

Analysis of statistical data

Back to our classic abstract

- This is the way the world is
- This is what is wrong with the world
- This is my startling/innovative idea
- Here is what I found



Description
+
Analysis

Quantitative Analysis

The process of presenting and interpreting numerical data
descriptive statistics and inferential statistics

- Descriptive statistics
 - measures of tendency
 - averages - mean, median and mode
 - measures of variability
 - around the average
 - range and standard deviation
 - Provide a picture of collected data
- Inferential statistics
 - outcomes of statistical tests
 - supports deductions from the data
 - tests hypotheses
 - relates findings to sample/
population

Think about the disciplinary perspective

- Your supervisors
- Their preferred texts
- Their preferred tools
 - Simple choice
 - Excel
 - SPSS
 - Get some specialist training
 - Get some experience
- Your community/ies of practice
 - Summer schools
 - Publications/consensus
 - Review
 - Update

See next slide to understand what I mean

Example of a disciplinary perspective

PHARMACEUTICAL STATISTICS
Pharmaceut. Statist. 2005; 4: 129–139
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/pst.168

Web-based resources to assist the statistical analysis and presentation of data



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The intention of this article is to highlight sources of web-based reference material, courses and software that will aid statisticians and researchers. The article includes websites that: assist in writing a protocol or proposal; link to online statistical textbooks; and provide statistical calculators or links to free statistical software and other guidance documents. Copyright © 2005 John Wiley & Sons, Ltd.

Keywords: *website; statistical textbook; statistical calculator; statistical software*

1. INTRODUCTION

When working day to day as an applied statistician it will often be the case that questions are asked by colleagues or you wish to obtain a quick answer to a problem. The World Wide Web, books and journals offer a vast array of resources to support both the statistician and other research-

author or colleagues in their consulting and teaching. All the websites (and links) quoted in the paper were last accessed on 21 March 2005.

2. GUIDELINES FOR WRITING DISSERTATIONS IN MICROSOFT

You need to decide your approach

- When you plan your study
- When you review your statistics
 - Preparation is part of that process
 - Generic – get training/attend specialist modules
 - Discipline – sanity check, participate in the dialogue
 - Just in Time – review what the current view is
 - Sanity Check – discuss with your supervisor and peers

Online textbook

STATISTICA
offers the most comprehensive array of

SPC

- Elementary Concepts
- Statistics Glossary
- Basic Statistics
- ANOVA / MANOVA
- Association Rules
- Boosting Trees
- Canonical Analysis
- CHAID Analysis
- C & R Trees
- Classification Trees
- Cluster Analysis
- Correspondence Analysis
- Data Mining Techniques
- Discriminant Analysis
- Distribution Fitting
- Experimental Design

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A printed version of this textbook is now available! *STATISTICS: Methods and Applications* is \$80 which includes a coupon for a free CD version. [click here to order](#) or go to [amazon.com](#).

Britannica
Internet Guide Award

The only Internet Resource about Statistics Recommended by Encyclopedia Britannica

StatSoft has freely provided the Electronic Statistics Textbook as a public service for more than 12 years now.

This Textbook offers training in the understanding and application of statistics. The material was developed at the **StatSoft** R&D department based on many years of teaching undergraduate and graduate statistics courses and covers a wide variety of applications, including laboratory research (biomedical, agricultural, etc.), business statistics, **credit scoring**, forecasting, social science statistics and survey research, data mining, engineering and quality control applications, and many others.

[http:// www.statsoft.com/textbook/stathome.html](http://www.statsoft.com/textbook/stathome.html)

National Centre for Research Methods

The screenshot shows the homepage of the ESRC National Centre for Research Methods (NCRM). The header features the ESRC logo and navigation links: HOME, TRAINING & EVENTS, RESEARCH, NEWS, and ABOUT US. A blue banner below the header says "Welcome" on the left and "You are here: Home" on the right. The main content area is divided into three columns. The left column, titled "CURRENT ANNOUNCEMENTS", features a photo of a woman and lists two items: "Research Methods Festival 2010 recorded presentations online" and "Research methods training bursaries available from NCRM". The middle column, titled "LATEST NEWS ARTICLES", features a photo of newspapers and lists five items: "Creative Interviewing: New Realities video", "NCRM research in the Guardian: Poverty is more likely cause of mistrust than race", "Using phone interviews: new Realities toolkit", "MLwiN 2.21 released", and "Emotional Challenges of Writing - New Realities video". The right column, titled "TRAINING & EVENTS", features a photo of a seedling and lists five items: "09/12/2010: Recent Advances in the Use of Paradata (Process Data) in Social Survey Research", "05/01/2011: Introduction to Multilevel Modelling in MLwiN", "11/01/2011: Introduction to Data Linkage", "12/01/2011: The Value of Data Linkage for Research", and "12/01/2011: Best of the Research Methods Festival 2010". To the right of the main content is a "Welcome to the ESRC National Centre for Research Methods (NCRM)" section with a paragraph describing NCRM as a network of research groups. Below this are three boxes: "Our Research" with a link to "view our research projects", "Publications" with a link to "search eprints archive", and "People" with a link to "search for people". At the bottom right is a "Google Custom Search" box with a "Search" button.

