Informatics Research Review (IRR)

Lecture 1: Overview and Literature Searching

2018/19

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Partially based on Steven J. Murdoch’s slides from UCL course on “Research in Information Security” and adapted from earlier versions by Mark van Rossum, Alan Bundy, Victor Lavrenko, Stratis Viglas
Core IRR Course Team

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IRR Tutors
Overview

• Introduction
• Course Organisation
  • Tutorials, Lectures, Assessment
  • Website & Resources
• Literature Review
• Literature Searching
• Academic Standards
• Useful Information
Introduction
IRR in a Nutshell

- **Compulsory**: you have to show up.
- **Survey** of research in targeted area
- May be forerunner to summer project
  - Survey *can be unrelated to your exact summer project*
  - Choice of project done **after** IRR
- Delivered by a **teaching assistant (TA)**
  - Another lecturer, PostDoc, or a PhD student
  - Knowledgeable about your **specialism**
- Keep it to **at most 10 pages** including references
Purpose of IRR

- Learn skills of research reading
- Learn skills of research writing
- Refine choice of research area
- Learn background to project area
  - Independent learning!
- Critical evaluation of the state-of-the-art
View from 35000 Feet

• Identify relevant **papers**
• Keep **notes** on each paper
• Attend related **seminars**
  • e.g. [http://www.inf.ed.ac.uk/events/seminars](http://www.inf.ed.ac.uk/events/seminars)
• **Practice** reviewing & writing: minor reviews + feedback
• Weave your new knowledge into a **story**
• Write your **report**
• **Draft submission:** 10am on Monday, December 3, 2018
  • **Tier-4 visa engagement point!**
• **Deadline:** 10am on Monday, January 14, 2019
Organisational Information
Your MSc Programme

• Taught component (100 credits)
  • Lectures, tutorials, coursework, exams
  • Learn established techniques that work

• Research component (80 credits)
  • Do something that’s never been done before
    • Study a new problem, develop a new method, etc.
    • Probably the most exciting (and hardest) part of MSc
  • Culminates in you writing a dissertation (~50 pages, 60 credits)

• Two courses prepare you:
  • IRR: literature review in your broad area of interest (10 credits)
  • IPP: write a detailed plan for your specific MSc project (10 credits)
MSc Project Timeline

- **Semester 1 (IRR)**
  - Learn about a relevant area: *explore* research papers
  - Write a 10-page *critical review* of what you learned
- **January**
  - Faculty supervisors propose *project topics*
  - Or, propose your own
  - Talk to supervisors, pick set of topics, algorithmic allocation
- **Semester 2 (IPP)**
  - Write a detailed *research plan* for what you’re going to do
- **Summer** (provided you progress to the dissertation stage)
  - Work on your *project* (build, test, analyse results)
  - Write a *dissertation*
IRR/IPP Structure

- **Sign up to a group** based on preferred interest
- IRR topic can differ from thesis topic, IPP and specialism
  - Poll: [https://goo.gl/forms/qKSa5LxPUEFHMM7y43](https://goo.gl/forms/qKSa5LxPUEFHMM7y43)
  - Groups are created based on this poll
- Groups will meet **every week** (starting in week 3(tbc))
  - Guide you through the **stages of writing** a review
  - **Discuss** progress, answer **questions**, provide **feedback**
  - Your tutor will email to arrange meeting time/place
  - Attendance **mandatory** – will affect mark
- IRR Tutor ≠ Personal Tutor
IRR Areas

- Agents, Knowledge Management, Representation & Reasoning
- Analytical & Scientific Databases
- Bioinformatics, Systems & Synthetic Biology
- Cognitive Science
- Computer Systems, Software Engineering, High-Performance Computing
- Cyber Security and Privacy
- Intelligent Robotics
- Learning from Data / Data Science / Machine Learning
- Natural Language Processing
- Neural Computation & Neuro-Informatics
- Theoretical Computer Science
FAQ

- Does IRR need to overlap with my specialist area?
  No, it is common but not required.

- Does my project need to be in my IRR area?
  No, it is common but not required.

