Understanding the consistency between words and actions for Android apps

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Motivation

Text descriptions can be an alternative approach to informing users about the use of privacy-sensitive resources.

Permission
Privacy policy
User perspective

Ex1) This app will navigate you to the nearest restroom ……
Ex2) You can share your photos with your friends ……

Research Questions

This work aims to address the following two research questions:

RQ1: How many apps provide text descriptions that successfully inform users about the use of privacy-sensitive resources by the app?

RQ2: What are the primary reasons due to which text descriptions fail to refer to the use of privacy-sensitive resources?

To answer these questions, we developed a framework called ACODE.

Key Idea: ACODE Framework

We combine two technical approaches: (1) Static code analysis and (2) Text description analysis

Input

APK
Desc

Static code analyzer

Permission filtration → API filtration → Function call analysis

Text descriptions analyzer

Text preprocessing → Binary classification

Key Findings

Answers to Research Question 1:

• Of the Official market apps, 17–35% refer to use of permissions in their descriptions.
• Of the TP market apps that can access location resources, only 4% of the text descriptions refer to use of permission.
For other resources, 17–20% of text descriptions refer to use of permissions.

Answers to Research Question 2:

<table>
<thead>
<tr>
<th>Resource</th>
<th>The primary reasons of the inconsistency</th>
<th>Official</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Apps with ad libraries use location resource without description</td>
<td>55%</td>
<td>78%</td>
</tr>
<tr>
<td>Contact</td>
<td>Apps developed with cloud-based app building services contain unnecessary APIs</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Camera</td>
<td>Apps with BAR/QR code reader access camera without description</td>
<td>53%</td>
<td>66%</td>
</tr>
</tbody>
</table>

We believe these findings will be useful for improving users’ awareness of privacy on mobile software distribution platforms.