Android Project: Critical Review
BatStats Application

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UCD
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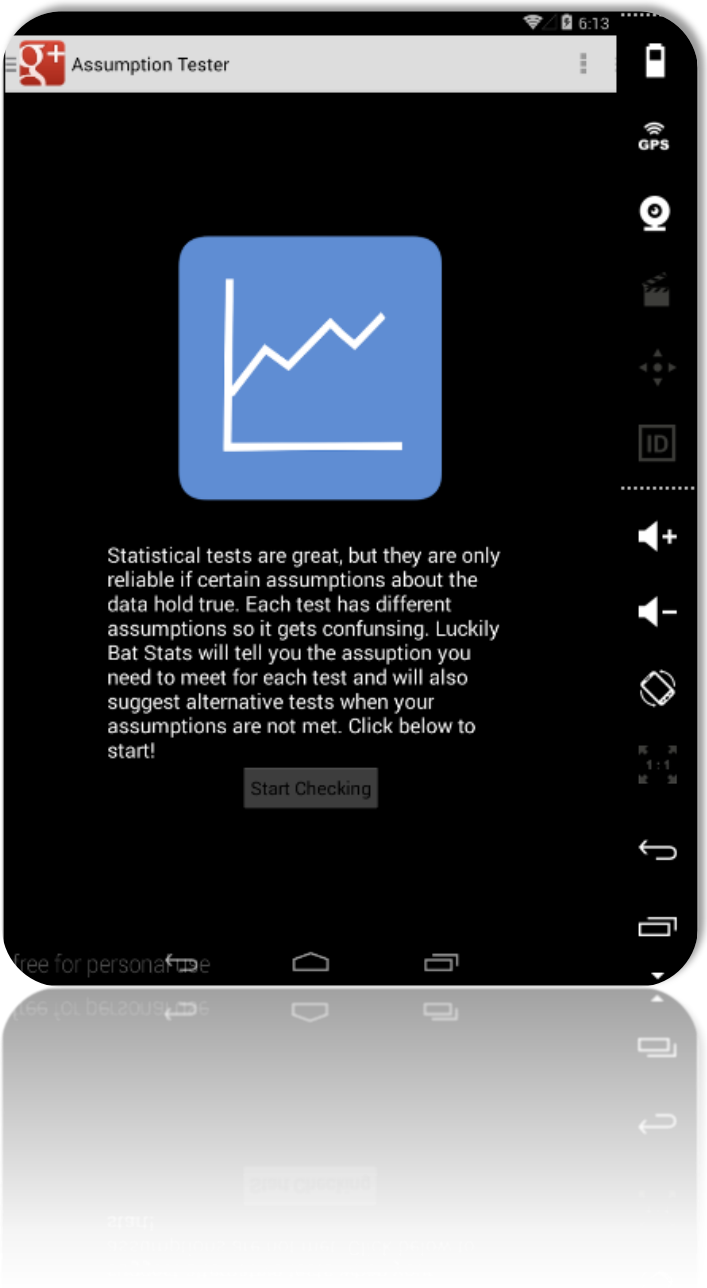

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Overview

The Problem

BatStats is a simple application that solves a very hard problem. Imagine the following scenario. You are a final year student and you have been gathering data all year for your final year project. You are nervous because your final project makes up a considerable portion of your overall grade and therefore also determines the overall quality of your degree. Added to this pressure you have little experience with statistics, and you know that if you analyse the data incorrectly you will incur serious penalties. This is an experience common to many undergraduate students. Usually, the solution involves waiting days or even weeks to set up a meeting with an academic supervisor so that you can ask them how to proceed. Meanwhile, you've lost precious time. You could also try flipping through statistics textbooks in the library, but these books are massive and contain countless possibilities. How could you reliably choose from among this myriad of options under such pressure and with so little time?

The Solution

The answer to your problems is BatStats – the android application where Batman can help you overcome the twisted and evil statistical question posed to you by Batman's arch nemesis, the Riddler. The format is simple. The Riddler asks you a handful of simple questions about the data you've gathered (Figure 1).