- Does my project need to be in my specialist area?
  No, it is common but not required.

- As part-time student, do I need to do IRR & IPP in the same year?
  No. Instead try to do IPP and project in the same year.

- Do IPP and my project be on the same topic?
  No, but this is very common.
  Special case: Part-time students.
IRR Tutorials

- Exact Location, time, and contents determined by tutor
- Content
  - What is a literature review
  - How to search for papers
  - How to read papers effectively
  - Write an introduction of your report
  - Scientific writing
  - Using Turnitin, reviewing drafts
  - First draft of report due
  - Feedback on first draft
- Submit your report via Turnitin (details will be on the website)
IRR/IPP Information

- IRR website
  http://www.inf.ed.ac.uk/teaching/courses/irr

- IPP website
  http://www.inf.ed.ac.uk/teaching/courses/ipp

- MSc project guide
  http://www.inf.ed.ac.uk/teaching/courses/diss/guide.html

- If you have questions (in this order!)
  1. Ask the tutor of your group
  2. Post your question on the Piazza forum
  3. Email the TA
  4. Email me
  5. Make an appointment to see me
To Do Now

• Fill in the poll
  https://goo.gl/forms/qKSa5LxPUEFHM7y43
• If you want to change, do NOT fill in the poll again.
  • Instead, wait until allocations are made and then request a change.
• You can start browsing Seed papers:
  https://www.wiki.ed.ac.uk/display/irrirpwiki/IRRSeedPapers
Technicalities
Course Website

- [http://www.inf.ed.ac.uk/teaching/courses/irr](http://www.inf.ed.ac.uk/teaching/courses/irr)
- Central repository of **relevant course information**
  - Announcements, resources, software, coursework information
  - Gets updated as we go along, keep checking!
- **Resources**
  - Material on literature searching, academic reading & writing, critical reviewing, academic standards & good practice
  - Links to IAD resources, papers, books & videos
  - It’s **your responsibility** to make use of these!
Piazza Forum

• **Forum** for course-wide **discussion**
  • Not just for asking questions when you’re struggling
  • **Main resource** for discussions around this course
    • Peer-to-peer, tutors, TA, course lecturer
    • Don’t expect me to respond to all questions and/or within 5 minutes!

• Allows **anonymous** posts
  • No trolling, University regulations still apply
  • May drop anonymity if forced to

• Tutors, TA & myself will follow discussions & contribute
Course Wiki

- Mainly a resource for **course tutors**
  - Schedule/content for tutorials
  - Sharing of tutorial materials
  - Take a look!
- **Seed papers**
  - Dynamic resource, lecturers/tutors may update this
- Archive of older course materials
Software Tools

• **Recommended tools**
  • LaTeX & BibTeX
  • Overleaf
  • LaTeX **template** provided on website
  • Links to useful tutorials provided on website
  • Free to use whatever for writing, but not supported/recommended
    • MS Word, Open/LibreOffice, …
• **Other useful tools**
  • Mendeley, Papers, …
• **Keep backups** when working locally!
Assessment
Assessment

• We are here to help and most students enjoy the course.
• Main reasons for failure:
  • Plagiarism
  • Not showing up at tutorials
  • Non-scientific topic: 'the new iPhone', 'History of facebook'
  • Poorly written literature review
    • Summary of random papers, rather than structured and critical review telling a story and culminating in the identification of an area worthy of further investigation
Assessment

• Minor review exercises within tutorial groups not marked, but feedback
• Final report will be marked by your tutor & you will receive feedback
• Mark is based on:
  • **Appropriate coverage**
    Did you hit all the important papers in the area?
  • **Understanding of sources**
    Are you just parroting back what you read?
  • **Critical evaluation and comparison**
    Beyond “A did X, B did Y”?
  • **Clarity of expression and presentation**
    Do your friends understand it?
  • **Attendance of tutorial group meetings**
    Discuss all absences with your tutor
Literature Review
Goals of a Literature Review

- Understand the **state-of-the-art**
  - What is current substantive knowledge?
  - What are the most important questions?
  - What research has been done most recently?
  - Who is doing the research?
  - What are they investigating?
- What is **current methodological knowledge**?
  - What research methods are being used?
  - What tools and techniques are being used?
  - How are results being analysed?
Why do a Literature Review?

