

User Feedback for Continuous Software Evolution

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11.11.2013

Introduction

Empirical analysis
of user feedback

Categorizing user
feedback and
creating
requirements

Questions to be answered

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Categorizing user
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- ▶ Can app stores serve as communication channel among users and with developers?
- ▶ How can developers use app stores to better and quicker understand evolving user needs and requirements?
- ▶ Which methods and tools should support software organizations to analyze, aggregate, and use this feedback?

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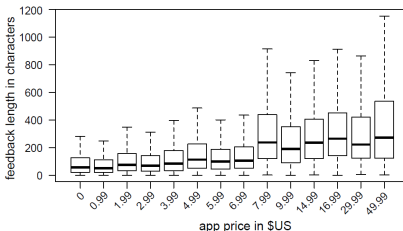
Categorizing user feedback and creating requirements

Focus of analysis

- ▶ Feedback usage
 - ▶ Feedback frequency
 - ▶ Feedback meta-data
- ▶ Feedback content
 - ▶ Feedback type
 - ▶ Feedback patterns
- ▶ Feedback impact
 - ▶ Market impact
 - ▶ Community impact

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#	topic	description	freq.
t1	praise	expresses appreciation	75.36%
t2	helpfulness	scenario the app has proven helpful for	22.45%
t3	feature information	concrete feature or user interface	14.45%
t4	shortcoming	concrete aspect, user is not happy with	13.27%
t5	bug report	bug report or crash report	10.00%
t6	feature request	asks for missing feature	6.91%
t7	other app	reference to other app, e.g. for comparison	3.91%
t8	recommendation	suggests acquisition	3.82%
t9	noise	meaningless information	3.27%
t10	dissuasion	advises against purchase	3.27%
t11	content request	asks for missing content	2.91%
t12	promise	trades a better rating for a specific improvement	2.00%
t13	question	asks how to use specific feature	1.27%
t14	improvement request	requests improvement (e.g. app is slow)	1.18%
t15	dispraise	opposite of praise	1.18%
t16	other feedback	references or answers other feedback	1.09%
t17	howto	explains other users how to use app	0.91%

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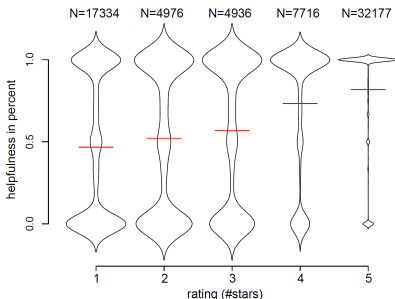
#	pattern	support	Ø rating
p1	{helpfulness, praise}	22.18%	4.86
p2	{feature information, praise}	14.18%	4.83
p3	{feature request, praise}	4.64%	4.37
p4	{helpfulness, feature information, praise}	4.27%	4.87
p5	{helpfulness, feature information}*	4.27%	4.87
p6	{praise, recommendation}	3.73%	4.90
p7	{other app, praise}	2.64%	4.79
p8	{praise, shortcoming}	2.64%	4.24
p9	{content request, praise}	2.27%	4.60
p10	{dissuasion, shortcoming}	1.82%	1.45
p11	{helpfulness, praise, recommendation}	1.73%	4.95
p12	{helpfulness, recommendation}*	1.73%	4.95
p13	{bug report, dissuasion}	1.27%	1.21
p14	{bug report, shortcoming}	1.27%	1.57
p15	{bug report, praise}	1.18%	4.23
p16	{feature information, praise, recommendation}	1.09%	4.83
p17	{feature information, recommendation}*	1.09%	4.83
p18	{improvement request, praise}	1.00%	4.18
p19	{feature information, other app, praise}	1.00%	4.91
p20	{feature information, other app}*	1.00%	4.91

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Outline

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- ▶ Use ASUM (**a**spect and **s**entiment **u**nification **m**odel) to determine topic and sentiment of comment
- ▶ Create report with topics and labels
- ▶ Test if REs benefit from the report

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Topic: <i>Updates</i>
Glitches, constantly refreshes and goes back to top of page. The last update messed up the newsfeed.
Topic: <i>Features</i>
The features on this app should be like the desktop, its too many things you cant do. Still missing some features that the iphone has but pretty good overall.
Topic: <i>Developers</i>
I hope the devs can look into this and see about adding a rotate features. You need to allow us to log out.

Results

	Control group	Test group
Comments analyzed	250	376
Total time (min)	46	44
Information recorded		
# New Requirements	8	12
# Req. Changes (alterations, reprioritization and deletions)	2	4
# Total Changes	10	16

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Onedirectional communication works

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Get information about actual use of app

- ▶ Which methods and tools should support software organizations to analyze, aggregate, and use this feedback?

Filter, aggregate on topics, helpfulness and rating

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- ▶ Galvis Carreno, Laura V., and Kristina Winbladh. "Analysis of user comments: an approach for software requirements evolution." Proceedings of the 2013 International Conference on Software Engineering. IEEE Press, 2013.
- ▶ Pagano, Dennis, and Walid Maalej. "User Feedback in the AppStore: An Empirical Study." Education 16.16,577: 1-99.

Discussion

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Discussssion

- ▶ Practical experiences with appstore comments
- ▶ Why not use a real bug tracking system?