

The Maths, Stats & OR Network: Supporting the Teaching & Learning of Statistics in Higher Education

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The Network's background

- Formed from CTI (Computers in Teaching Initiative) Centres in Statistics & Mathematics, with RSSCSE
- 2000-2004: Part of the Learning & Teaching Support Network (LTSN)
- 2004-present: Subject Centre of the Higher Education Academy

Our objectives

- Be the primary source of information and advice on higher education learning, teaching and assessment in Mathematics, Statistics and Operational Research
- Promote and support the discovery, development and sharing of innovative practice within Mathematics, Statistics and Operational Research
- Support individual and departmental activity addressing the development of curricula and teaching practice

Our objectives

- Provide, encourage, and support initial and continuing professional development opportunities for all staff
- Raise public awareness of mathematics and promote it as an attractive option for university study
- Engage with the national political agenda in Higher Education

Supporting those teaching statistics

- Statistics Facts, Formulae and Information Leaflet
 - 2,300 distributed this academic year
 - Available free of charge to all UK HEIs (email: info@mathstore.ac.uk)
 - Plans to develop version for medical statistics students underway

Supporting those teaching statistics

- Quarterly newsletter: *MSOR Connections*
 - Distributed free of charge
 - All issues available online (www.mathstore.ac.uk/newsletter)
 - Recent articles on teaching statistics by:
 - [Warren Gilchrist](#)
 - Adrian Bowman
 - Catherine Fritz

Supporting those teaching statistics

- Funding for mini-projects
 - Learning basic statistics by solving problems – Jennifer Freeman (Sheffield)
 - Statistics in medicine: a risky business? - Margaret MacDougall (Edinburgh)
 - R-books for guided learning – Paul Hewson (Plymouth)
 - eLearning Statistics modules for modern regression methods and design of experiments – David Woods (Southampton)

Additional Activities

- Range of workshops including DayBreak Programme:
 - Teaching of advanced statistics topics
 - Tailored to needs of interests of participants
- Teaching Statistics in Higher Education Course:
 - distance-learning programme
 - designed for those who are teaching or are about to teach statistics in higher education.

E-learning modules

- Produced by David Woods:

- Design of experiments

- <http://www.doe.soton.ac.uk/elearning>

- Modern regression methods

- <http://chemtools.chem.soton.ac.uk/projects/stats>

R-books for Guided Learning

- Aim: Develop interactive course-notes/text books which both animate key concepts and also provide learner feed-back.
- Project has developed one mathematical illustration (based on the central limit theorem) to date and made available interactive course notes for this topic.
<http://r-forge.r-project.org/projects/rbooks/>
- Conducted a brief survey to examine priorities within UK higher education.

R-books for Guided Learning

Topic	Never	Year 1	Year 2	Year 3	M level	Total
Discrete Distribution Theory	0	19	7	3	2	19
Continuous Distribution Theory	0	18	11	4	2	19
Expectations of Random Variables	0	18	7	2	1	19
Moments	0	15	10	3	1	19
Characteristic functions	3	3	8	5	3	16
Confidence Intervals	0	15	9	5	4	18
Central Limit Theorem	0	14	7	5	3	18
Strong and Weak Law of Large Numbers	3	2	9	7	3	16
Least Squares	0	10	13	5	1	18
Maximum Likelihood	0	2	11	12	2	17
Bayes Theorem	0	16	5	7	2	18
Correlation	0	16	6	3	1	17
Hypothesis Testing	0	14	12	7	4	18
Data handling, summaries and plotting	0	14	6	3	2	16

Table 1: Number of respondents indicating that a particular topic was taught in a given year on a mathematics programme (this is a best judgement answer as there are subtle variations in a number of programmes)

R-books for Guided Learning

R Books: An Introduction to Cluster Analysis

Background

There is an online reading list associated with this topic: [Online Reading List for STAT3401](#). Cluster analysis is an extremely widely used set of techniques, you cannot fail to find some useful supplementary reading. In particular, it may be worth checking out these [Hierarchical Clustering java applets](#) which illustrate how three of the main hierarchical clustering algorithms work.