- Help you understand current work in the field
- Can assist with understanding of theoretical or practical problem and/or hypothesis
- Helps identify your contribution
- Provides a firm foundation for your work
- Increases chances of paper being accepted
- Stops comments from reviewers such as, “This paper should have considered the work of Smith et al. who performed an experiment very similar to the one described in this paper”
Literature Searching
Starting Point

- Select interesting **seed papers** from: https://www.wiki.ed.ac.uk/display/irrirpwiki/IRRSeedPapers
- Provided by **project supervisors** for each specialisation
- You can also use a paper you **found yourself**
  - Check with tutor
Next Steps

• Follow-up the **citations** in the papers you read
  • Reference list

• See who cited the paper (easy with **Google Scholar**)

• Library and online resources
  • ACM or IEEE **Digital Libraries**
  • Citeseer and ISI Web of Knowledge
  • Google Scholar
  • **Library Online** [http://www.lib.ed.ac.uk/resources](http://www.lib.ed.ac.uk/resources)
Meeting Academic Standards
Citations are important!

- Bedrock of academic honesty
- Avoids claims of plagiarism

"No". ¹

¹ William Shakespeare, *Hamlet*, Act III, Scene I, line 96
Avoid Plagiarism

• **Quotations** must be acknowledged
  • Including close paraphrase

• Use **quote marks and cite source**
  ...Smith (2009) argued that “the Level 2 cache systems are the core to fast database systems in future HPC”....

• **Do not copy-paste-edit** from online sources

• Read **School guide on plagiarism**

• Plagiarism carries **serious penalties**. Fail on the course is the least severe...

• Guidance on **Good Academic Practice** on the course website
Useful Information
Institute for Academic Development

• Part of the University of Edinburgh
• Offers for **free:**
  • Study skills workshops
  • Self-study learning resources
  • Advice to help you succeed in your studies
• Useful **resources** for taught postgraduate students
  • Literature review
  • Literature searching
  • Managing reading workloads
  • Writing at postgraduate level
English Language Education

- Also part of the University of Edinburgh
- Provides **free support**
  - Courses, workshops, independent study materials
- **Embedded sessions** in the IRR course
  - Lecture 2, 3: Academic Reading & Writing
  - Q&A workshop in week 5
Time Management

- Work out **timetable** for reading/writing
- Leave plenty of time for **feedback** and **correction**
- Read at a **steady pace**
- Keep **notes**
- Write as you go
- Completeness before perfection
  - Allow for several iterations before submission
  - Don’t become too attached to your own text
Bonus Material

Steven J. Murdoch’s slides from UCL course on “Research in Information Security”
Goals of a Literature Review

• Understand the state of the art
  • What is current substantive knowledge?
  • What are the most important questions?
  • What research has been done most recently?
  • Who is doing the research?
  • What are they investigating?

• What is current methodological knowledge?
  • What research methods are being used?
  • What tools and techniques are being used?
  • How are results being analysed?
Why do a Literature Review?

• Help you understand current work in the field
• Can assist with understanding theoretical and practical problem
  • Can assist with hypotheses
• Helps identify your contribution
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  • Stops comments from reviewers such as, “This paper should have considered the work of Smith et al. who performed an experiment very similar to the one described in this paper”
Selecting Sources for Review

• You want to learn about an area
  • Look for textbook
  • If no textbook look for survey paper
    • e.g. ACM surveys, meta-analyses
  • If no survey papers, look into proceedings/authors
• Keeping up to date
  • Look at latest proceedings or papers in area
• Don’t rely on Google/open-access/online papers
  • Be aware that others do
Selecting Sources for Review