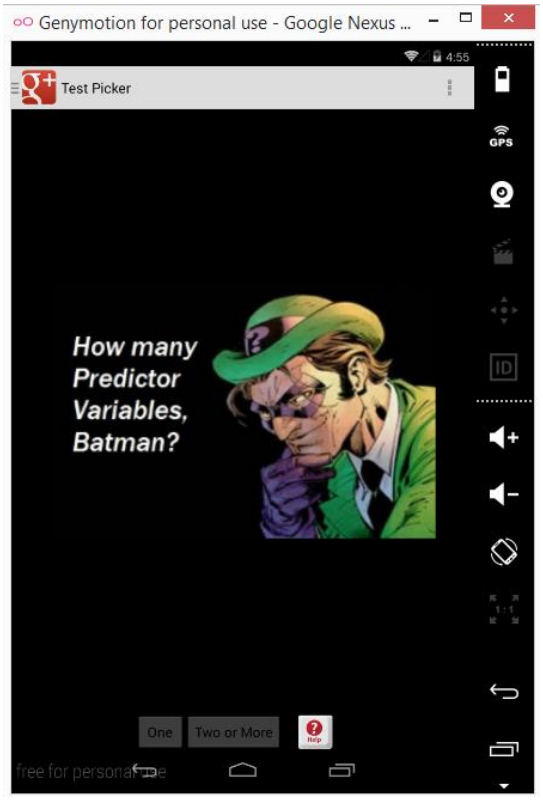

Figure 1 Example Question Page

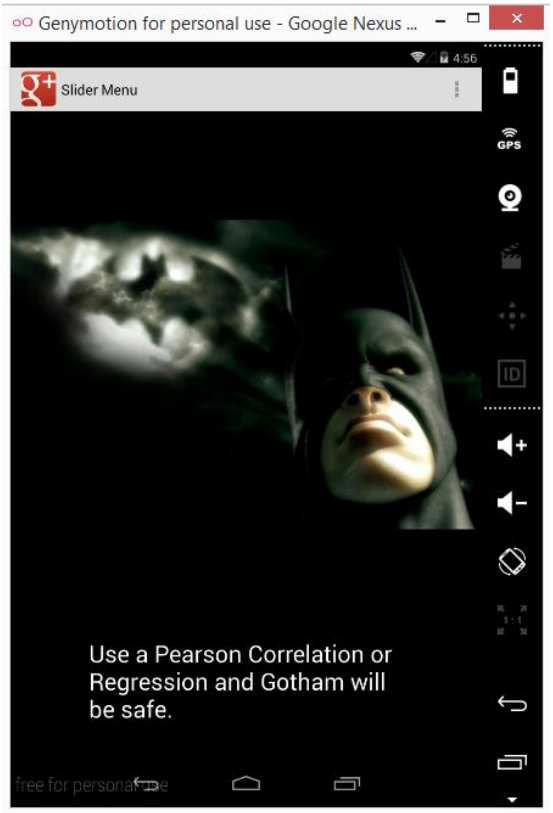

Figure 2 Example Answer Page

There is also a help button if you don't understand any of the questions. After answering a few of these questions Batman will come to your rescue with the answer you need – the statistical test you need to analyse your data (Figure 2). However, the Riddler is a tricky fellow and never gives up that easy. So before you can trust Batman's advice you must also ensure that your data meets certain conditions. Luckily, BatStats also has an 'assumptions checker' so that you can be sure your data is suitable for the test chosen by Batman (Figure 3).

