Informing Future Design via Large-Scale Research Methods and Big Data

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Abstract

With the launch of 'app stores' on several mobile platforms and the great uptake of smartphones among the general population, researchers have begun utilising these distribution channels to deploy research software to large numbers of users. Previous Research In The Large workshops have sought to establish base-line practice in this area. We have seen the use of app stores as being successful as a methodology for gathering large amounts of data, leading to design implications, but we have yet to explore the full potential for this data's use and interpretation. How is it possible to leverage the practices of large-scale research, beyond the current approaches, to more directly inform future designs? We propose that the time is right to re-energise discussions on large-scale research, looking further than the basic methodological issues and assessing the potential for informing the design of new mobile software.

Author Keywords

App stores; mass participation; design; large-scale mobile HCI; user study; research in the large

ACM Classification Keywords

H.5.2 [User Interfaces]: Evaluation/Methodology

Introduction

In recent years, smartphones have become popular among the general population, now accounting for over half of all phone purchases in the US. The fact that people carry and use mobile devices with advanced sensors in everyday life, coupled with the 'app store' method of simple software distribution, means that researchers are now able to deploy advanced mobile software to very large numbers of users in ways not previously possible. A research community has been established, based around three previous Research in the Large workshops [10], which have brought together researchers from academia and industry who were interested in exploring the opportunities of app stores and establishing a best practice of how research utilising these large-scale methods should be conducted.

These opportunities have been embraced by researchers in many successful ways. The potential benefits and challenges have been explored, and new methodological practices have started to emerge, as shared experience within the community has developed. There is now a corpus of literature for new researchers in the area to review to gain insights into which practices might work (and which might not), covering areas such as recruitment, data capture, analysis techniques and ethical responsibilities.

Researchers working in this area have followed a number of different paths. In adopting the strategies of large-scale research, researchers have managed to collect data on usability and human factors in design in previously unprecedented volume [7]. Other research has studied use of the distribution stores themselves, collecting data about app install behaviour and people's use of their phones [6]. Combining mass participation trials with simultaneously conducted smaller scale trials to gain qualitative insights about phenomena seen in the data has also proven successful [9].

Having identified the challenges, developed strategies for dealing with them, and established the beginnings of a community consensus on the best practices for conducting research using app stores, we are now in a position to step back and consider what more we might learn through these methods. A major goal of HCI as a field is to inform the future designs of interactive technology. Exactly what role does this burgeoning trial methodology have towards this goal? In what ways can research conducted through app stores and other means of wide distribution directly inform design?

While many previous publications in this area have helped us find trends in user behaviour, and issues surrounding long-term use, fewer reported studies in the literature seem to discuss closing the design cycle to inform future designs. While large corporations use well-known methods to iterate their own services (e.g. data-driven design and A/B testing), they generally only contribute to improving their own existing services. Although the usage data and means of understanding the data seem readily available, what we are missing in research around mobile services and mobile technology is a discussion of methodologies for using large-scale deployments and data collection in informing future designs.

Design methods

HCI is a research field that engages with design in several ways [4], bringing new artefacts to life and understanding people interacting with technologies.

Many methods exist to inform such new designs, and the field constantly evolves, with new or improved design methodologies proposed every year.

However, we should be careful when we talk about these as design methods, as in methods for designing – solving a specified design problem. Many methods in HCI are more targeted towards *informing* new designs, rather than *to design*. This is to say that rather than providing tools on answering the question of *how to build a system that solves a problem*, they offer tools to *inspire new ideas*. For example, ethnography allow us to look at both existing practices, and how new practices develop in use of new technologies. The initial purpose of applying such methods to HCI was not only to develop implications for design [3], but also to inspire and inform new designs and ideas. Probes and related techniques are not meant to be used in evaluation of systems or even to develop implications for design, but rather to inspire and give designers and researchers new ideas [5].

While we have seen how the use of app stores and large-scale HCI trials can be successful for evaluating technologies, can such research also be successful in informing new designs?

Much of the research performed so far using large-scale mobile HCI methods can be seen as providing *implications* for design. We propose to concentrate on another use of large-scale methodologies, less established in the literature, and perhaps with a slight difference in methodology and approach to both research practice and data: the use of large-scale deployment and data-collection techniques to *inform* design. For instance, discovering usage patters through

analysis of log data from a large amount of users can prove useful in inferring how a design is appropriated in actual use. This in turn can lead to new ideas for designs – or cause an immediate redesign of the currently 'running' trial, directly pushed to users.

Practices of this type are currently adopted in industry, and examples have begun to appear in HCI literature. We hope that this workshop will be a place for those designing from large-scale data to share best practices and learn from each other's approaches. Examples of this type of work from the organisers include Health Mashups [2], StoryPlace.me [1] and the Hungry Yoshi iOS game [8]. In each of these projects, data from a running trial was used to iterate on the design of the system and in some cases create entirely new systems based on data obtained from previous deployments.

The Workshop

This workshop aims to discuss and develop ideas on how mass participation trials, large-scale usage data, and service distribution can be leveraged and contribute to new ways of informing design. We want to bring together people from a wide array of disciplines who have experience with studies of technology in everyday contexts, mass participation trials, and designing mobile technologies.

Issues we want to discuss include, but are not limited to:

- Suitable methods for involving users in the design process
- Large-scale methods of requirements gathering
- Methods of analysis of aggregated data, so it can inform design

- Requirements on data collection and data handling (including privacy of user data)
- Ways of categorising or segmenting a system's users into several 'populations' for whom different feature designs might be targeted
- Issues with retaining user interest, when development takes the wrong turn
- Iterative design processes vs quick-and-dirty try-and-throw-it-out-there
- Importance of differences of user expectations between different platforms
- Further understanding large-scale data through smaller qualitative studies and using these findings to inform design.
- Ways to track changes in use under different design conditions (e.g. A/B testing)

Discussion

During this workshop, we hope to move discussion of large-scale mobile HCI methodology beyond use simply as a tool to collect large amounts of data. We look to established techniques and emerging practices for the ways in which large-scale mobile HCI research can be used to inform future design.

Where the current methodology looks like a lasso, where an app is released, collects some data, and put under the researchers' microscope, perhaps we should look at how the actual ecosystem of today's mobile software can be part of an ongoing design process. We intend to review established practices, consider new techniques and emerging studies and move towards developing methodologies that grant such endeavours validity.

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