- Scientific articles
  - Follow the scientific method
  - Required to provide evidence for claims
  - Peer reviewed
  - Open to scrutiny and verification by readers
- Compare with
  - Commercial documents/reports
    - Beware of vendors’ white papers
  - Newspaper and magazine articles
    - May be exaggerated to sell more newspapers
Selecting Sources for Review

• Need to be selective
  • Search on Google Scholar in title field only (Jan 2014)
    • cryptography – 14,000 hits
    • cryptography “public key” – 7,550 hits
    • cryptography "public key" algorithms – 147 hits
      • If search is anywhere in article – 123,000 hits!
  • Be clear about scope of literature review
    • Driven by your research question
    • However, may need to search outside main field
      • e.g. use of Q methodology in privacy research
      • Using an existing technique in a new field
Selecting Sources for Review

• Google Scholar - http://scholar.google.co.uk/
  • Search by author, year, journal, keyword in contents and title
  • Exact phrase search
  • Number of citations
  • Links to SFX@UCL when connected to UCL network
• UCL’s metalib - http://metalib-a.lib.ucl.ac.uk
  • Search by author, title, year
  • Recommend “Advanced” search
• Difference between searching on/off UCL network
Selecting Sources for Review

- Citeseer
- Links articles to the ones they cite and the ones that cite them
  - https://citeseer.ist.psu.edu
- Researcher’s own page(s)
  - Often have free copies of their papers
  - Try a friendly e-mail 😊
- Conference proceedings
  - WEIS, NSPW, SOUPS, CHI, EuroCrypt etc.
Selecting Sources for Review

- **DBLP**
  - Computer science bibliography
  - Tabulates articles by:
    - Specific author
    - Specific conference or journal
  - [http://www.informatik.uni-trier.de/~ley/db/](http://www.informatik.uni-trier.de/~ley/db/)

- **Web pages**
  - Articles in quality newspapers, reports, presentations, TV programmes etc.
  - Use with care!
  - Avoid a bibliographies consisting of mainly URLs
Selecting Sources for Review

• Identify key authors in the field
  • Seminal papers – look for lots of citations
    • “A method for obtaining digital signatures and public-key cryptosystems” – Rivest, Shamir & Adleman – 13,659 citations
  • Privacy – Nissenbaum, Westin, Acquisti, Cranor, etc.

• Questions to ask yourself
  • How relevant is this to my research?
  • How current is the work?
  • What have I not seen before?
  • Does it seem to be a credible source?
  • Is it well structured and easy to read?
Starting Out

• You will initially feel:
  • Overwhelmed
  • Ignorant
  • Confused
  • As though review will never end
• A methodical approach will assist you to:
  • Select the sources – begin to understand the problem
  • Do active/effective reading
  • Create a well-organised literature review
Starting Out

- The foundation of a good literature review
  - A good research question
- Identify important journals and conferences in your area
- Use an iterative approach
  - Initial research question scopes initial literature search
  - Refine the research question
  - New search with refined research question
  - Repeat as necessary
- The final scope of the review
Different Types of Reading

- Pleasure or general interest
  - e.g. fiction, magazines, blogs
- Functional
  - Aimed at achieving a specific goal
  - e.g. instruction manual, news
- Work
  - Also trying to achieve a goal
  - e.g. reports, news, research papers, contracts

- Don’t confuse them
Active Reading

- Has an objective and expectations
- Selective about the text
  - Selects which text to read
- Selective within the text
  - Only read sections which are important to you
  - Don’t necessarily read text from start to finish
- Critical
  - What is the quality of the source?
  - Critically read the text
Active Reading

- Ensures understanding
  - Re-reads text if necessary
  - Consult other sources
  - Come back to it!
- Probably uses printed version of text
  - Easy to annotate
  - Quickly move through text
  - Easier to cross-reference several documents
Effective Reading

- Work in correct environment
- Set goals for the reading
- Read in short sessions
  - Be realistic!
- Make notes – summarise what is being said
  - Reading off a screen is not sufficient
  - Use technique you feel comfortable with to organise knowledge
- Allow time to reflect and come back to the text
Managing Your Sources