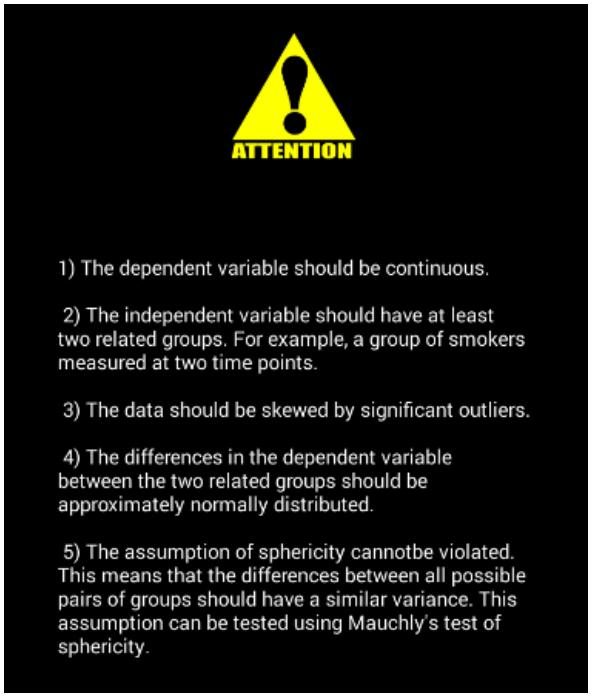

Figure 3 List of Assumptions

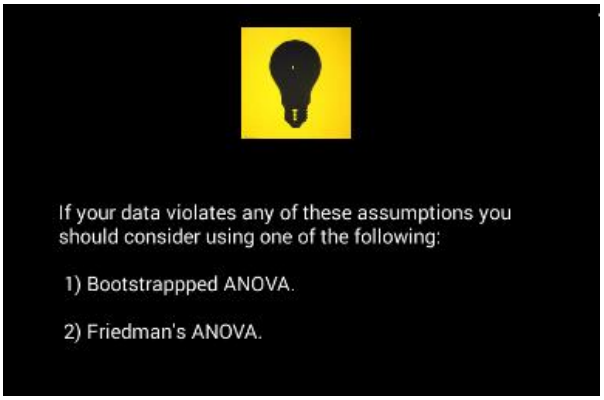

Figure 4 List of Alternative Tests

If a problem is discovered then the 'assumption checker' will provide you with alternative test (Figure 4). Even Batman makes mistakes, but so you can think of the 'assumption checker' as Batman's sidekick Robin.

Competition

There are a great number of apps that provide statistical tools that can be used on your mobile device. There are also many educational apps that provide introductory material in the form of glossaries, definitions and videos. However, there aren't many apps that help a user to quickly and easily select the right kind of statistical test for their data. This is a significant niché in the app market because students and researchers usually don't have the time to wade through textbooks or take small courses when they have a project deadline approaching. Therefore, there is a need for an app that offers quick and dirty solutions so that users can

quickly get the answer they need without all the fuss. One app does exist on Google play called the “Statistics Decision Tree” .

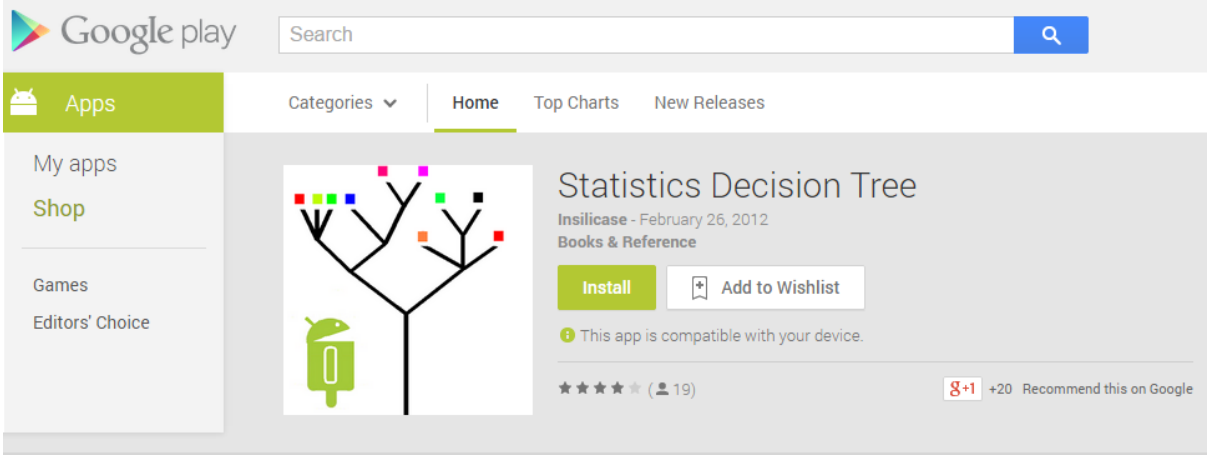

Figure 5 Statistics Decision Tree

The app currently has a review of 4.1 based on 19 user reviews and it has between 1000 and 5000 installs. Despite this positive feedback the app is quite basic providing only minimal feedback and with no real thought put into its appearance. Furthermore, no additional features are included beyond the decision tree. This is a limitation since the tests selected by the app are only valid if they meet all the assumptions associated with those tests. BatStats can improve on this already fairly successful app by adding extra necessary features and improving on its overall look and feel.

Target Audience

The audience for BatStats is University students or possibly even researchers in need of some reassurance. Based on the number of downloads on similar, but less extensive, apps on Google play (1000 – 5000) there is definitely some interest out there for an app like BatStats.

