

Chapter 40

Probability and Statistics Apps for Mobile Devices: A Review

Howard P Edwards

Massey University at Albany, New Zealand

ABSTRACT

Mobile devices such as tablets and smartphones are rapidly replacing laptops and notebooks as the primary student e-learning device. This chapter discusses the needs of a Statistics app user and how these differ from the needs of users of other Mathematics apps, and then reviews some the mobile apps currently available which enable a user to either learn Statistics or to carry out the sorts of summaries and analyses encountered in an undergraduate Statistics course. Implications of these apps for both teaching and learning are discussed.

INTRODUCTION

For many years now changes in teaching practice and learning methodologies in Mathematics and Statistics have been strongly influenced by changes in Information and Communications Technology (ICT). This is especially true for Statistics. From the advent of mainframe computing in the 1960s through to the development of the personal computer in the 1980s and the laptop in the 1990s, much of this change was driven by hardware developments; however the accessibility and use of graphical computing, firstly static and then dynamic, produced rapid development in software which could

1. Allow data to be stored, displayed, manipulated, and analysed; and
2. Be used to demonstrate key concepts and ideas such as uncertainty, sampling error and variation by using both passive and interactive visualisation techniques.

This period of graphical software development has continued since the early 1990s and is now widely embedded in statistical learning; and the development of the World Wide Web has seen further impetus to the graphical/visualisation environment through tools such as Gapminder, Tableau Public and YouTube. Indeed, it can be argued that much of the development of Statistics

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Education as a discipline since the 1980s has been brought about by these changes in computer hardware, software and networking. Tishkovskaya and Lancaster (2012) provide a substantial review and discussion of the impacts of technology and the World Wide Web on Statistics Education.

The last few years have seen another quantum change in ICT hardware, namely the rise of tablets and smartphones (henceforth referred to as mobile devices). In a very short space of time these devices have become widespread and they are now poised to replace laptops and notebooks as the portable ICT device of choice amongst learners of all ages (some may argue that they have already). Kalloo and Mohan (2011) point out that mobile devices have been shown to increase motivation, engagement, personalization, collaboration, interactivity, and a sense of community in learners. Developments such as these present both exciting opportunities and challenges to educators: on the one hand, new devices deliver the potential for more enriching experiences and deeper insights for students, but educators have to keep abreast of these changing technologies and take time to come to grips with the implications for learning and teaching – often in an academic environment which is time-poor.

Statistics is no exception to this, and many software applications for mobile devices (or apps as they are widely known) now exist to aid learners in their study of probability and statistics. However there is no simple way in which a potential Statistics app user can discover what apps are available, what they do and how well they do it. Some statistics journals provide book reviews and even software reviews, but presently the only searchable databases of apps are those provided by the respective app stores (iTunes, Google Play, Windows Phone Store), and typing in words like “Statistics” produces a very large number of responses which include many irrelevant results, such as apps for sports statistics and apps for measuring web page hits. For example, the only information about an individual app in iTunes

(other than that provided by the app’s author) is the users’ ratings summary, which does not reflect the views of users who are knowledgeable about Statistics in any way.

This chapter reviews a range of apps for mobile devices that are available for use in teaching and learning in the areas of probability and statistics, and raises several issues for consideration by potential users of statistics apps. Note that the author of this chapter is not associated in any way with any of the apps which appear below.

BACKGROUND

Ownership of mobile devices has increased rapidly in a very short space of time. According to Pew Research, US ownership of smartphones has increased from 35% in 2011 to 58% in 2014 and ownership of tablets has increased from 8% in 2011 to 42% in 2014 (www.pewinternet.org/data-trend/mobile/device-ownership/). Dean (2011) reported that usage patterns of smartphones are significantly different from that of personal computers and Google (2012) reported that 80% of respondents never leave their homes without their smartphone and use it in many different settings.

Hand in hand with the growth of mobile devices has been the growth in availability of apps which allow the mobile device user to run mobile software applications interactively on his or her mobile device using its touchscreen interface in a myriad of ways. Khan (2011) reported that typical app usage exceeded that of mobile web-browsing and Elias (2011) reported that users downloaded apps for very specific purposes and then used them for knowledge acquisition. Therefore as Seneca (2014) pointed out, relevant consideration of mobile user context and user interface design should be a fundamental aspect of any mobile learning design. In addition, teachers and educators have a duty to familiarise themselves with mobile technologies and how students might use them (Schuck, Aubusson, Kearney, & Burden (2010)).

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