ESRC National Centre for
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RMethods

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Welcome to the ESRC National
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NCRM is a network of research groups,
each conducting research and training in
an area of social science research
methods.

Our Research
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CURRENT ANNOUNCEMENTS

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<http://www.ncrm.ac.uk/>

Analytical Statistical Methods

Wolfram MathWorld the web's most extensive mathematics resource

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Created, developed, and
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Probability and Statistics

- Bayesian Analysis (1)
- Descriptive Statistics (62)
- Error Analysis (19)
- Estimators (23)
- Markov Processes (7)
- Moments (57)
- Multivariate Statistics (15)
- Nonparametric Statistics (12)
- Probability (57)
- Random Numbers (36)
- Random Walks (16)
- Rank Statistics (12)
- Regression (30)
- Runs (5)
- Statistical Asymptotic... (5)
- Statistical Distributions (4)
- Statistical Indices (10)
- Statistical Plots (16)
- Statistical Tests (57)
- Time-Series Analysis (18)
- Trials (20)

<http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html/>

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Excel – tips and warnings

Statistical Good Practice Guidelines

Excel for Statistics - Tips and Warnings

Release date: November 2000

This is one of a series of guides for research and support staff involved in natural resources projects. The subject-matter here is **Excel for Statistics - Tips and Warnings**. [Other guides](#) give information on allied topics. Your [comments](#) on any aspect of the guides would be welcomed.

1. [Introduction](#)
2. [Adding to Excel](#)
3. [Conclusions](#)

Appendix - [Excel for Pivot Tables](#)

1. Introduction

The availability of spreadsheets that include facilities for data management and statistical analysis has changed the way people manage their information. Their power and ease of use have given new opportunities for data analysis, but they have also brought new problems and challenges for the user.

Excel is also widely used for the entry and management of data. Some points are given in this guide, but these topics are covered in more detail in a companion document, entitled "The Disciplined Use of Spreadsheets for Data Entry".

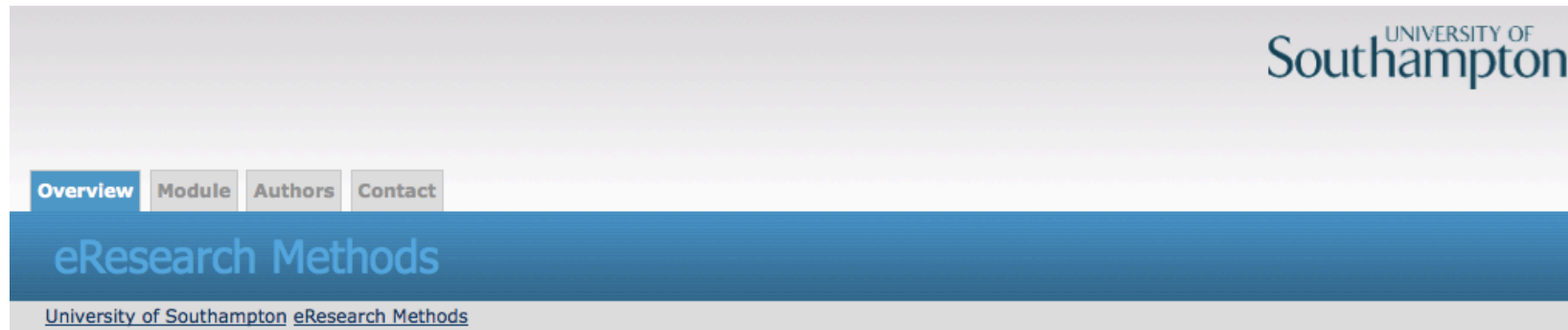
In this guide we point out strengths, and weaknesses, when using Excel for statistical tasks. We include data management, descriptive statistics, pivot tables, probability distributions, hypothesis tests, analysis of variance and regression. We give the salient points as tips and warnings. For those who need more than Excel we list some of the ways that users can add to its facilities, or use Excel in combination with other software. Finally we give our conclusions about the use of Excel for statistical work.

As an appendix we include more detailed notes about tabulation. Excel's facilities for Pivot tables are excellent and this is an underused facility.

