

Finding and using information

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Bibliographic databases... ...or how to find/organise information

Most of the material is due to Dugald Duncan,
Heriot-Watt University

Use the WWW + Google

Search engine `www.google.co.uk` or `www.google.com` is very powerful

- Search on `Euler` returns 14,100,000 hits (2014 = 15,600,000)
- `Euler's method` returns 302,000 hits (2014 = 560,000) hits
- `"Euler's method"` returns 140,000 hits (2014 = 150,000) hits

and at least some of the first few seem sensible

- The search on `Euler's method` means look for pages with both of these words separately or together and in any order anywhere in the page
- The search on `"Euler's method"` means look for pages with that exact phrase

!!! DBD has checked these numbers each year – some go up and down and others keep going up

Google

- Yet more control:

- `"Euler's method" kangaroo` returns 665 (966) hits
- `"Euler's method" kangaroo murderer` returns 298 (222) hits
- `"Euler's method" kangaroo -murderer` returns 660 (584) hits
- `"Euler's method" "kangaroo murderer"` returns 0 hits

- The minus sign tells Google to search on pages without the word following it
- Can also use the advanced search page

! Hit counts can be inconsistent

!!! There are large numbers of bizarre web pages

- **Google Scholar** searches make it easier to focus on academic articles:

`"Euler's method" kangaroo` returns 3 (3) hits


Mathematical “Encyclopedias”

- Mathematical software often has a built in help system that gives background information and references on the methods they use as well as definitions of special functions etc. – *use it as an encyclopedia*
 - Mathematica information is available free on the web at mathworld.wolfram.com
 - Maple has some information on line, but seems to give more running the package itself
- The recently published *NIST Handbook of Mathematical Functions* is available as a book, CD-Rom and online at <http://dlmf.nist.gov/>
 - It is a wonderful resource to find out about the properties of functions you have never heard of before
 - Updates the old 1964 standard by *Abramowitz and Stegun*
- **History of maths.** The St Andrews *MacTutor History of Mathematics Archive* is excellent – search on to find it and other sites

Web Archives - free to users

- The more or less global e-print service **ArXiv** was developed by Cornell University
- It covers many areas of maths, physics, computer science and quantitative biology
- Find it at www.arxiv.org and other mirror sites
- It has its own quite flexible search facility

Not peer reviewed

- Its coverage is excellent in some areas. It is less good in others – but use is  growing across the mathematical sciences

Also:

- Jstor (jstor.ac.uk) - database of papers published >4 years ago
- ResearchGate (need to set up an account)
- Academia.edu (need to set up an account)

Commercial Databases



Subscription only. Check with your library

- ISI (Thomson Reuters) Web of Knowledge
 - AMS MathSciNet (Mathematical Reviews)
 - Zentralblatt MATH
- Title, author, keyword, date, address searches
 - Output is a subset of
 - full publication details
 - author address
 - abstract or review
 - list of references made by the paper
 - list of papers which refer to the paper being considered
 - link to details of papers by same authors
 - web links to journal articles

Check the University online library search

More online resources

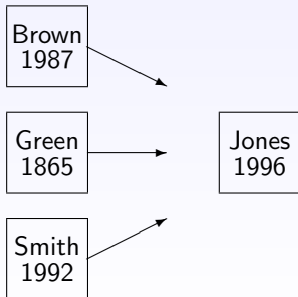
- StackOverflow: stackoverflow.com
- MathOverflow: mathoverflow.net
- Mathematics Stack Exchange: math.stackexchange.com
- Cross Validated: stats.stackexchange.com

- Wikipedia - initial source of information and references, to be confirmed by proper references

Citations and the Flow of Ideas

- Imagine that you have the paper by Jones from 1996
- At the end of the paper there will be a list of references (citations) that tells you where the methods, previous useful results and ideas for the paper came from
- This information can be useful to you. Does not need a database

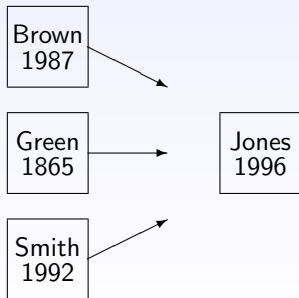
In Jones 1996



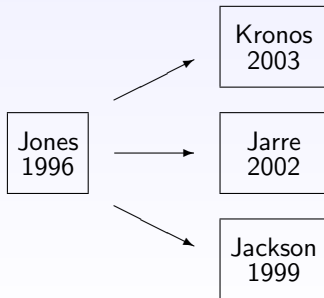
Citations and the Flow of Ideas

- Who has used or developed the ideas in Jones 1996 further?
- I.e. who may be working on the same problem as you?
- Your copy of Jones 1996 will not tell you that, but a **citation database** will, or in **Google Scholar search**

In Jones 1996



In database /Google Scholar search



Organise your references

I've got a hard disk full of downloads and lists of papers, what do I do?

- Nick Higham's book discusses the **BiBTeX bibliography database** or \LaTeX
[Note: database = file that stores information in an organised way]
- **Bibliography manager software**, e.g.
 - EndNote – commercial, check for university site license
 - JabRef – jabref.sourceforge.net – free, multi-platform
 - Zotero – www.zotero.org
 - Mendeley – www.mendeley.com – free, multi-platform
– reads a directory of PDFs and automatically makes a list etc
Some of them also read and output TeX files
- **Card-index file?** details and summary of one paper per card
- **Folder per topic** with pdf files and reference lists
- **Piling system?** – dump everything into a heap and hope for the best



DON'T put information into a database unless you are sure you can get it out

Summary

- There are lots of ways to find mathematical information
- Powerful computer tools make searching easier
- Careful design of a search for information makes sense, but luck and lateral thinking can play a positive part too. Keep a broad mind and look around: you might find the answers before the questions – and they might come from an apparently unrelated subject area
- Ask for advice from your supervisor, but bear in mind that people are sometimes slow to adopt new tools
- Your library may be able to help
- Discuss mechanisms with higher year PhD students or postdocs
- Organise your references in a sensible way – **now is a good time to plan ahead for what you need as your project/career develops**