Examining User-Developer Feedback Loops in the iOS App Store

Kendall Bailey, Mei Nagapan, Danny Dig
“OneNote is an excellent, easy to use tool for students, writers, people looking for a way to organize notes” – About (2004)
E-mail Microsoft Customer Service

Use this form to e-mail Microsoft about product information or general inquiries. If you have technical support issues, please visit Microsoft Technical Support.

If you suspect your Hotmail/Outlook.com account has been hacked, taken over or if you have a problem signing in, please visit Outlook.com Help.

* Required

Your feedback is important to us. To make sure we can address your questions or concerns, please fill out the form below completely.

Name: *

E-mail address: * (you must include your e-mail address below)

What Product family do you have a question about? (e.g. Windows, Office, Internet Explorer) *

What Product Version do you have a question about? (e.g. Windows 7 Home Premium, Office 2010 Professional, Word 2010) *

How did you obtain your Microsoft Product? *

- Please Select -

How may we help you? *

Choose one:

- What is the subject of your comment or question? *

Please provide a detailed description of your issue or question along with any error messages so we may assist you. Do not include any additional personal information when submitting this feedback. *

Make sure you receive a reply from Microsoft. Review important information about spam filters.

Enter the characters you see.

New | Audio

Submit
Microsoft Windows

The system has recovered from a serious error.

A log of this error has been created.

Please tell Microsoft about this problem.
We have created an error report that you can send to help us improve Microsoft Windows. We will treat this report as confidential and anonymous.

To see what data this error report contains, click here.

Send Error Report  Don't Send
Microsoft Windows

The system has recovered from a serious error.

A log of this error has been created.

Please tell Microsoft about this problem.
We have created an error report that you can send to help us improve Microsoft Windows. We will treat this report as confidential and anonymous.

To see what data this error report contains, click here.

Send Error Report  Don't Send
Feedback Loops

User

“Login issue fixes.”

“Login issue fixes.”

Updates & Uses App

Reads Review

“This app always comes up with a login error disclaimer.”

Developer
Motivation for our Research

We buy software differently: AppStores as software Hubs, AppSores are communication channels

We know little on how developers respond to feedback

Understanding feedback loops is Win-win-win
Methodology: Corpus

From iTunes App Store

- Seeded the top 50 apps from Distimo

1,752 iOS apps
30,875 release notes
806,209 reviews
Methodology: Finding Feedback Loops

• Search backwards from releases and find matching user reviews
• Challenges:
  • Only compare same type of statement (e.g., bugs, features)
  • Noise from non-actionable information
  • Search Scope: A review statement is limited to a single feedback loop, but a release statement can complete multiple feedback loops.
Challenge 3: Search Scope

Search Scope:

1. We fixed a crash under iOS 6
2. We've also fixed a few crashes and bugs
3. Fixed crashes when importing from video

It's crashes whenever I try to make a gif.
I love the app, but every time I try to post a video it crashes.
There's a lot of crashing errors also :(.
Every time I add a video the sound goes off and the app crashes.
Methodology: Tools

Determine kinds of statements (e.g., bug, feature, crash) with Support Vector Machine (SVM) classifier based on LibLinear by Fan et al. [JML08]

Determine relatedness between words and short phrases with semantic relatedness tool based on Wikipedia Miner by Milne et al. [AI13]

Determine tone of reviews with sentiment analysis based on SentiStrenght by Thelwall et al. [JASIST10]
Methodology: Classifying

• Support Vector Machine (SVM) classifier
• Sentence level granularity
• Manually labeled 3667 release notes statements
  • Interrater agreement 79% of 20%
• Manually labeled 2504 review statements¹
  • 97% interrater agreement from 62% agreement

Research Questions

RQ1: How frequent are feedback loops?

RQ2: What are the characteristics of these feedback loops?

RQ3: What enables feedback loops?
RQ1: How frequent are feedback loops?

- Feedback loops in 331 apps
- 18.7% of apps
RQ2: What are the characteristics of these feedback loops?

<table>
<thead>
<tr>
<th>Label</th>
<th>Number Reviews</th>
<th>Number Feedback Loops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bug Fix</td>
<td>121573</td>
<td>505</td>
</tr>
<tr>
<td>Feature Request</td>
<td>57781</td>
<td>308</td>
</tr>
<tr>
<td>Crashing</td>
<td>51949</td>
<td>323</td>
</tr>
<tr>
<td>Compatibility Problems</td>
<td>24617</td>
<td>5</td>
</tr>
<tr>
<td>User Interface</td>
<td>18028</td>
<td>3</td>
</tr>
<tr>
<td>Response Time</td>
<td>11056</td>
<td>14</td>
</tr>
<tr>
<td>Network Problem</td>
<td>10459</td>
<td>22</td>
</tr>
<tr>
<td>Resource Heavy</td>
<td>3949</td>
<td>3</td>
</tr>
<tr>
<td>Log-in Issue</td>
<td>2703</td>
<td>37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>302115</strong></td>
<td><strong>1220</strong></td>
</tr>
</tbody>
</table>
RQ2: What are the characteristics of these feedback loops?