Novelty

There are several novel aspects to the BatSats app. The first novel aspect of the app is its humorous low-level treatment of what is generally considered a formal, high-level subject matter. The reasons for this approach are discussed under the next heading. The help button seems like an obvious feature, but it is not available on the most similar app that is currently on Google Play. This seems like a significant advantage since users will only install the app if they are in need of some help to begin with. The app also offers two important additional features over its closest competitor on Google Play. After providing the user with the correct statistical test, the user can then use the “assumptions checker” feature to ensure that their dataset doesn’t violate any of the small print that comes along with the relevant statistical test. The feature provides alternative tests whenever a problem is discovered. Finally, the app includes a feature that is a step by step guide on how to install a user-friendly graphical interface on the ‘R’ statistics package. This is a useful feature as many students experience

frequent interruptions in their workflow by having to rely on closed source software like SPSS. This results in students only working from college or having to go to computer services to fill out forms to get the necessary software. There is also a perception among students that open-source statistics packages require the user to be able to code. By simply installing the "R Commander" package on R students could avoid all these problems. These combined features are not found together in any other app on the market based on the author's research.

Features

Usefulness/Entertainment

The Batman theme keeps the tone light-hearted and allies the app with a much loved comic hero that is popular amongst the typical University cohort. The idea of allying the app with a well-known brand was inspired by Andy Fields the author of several highly regarded textbooks on statistics. Andy Fields became famous for writing highly entertaining statistics textbooks that cover complex concepts in a very witty and informal style .As a result of his particular style of teaching he has attracted a loyal legion of fans. A popular meme that appears to have been started by Andy Fields is known as "catistics" which involves taking pictures of cats reading Andy Fields' textbooks. This shows that there is a significant level of enthusiasm in the market for educational products that diverge away from the traditional overly-academic format. People want to learn high-level concepts that are presented in a low level format that is rich with humour and light-heartedness.

Statistics Picker

The statistics picker is the focal point of the app. It is implemented as a decision tree of activities that fan out towards the correct answers. Each node in the tree has a question with between two and three possible answers. Each node also has a help button that clearly explains the terms used in the question. To reinforce the user's efforts the correct answer is presented along with an image of Batman and his famous theme tune.

Assumptions Tester

The assumption tester was implemented using a scrollable list view of statistical tests which open up new activities. These activities contain the assumptions that need to be met for each respective statistical test as well as alternative tests that can be used if the assumptions are not met.

GUI Installer

The GUI installer is a very simple feature, but it's equally important to the end user. Its implemented using one activity that modifies it's content as the user clicks next by cycling through an array. At each phase the user is presented with an image and a set of instructions on how to proceed with the installation

Challenging Features

Slider Menu

To allow the user to easily navigate between the three features described above a sliding menu was created. This is called a Navigation Drawer in the Android manual and it allows the user to access the navigation panel by simply swiping in from the left hand side of the screen. It is explained very clearly with illustrations on Ravi Tamada's Blog *AndroidHive* and this is where I learned how to implement the feature.

