Colorado School of **Public Health**

GLIMMPSE Lite: Power and Sample Size Calculations Using Mobile Devices

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Motivation

- When designing research studies, scientists must determine the number of participants needed to answer the question of interest, while minimizing risk to participants.
- Our goal is to provide a free, open source mobile app to calculate power and sample size for researchers on the go.

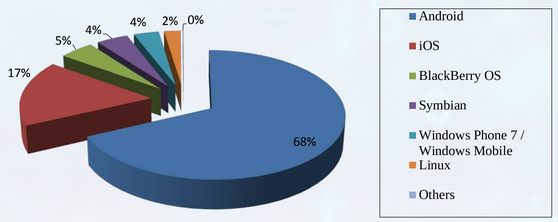
Background

- Our team previously developed GLIMMPSE, a free, open source, user-friendly web application that calculates power and sample size for multilevel and longitudinal studies.
- We designed GLIMMPSE Lite as a prototype, to test extending power and sample size calculations to mobile platforms.
- GLIMMPSE Lite leverages the existing Java Web Services architecture which powers the web application.

Why Mobile?

- Large user base for mobile applications.
  - 152.8 million smartphones.
- Carry power results in your pocket while
  - Attending a meeting.
  - Travelling in an airplane (with wi-fi or mobile network).

Figure 1: Smartphone World Wide Market 2012



Source : IDC (International Data Corporation) Mobile Phone Tracker 8th August 2012

Application Market Study

Product	Platform	Cost	Method of Analysis					
			One Way ANOVA			Data Analysis	Power Analysis	Sample Size Analysis
			One-sample t-test	Two-sample t-test	Multiple Groups			
GLIMMPSE Lite	IPhone, Android	FREE	-	✔	✔	-	✔	✔
ANOVA : Analysis of Variance (Learning App.)	Android	$2.99	-	-	-	-	-	-
One Way ANOVA	IPhone	$8.99	-	-	✔	✔	-	-
ANOVA	IPhone	$4.99	-	✔	✔	✔	-	-
ANOVA	Android	$2.99	-	✔	✔	✔	-	-
Power Analysis	IPhone	$4.99	✔	✔	-	-	✔	✔

Table 1: Mobile applications available for ANOVA.

GLIMMPSE Lite

- Provides power or sample size calculations for t-tests and ANOVA.
- Currently available for iPhone and Android (85% market share).
- Native applications built using
  - Objective-C/Xcode/AFNetworking for iOS.
  - Java/Eclipse for Android.

Architecture

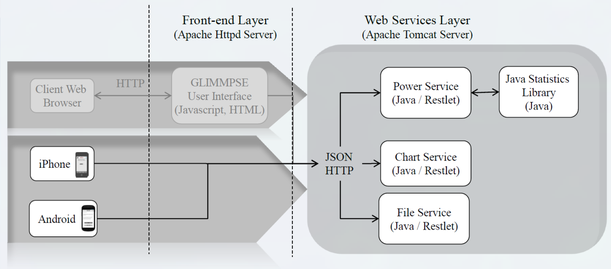


Figure 2: GLIMMPSE (web) and GLIMMPSE Lite (mobile) software architecture.

- Reuses existing Java Web Services to perform power calculations.
- Uses HTTP/JSON to permit easy communication with a variety of mobile devices.
- Allows rapid application development in a small team environment.

User Interface Design

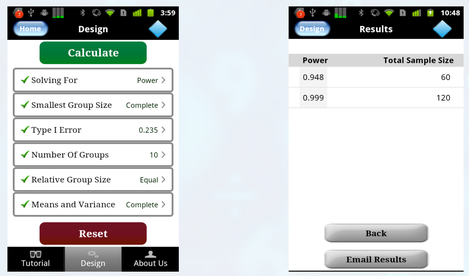


Figure 3 : GLIMMPSE Lite Android version.

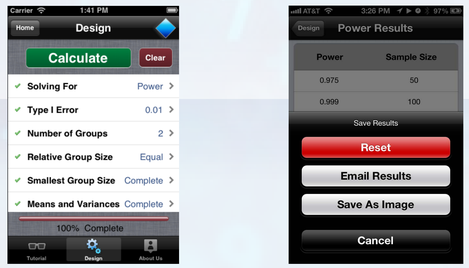
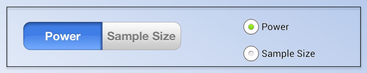


Figure 4: GLIMMPSE Lite iPhone version.

- Simple and uncluttered user interface design.
  - Complex calculation broken into a list of smaller tasks.
  - Integrated help pages for each input screen.
- Allows user to save results via email or as an image.

Platform Specific Design Decisions

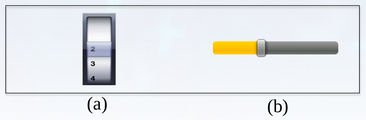
- OS support:
  - Android: API level 9 onwards.
  - iPhone: iOS 5 onwards.
- Different widgets in Android:
  - *Switch* on iPhone vs. *Radio buttons* on Android.



(a) (b)

Figure 5 : GLIMMPSE Lite widgets on (a) iPhone (b) Android.

  - *Rotating wheel* on iPhone vs. *scroll bars* on Android.



(a) (b)

Figure 6 : GLIMMPSE Lite widgets on (a) iPhone (b) Android.

Focus Group Study

- Nine participants filled out a survey rating the user experience with GLIMMPSE Lite.
  - Five PhD level biostatisticians
  - One PhD level epidemiologist
  - One M.S. student in biostatistics
- User satisfaction was high for “look and feel” and “text readability” for both mobile platforms.
- Two users encountered errors while using the apps, which we have corrected.

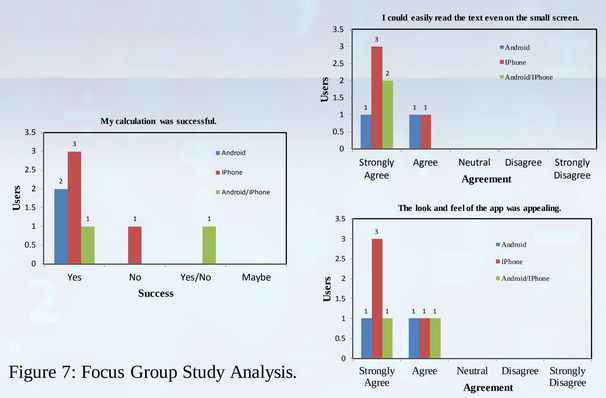


Figure 7: Focus Group Study Analysis.

Conclusion and Future Work

- GLIMMPSE Lite provides a convenient tool to assist biomedical researchers in the study design process.
- Software downloads and documentation are available from http://samplesizeshop.org/.
- Future work includes
  - Releasing to the Apple Store and Google Play.
  - Adding support for multilevel and longitudinal designs currently supported in the GLIMMPSE web interface.
  - Using PhoneGap to support additional mobile platforms such as Blackberry and Windows Phone.

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