- 1.1 [Data Entry and Management](#)
- 1.2 [Basic descriptive statistics](#)

<http://www.ssc.rdg.ac.uk/publications/guides/topxfs.html>

Online module



UNIVERSITY OF
Southampton

Overview Module Authors Contact

eResearch Methods

University of Southampton eResearch Methods

E-Learning Module for Generic Research Methods

Overview

The e-Research Methods module has been developed as a Masters level introduction to conducting research. It is suitable for use by students on post-graduate taught courses, at early stages of post-graduate research courses and may also be useful to undergraduate students undertaking extended project or dissertation work. It attempts to be sufficiently generic to allow its use across a wide range of disciplines.

Using this module

The module has 8 generic themes and is sufficiently flexible to allow each of the themes to stand alone or all 8 to be undertaken as a group. A University of Southampton student completing the entire module and associated assessments as a recognised part of their programme of study may be awarded 20 credit points (CATS) and the module specification has been approved by Academic Quality and Standards Committee for this purpose.

To use this material you may:

- Access it directly via this website.
- Link to this site from your own web site.
- Link to this site from a VLE (e.g. Blackboard or Medis). This option is recommended if you want students to be able to work in groups and use discussion boards, wikis or other communication tools.
- University of Southampton staff may access the source code in EdShare. You are welcome to take a copy of the source from EdShare and edit it to suit your own needs but please note that only the version stored in EdShare will be maintained.

<http://www.erm.ecs.soton.ac.uk/>

Beware...

“Far too many scientists have only a shaky grasp of the statistical techniques they are using. They employ them as an amateur chef employs a cookbook, believing the recipes will work without understanding why...”

- Sloppy statistics shame science”, *The Economist*, 3 June 2004
<http://www.economist.com/node/2724226>

Keep on thinking about numbers...

The screenshot shows the BBC Podcasts website interface. At the top, there is a navigation bar with the BBC logo, a 'Sign in' link, and menu items for News, Sport, Weather, iPlayer, TV, Radio, and More. A search bar is located on the right. Below the navigation bar, the word 'podcasts' is displayed in a large, bold font. To the right of 'podcasts' are buttons for 'Podcast Home' and 'Podcast Help'. A 'Quick Find' search box is positioned above the main content area, with the placeholder text 'Type podcast name (eg. Moyles)'. The main content area features a large promotional banner for 'More or Less: Behind the Stats' on BBC Radio 4. The banner includes the BBC Radio 4 logo, a photo of Tim Harford, and the text 'More or Less: Behind The Stats'. To the right of the banner, there is a description of the podcast: 'Tim Harford and the More or Less team investigate numbers in the news. Numbers are used in every area of public debate. But are they always reliable? More or Less tries to make sense of the statistics which surround us. A half-hour programme broadcast at 1330 on Friday afternoons and repeated at 2000 on Sundays on Radio 4.' Below the description, there are subscription options for free, including iTunes, My Yahoo!, Zune, Google Reader, ZENCast, and RSS feed. A blue starburst graphic is overlaid on the right side of the page, containing the text 'Podcasts, available indefinitely! Co-produced with OU'. Below the starburst, there is a section for 'Recent episodes (5)'. The first episode listed is 'Gay Britain 01 Oct 10', dated 'Fri, 1 Oct 10'. The description for this episode reads: 'Tim Harford and the More or Less team examine the micromort measure of risk and official statistics on sexual identity.' To the right of the episode description, there is a 'Duration: 28 mins' label and a progress bar showing '00.00 / 27.35'.

<http://www.bbc.co.uk/podcasts/series/moreorless>

Further Information

References for quantitative analysis

- Graphical presentation of information:
- Demos on visual literacy for scientists/engineers and for business and communication:
<http://www.visual-literacy.org/>
- Tufte, Edward R. (1983). *The visual display of quantitative information*. Graphics Press, Cheshire, Conn, ISBN 096139210X
- Wilkinson, Leland. (1999). *The grammar of graphics / Leland Wilkinson*. Springer, New York, ISBN 0387987746

Webliography

- further information on statistical and numerical methods of analysis:
- <http://www.intute.ac.uk/socialsciences/statistics/> (JISC, no longer updated)
- <http://www.ncrm.ac.uk/> (EPSRC national research centre)
- <http://www.s3ri.soton.ac.uk/> (University of Southampton SR3I, national research centre)
- <http://mathworld.wolfram.com/topics/ProbabilityandStatistics.html/> (Wolfram Mathematics)
- StatSoft Online text book [http:// www.statsoft.com/textbook/stathome.html](http://www.statsoft.com/textbook/stathome.html)
- Notes on Data Visualisation <http://www.edshare.soton.ac.uk/4071/>
- Excel tips and warnings <http://www.ssc.rdg.ac.uk/publications/guides/topxfs.html> (University of Reading)
- Online module <http://www.erm.ecs.soton.ac.uk/> (University of Southampton)

Leisure statistics

More or Less – Podcasts

- <http://www.bbc.co.uk/podcasts/series/moreorless>
- JunkCharts