detection → User Interface Design
- Software Development → UI Design Principles → Object Detection → Rule-Based UI Violation Detection