<table>
<thead>
<tr>
<th>Label</th>
<th>Number Reviews</th>
<th>Number Feedback Loops</th>
<th>Number Completed Loops per 10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bug Fix</td>
<td>121573</td>
<td>505</td>
<td>42</td>
</tr>
<tr>
<td>Feature Request</td>
<td>57781</td>
<td>308</td>
<td>53</td>
</tr>
<tr>
<td>Crashing</td>
<td>51949</td>
<td>323</td>
<td>62</td>
</tr>
<tr>
<td>Compatibility Problems</td>
<td>24617</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>User Interface</td>
<td>18028</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Response Time</td>
<td>11056</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Network Problem</td>
<td>10459</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Resource Heavy</td>
<td>3949</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Log-in Issue</td>
<td>2703</td>
<td>37</td>
<td>137</td>
</tr>
<tr>
<td>Total</td>
<td>302115</td>
<td>1220</td>
<td>1739</td>
</tr>
</tbody>
</table>
RQ2: What are the characteristics of these feedback loops?

<table>
<thead>
<tr>
<th>Label</th>
<th>Number Reviews</th>
<th>Number Feedback Loops</th>
<th>Number Completed Loops per 10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bug Fix</td>
<td>121573</td>
<td>505</td>
<td>42</td>
</tr>
<tr>
<td>Feature Request</td>
<td>57781</td>
<td>308</td>
<td>53</td>
</tr>
<tr>
<td>Crashing</td>
<td>51949</td>
<td>323</td>
<td>62</td>
</tr>
<tr>
<td>Compatibility Problems</td>
<td>24617</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>User Interface</td>
<td>18028</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Response Time</td>
<td>11056</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Network Problem</td>
<td>10459</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Resource Heavy</td>
<td>3949</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Log-in Issue</td>
<td>2703</td>
<td>37</td>
<td>137</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>302115</strong></td>
<td><strong>1220</strong></td>
<td><strong>1339</strong></td>
</tr>
</tbody>
</table>
RQ3: What enables feedback loops?
RQ3: What enables feedback loops?
RQ3: What enables feedback loops?
RQ3: What enables feedback loops?
RQ3: What enables feedback loops?
RQ3: What enables feedback loops?

![Diagram showing sentiment of all review statements]

- Angry face
- Neutral face
- Happy face
RQ3: What enables feedback loops?
User:

“Give me a big selection of dogs then I will give you 5 stars!!!!!!”

Update & Use App
Update Review

Developer:

“New puppies have been added.”

Reads Review
Ransoming Developers

User

“GIVE ME A BIG SELECTION OF DOGS THEN I WILL GIVE YOU 5 STARS!!!!!!”

Developer

Reads Review

“-New puppies have been added.”

My Dog Room Free

27 User Developer
Implications

Developers
- Need an infrastructure to manage reviews
- Responding to ransom notes not effective
- Catch all Thrown Exceptions

Users
- Post your requests and issues
- Rate in extremes
- Keep a level tone
- Be patient, it can take a long time to respond

App Stores
- Need for other communication channels
- Given developers visible accountability
- Trace power reviewers and promote their reviews

Researchers
- Alternative models for submitting feedback
- How other users respond to feedback loops
- Recommending systems for developers
Another kind of feedback loop

Do you have a plan for your personal growth?
How do you get better at what you do?
How do you improve your relationships?
How do you hire great students?
How do you mentor and grow them into tomorrow’s tech leaders?
How do you prioritize the important over the urgent?
Discussions

• What was the most unexpected result?

• What did the authors do right?

• What could have been improved?
New Ideas

• Miguel: how can we get the App Store to incorporate the feedback loop into the App rating?

• Braden: replicate study on Google Play Store
  • A study from the user’s perspective on the app review process

• Deval: similar study performed on pull requests and merge requests
• Dan: more insights into the “WHY” behind the findings
• Malinda: improve the analysis of the remaining 80% cases.
  • Integration with bug triage systems
• Vijay: improved results with better SVMs, alternative to ML
Open Questions

• Miguel: how would other users respond to presence of feedback loops? How would App Store present feedback loops?
• Braden: did we remove the “outliers”? How do feedback loops look like for lesser known companies or individuals?
  • Can the aggressiveness of the tone affect tight feedback loops?
• Dan: why login issues are so prevalent?
• Malinda: confounding effects with non-payed applications?
  • do feedback loops continue after a bug was fixed?
• Vijay: dedicated channels for communication improve feedback loops?