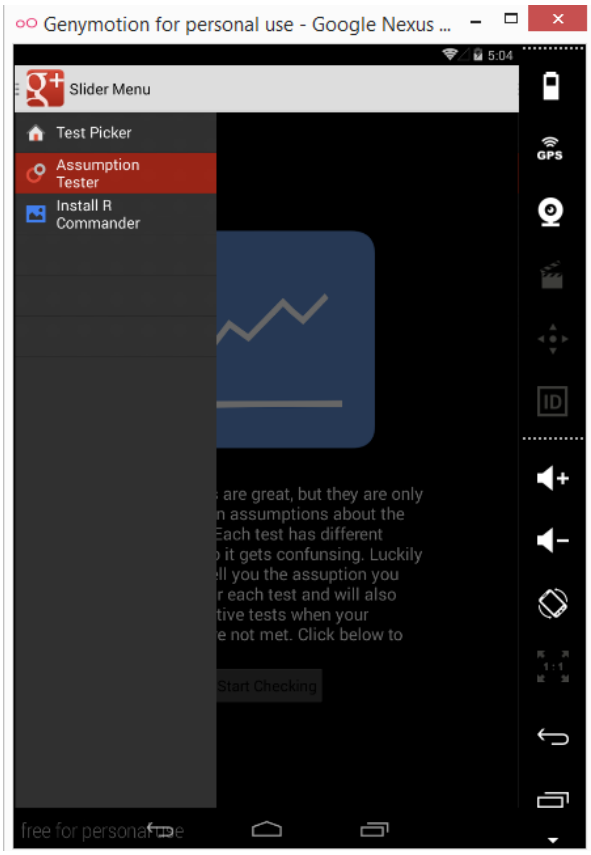

Figure 6 Navigation Drawer

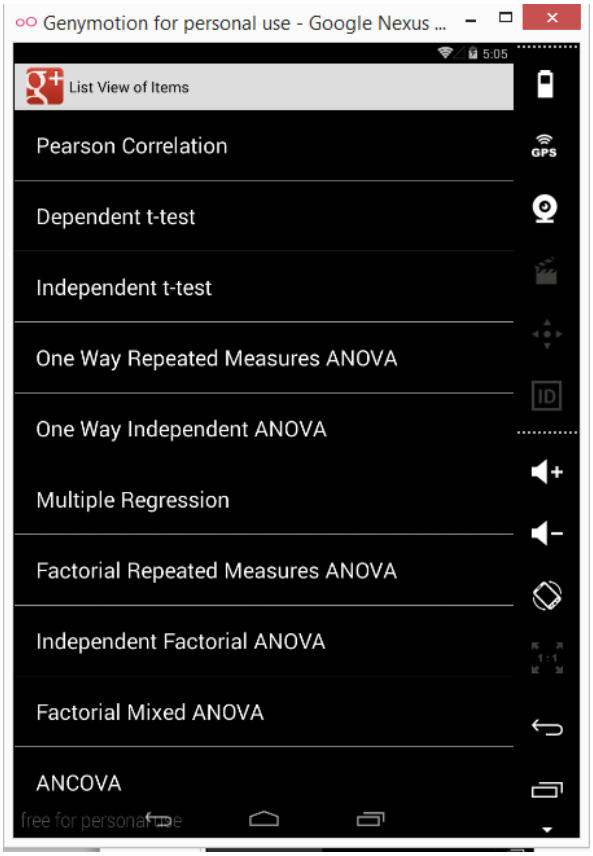

Figure 7 List View of assumptions

List Views

To implement the listview for my "assumptions checker" I also used Ravi Tamada's excellent blog *AndroidHive*. I modified the content and style however, to keep the look and feel consistent with rest of the application.

Sound Effects

To play the Batman theme tune when the answer is revealed in the statistics picker I also had to implement a media player within an onClick listener. The theme tune was taken from an online database of movie audio clips.

Design

A key design decision was whether to use a decision tree layout of activities or instead create one activity that modifies its content for each question and then queries a local database for the correct answers. The main argument for using a database is that it would make the app more scalable. However, I decided to use the YAGNI principle espoused by Ron Jeffries, a co-founder of the extreme programming methodology. YAGNI stands for "You aren't going to need it" and the approach is further defined by Jeffries himself:

"Always implement things when you actually need them, never when you just foresee that you need them."

Speed

The app performs as fast as any other applications on my smartphone, but this was to be expected as I kept the design and implementation as simple and straightforward as I could.

Future Work

To improve the app there needs to be a more detailed explanation of how to use the R Commander graphical user interface in R. Currently, the app only shows users how to install the package, but not how to use it. Ideally, there should be examples of each statistical test being executed within the graphical interface with screenshots and easy to follow instructions. It would also be helpful to include a similar feature for creating graphs from the user interface. Also, compared to the 'statistic picker' the 'assumptions tester' may require a slightly higher level of understanding. It would be helpful to expand this feature by including a glossary of terms and some helpful definitions. Statistical concepts such as 'heteroscedasticity' and 'normal distribution' are almost impossible to understand as a novice without the aid of graphs. This would have to be taken into account when the app is being updated in the future.

Lessons Learned

November 30, 2014

Having some experience with frameworks like Django, Express,js, and Grails, I expected to adapt quickly to Android because it also uses the Model, View, Controller framework. However, I found Android difficult and unintuitive compared to other frameworks I've worked with. When adding new features one has to be constantly mindful of what API level they're target audience has on their phones because some features – like the Navigation Drawer – are only available from API 14 onwards. Another complication is that emulators can be very slow and unless you have many different types of smartphones lying around your workflow will be slower than normal. The Eclipse IDE also acts very peculiarly with Android and on many occasions I had to clean projects, or restart the IDE to fix problems. This is very time consuming because you can spend hours debugging when there is nothing wrong with your code. I can now appreciate that developing commercial apps is certainly more than a hobby, and requires an expert level of domain knowledge and a great deal of experience. Personally, I found Android very unenjoyable and unrewarding compared with other frameworks. If I were developing another app in the future I would probably look elsewhere to see what else is out there. Having said that, I learned a lot about mobile app development and it's nothing like what I expected.