Literature Searches: Keeping on Top of Your Field

John Stockie

CFD Research Group Meeting

http://www.math.sfu.ca/~stockie/research/cfdgroup.html

November 7, 2011

(this document is hyperlinked!)

Outline

1. Introduction
2. Getting Aware
3. Staying Aware

Outline

1 Introduction

2 Getting Aware

3 Staying Aware

Motivation

- One of our main jobs as academics is to become **experts** in at least one field.
- To do so, it is essential to stay on top of past and current literature.
- A **literature search** is an important task for:
  - theses
  - journal papers
  - grant proposals
  - course projects
- This is one big aspect of my earlier advice to *Read often, and broadly!*

Outline

1 Introduction

2 Getting Aware

3 Staying Aware

Getting Aware: Literature Searches

- When you are starting to move into a new area, you must get informed about:
  - what has been done before?
  - what is old and what is more recent?
  - who is doing it and where is it being done?
  - what is "hot"?
  - what questions haven't been answered yet?
- With the flood of information being published in academia, it is often difficult to know where to start.

Primary Sources

The main sources in order of respectability/reliability are:

- books and research monographs (most reputable publishers: AMS, SIAM, Springer, . . .)
- published journal articles (tier I, tier II, . . .)
- conferences papers (refereed vs. non-refereed)
- professional academics' web sites
- technical reports: in the "old days" much of the hottest research was hidden in confidential technical reports at ORNL, LANL, etc.
- preprints: especially at www.arXiv.org
- . . .
- Wikipedia, other web sources

The Anatomy of a Search

- Look up subject/keywords on:
  - MathSciNet (through the SFU library)
  - Google Scholar
  - Publisher portals: Science Direct (Elsevier), SpringerLink (Springer Verlag), etc.
  - I find (plain) Google relatively useless for literature searches.
- Once you find one relevant paper:
  - Read the bibliography carefully and identify sources with interesting titles. Recurse.
  - (Reverse) Do a **citation search** to find out who cites this paper. Recurse.
- For more "classical" work that's not online, look up books or articles in the library and do the same.
- If the book or paper you want isn't available, then order it through Interlibrary Loans (ILL): PDF in 1-2 days, hardcopy in 1 week.

What to Focus on

If you're feeling oberwhelmed, then start with

- reputable people
- reputable journals

Ask if you don't know!

Outline

1 Introduction

2 Getting Aware

3 Staying Aware

Staying Aware: Keeping Up To Date

- A single literature search is insufficient – you need to follow an area continuously over a long period of time.
- Join a Society, read their newsletters and journals, and participate in events: CAIMS, SIAM, AMS, CMS, Interpore, SMB, etc.
- Go to specialist workshops as well as more general conferences (ICIAM). If you can't attend, then at least look at a list of invitees and topics.
- Watch for special thematic programs at the mathematics institutes: PIMS, Fields and CRM in Canada; IMA, MSRI, IPAM, AIM in USA; Newton Institute in UK; etc.
- Visit other experts.
- Join or start a "reading club."
- Agree to review papers and grant proposals.
- Automatic updates from publishers and other sources ...

Ensuring You Intercept Newly Published Sources

- The old-fashioned method: Go to the library and read your favourite journals cover-to-cover.
- Content alerts from your favourite journals, as well as subject, author and keyword alerts.
- arXiv subject alerts.
- Google alerts.

Which Journals To Read

(a very biased and personal list . . . if I was stranded on a desert island and had only 20 subscriptions to keep me occupied, then what would they be?)

- Applied mathematics: *SIAM J. Appl. Math.*, *SIAM Review*
- Numerical analysis and scientific computing:
  J. Comput. Phys., *SIAM J. Sci. Comput.*,
  SIAM J. Numer. Anal., *Acta Numerica*
- Fluid mechanics: *J. Fluid Mech.*, *Computers & Fluids*,
  Phys. Fluids
- Mathematical biology: *J. Math. Bio.*, *Bull. Math. Bio.*
- Magazines: *SIAM News*, *Comput. Sci. Engrg.*, *Significance*
- Teaching: *Math. Intelligencer*, *Amer. J. Phys.*, *Phys. Teacher*
- General science: *Nature*, *Science*, *PNAS*, *Ann. Rev. of XXX*
  - Side benefits: a source of ideas for new problems

How to Remember All You've Found

- Over time, the work you collect will become difficult to handle.
- Keep an annotated bibliography (BibTeX, EndNote?) that answers:
  - what is the main result?
  - what did I like or not?
  - how does it relate to my work or interests?
  - does the author(s) identify any open problems?

  (I have 5000 BibTeX entries and counting . . .)
- Store an annotated paper copy or (preferably) PDF file.

Questions?