The first step in our exploration of cluster analysis is to select some data. The drop down menu will give you a choice of data objects already within R, as well as letting you load csv files currently residing in your workspace. You are cautioned that this is a very simplistic input routine, any files must be in an acceptable format. If anything goes wrong, it is quite likely to be because the data format isn't acceptable, full instructions are provided [HERE](#)

Please select a data set for further exploration:

Heptathlon.csv	X100mHurdles.S.	HighJump.m.	ShotPut.m.	X200m.sec.
Mammalian Milk	Min. :13.23	Min. :1.600	Min. :11.14	Min. :23.53
Tinned Food	1st Qu.:13.52	1st Qu.:1.720	1st Qu.:12.81	1st Qu.:24.40
econ.csv	Median :13.73	Median :1.750	Median :13.54	Median :24.77
Heptathlon.csv	Mean :13.90	Mean :1.743	Mean :13.30	Mean :24.91
hotelling.csv	3rd Qu.:14.19	3rd Qu.:1.780	3rd Qu.:14.14	3rd Qu.:25.25
IND : 2	Max. :15.12	Max. :1.840	Max. :15.55	Max. :27.27
KZK : 2				
UKR : 2				
(Other):13				
LongJump.m.	Javelin.m.	x800m.s.		
Min. :5.220	Min. :32.53	Min. :129.1		
1st Qu.:5.850	1st Qu.:41.48	1st Qu.:133.9		
Median :5.950	Median :43.92	Median :137.7		
Mean :5.978	Mean :43.47	Mean :137.2		

Network e-learning resource development

- 4 major areas of current activity:
 - Rpanel
 - Model Choice
 - STEPS
 - DRUID

Rpanel

- The rpanel package provides a set of simple interactive controls for R functions which are particularly useful in creating dynamic graphics
- Led by Adrian Bowman and Ewan Crawford in Glasgow
- More information:
<http://www.stats.gla.ac.uk/~adrian/rpanel/>

Model Choice

- Model Choice is a system that presents a graded series of scenarios to students, at a level appropriate to their current learning, and challenges them to choose from a list the probability distribution that should be used to model the outcome of the stochastic experiment being described.

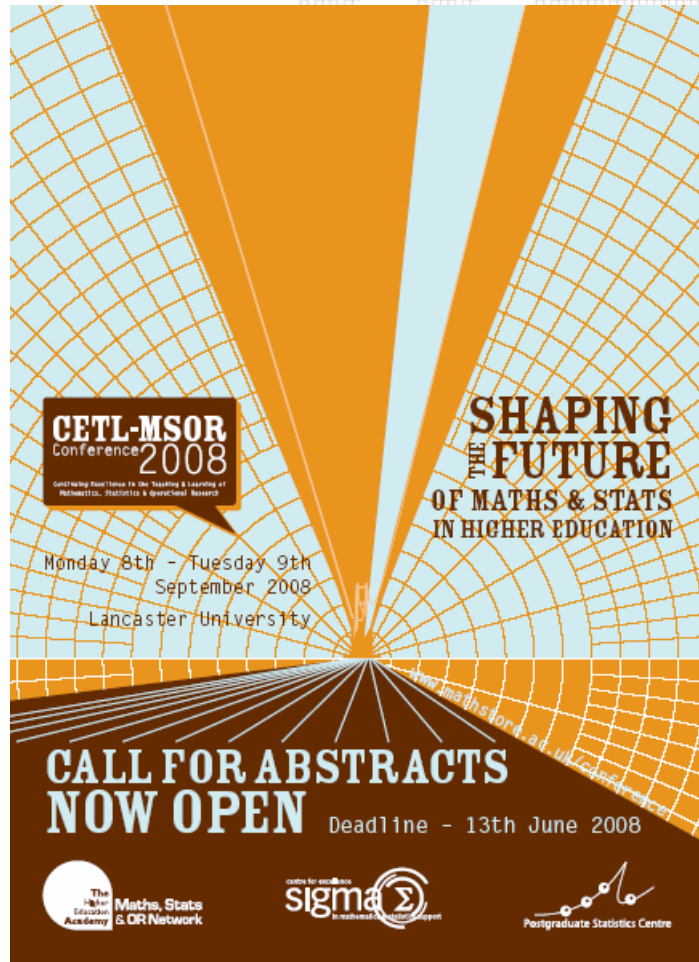
STEPS

- Online Statistics Glossary:
<http://www.stats.gla.ac.uk/steps/glossary/>
- Aim: To develop the current STEPS glossary into a more extensive resource with dynamic links to other related resources and examples, many of which will be subject-specific.

Two questions

- What issues are your departments facing in relation to teaching, learning and assessment?
- What three things could/should the Network do to support you and your colleagues?

A final word



- Annual Conference (CETL-MSOR 2008): 8/9 September, Lancaster University
- Call for abstracts now open (closing date 13 June 2008)
- www.mathstore.ac.uk/conference

Contact us

We Welcome Your Views

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