- Use a bibliographic tool
  - Sometimes provides a plug-in for browsers and word processors
- Zotero bibliography management tool
  - www.zotero.org
  - Recommend standalone version
  - Plug-in for MS Word
  - Access via the web
  - 12 minute ISD introduction to Zotero at http://www.ucl.ac.uk/isd/common/resources/snippets/zotero
Zotero
Mendely
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<td>EUROBATS Secret</td>
<td>2004</td>
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<td>Fresh powder on Waddington's slopes</td>
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<td>Fraser, O. N.</td>
<td>2011</td>
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<td>2012</td>
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<td>Large-billed crows (Corvus macrorhynchos)</td>
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<td>Greenhall, A.</td>
<td>1982</td>
<td>House bat management</td>
<td>Nature</td>
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<td>Greer, E. L.</td>
<td>2010</td>
<td>Members of the HSK4 trimethylation complex</td>
<td>Microscopy</td>
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<td>Grothe, B.</td>
<td>2000</td>
<td>Structure and function of the bat superior olivary core</td>
<td>3rd Internat车上</td>
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<td>Hago, T.</td>
<td>2007</td>
<td>Adaptive SONAR sounds by echolocating bats</td>
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<td>Haider, H. K.</td>
<td>2010</td>
<td>Preconditioning and stem cell survival</td>
<td>J Cardiovasc Res</td>
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<td>The paracrine effect: pivotal mechanisms in cells</td>
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<td>Malo, M.</td>
<td>2010</td>
<td>Stem cell therapy for chronic myocardial infarct</td>
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<td>McKern, P. J.</td>
<td>2003</td>
<td>Neurobiology of echolocation in bats</td>
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<td>Nakatsuji, N.</td>
<td>2010</td>
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<td>New York State</td>
<td>2009</td>
<td>Guidelines for conducting bird and bat studies at comm...</td>
<td>J Dent Res</td>
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<td>Paige, S. L.</td>
<td>2010</td>
<td>Endogenous Wnt/beta-catenin signaling is re...</td>
<td>J Dent Res</td>
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<td>2001</td>
<td>In search of King Solomon's ring</td>
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  volume = 8,
  year = 2009
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@inproceedings{bridgespa,
  author = {Smits, Rob and Jain, Divam and Pidcock, Sarah and Goldberg, Ian and Hengartner, Urs},
  booktitle = {Proceedings of the 10th Annual ACM Workshop on Privacy in the Electronic Society},
  date = {2011},
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  number = {10},
  pages = {93-102},
  publisher = {ACM},
  title = {BridgeSPA: Improving Tor Bridges with Single Packet Authorization},
  year = {2011}
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@article{spator,
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@techreport{optimizing_proxy_placement,
  author = {Jacopo Cesareo and Jos Karlin and Michael Schapira and Jennifer Rexford},
  institution = {Department of Computer Science, Princeton University},
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@inproceedings{routing_around_decays,
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  title = {Routing Around Decays},
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Critically Reviewing the Literature

• Questions to ask yourself
  • If relevant, does it follow the scientific method?
  • Is the method used appropriate?
  • Are the results valid?
  • Do the conclusions make sense given the findings and existing work?
  • Has this study been cited by others?
A Good Literature Review

• Begins with a well formed research question
• Explores the research question
  • What work has previously addressed this question?
  • What aspects of the problem are still unknown?
  • What have others argued?
  • What needs to be done?
  • How does this affect practitioners and theorists?
• Is founded on existing & accepted theories
  • Is not simply a list of URLs
A Good Literature Review

- Locates all relevant literature
- Has a logical structure - structured by
  - Themes
  - Time
  - Experiments/trials
  - Different research approaches
  - etc
- Critically reviews the literature
  - Not just a simple catalogue of the literature
- Justifies the reason for the research
Citations are important!

- Bedrock of academic honesty
- Avoids claims of plagiarism
Citations

• Students often get citations wrong
  • Over cite, under cite or not cite at all
  • Reader can’t see an obvious research trail
  • Quoting irrelevant sources
  • Too few or too many references
  • Wrong or mixed citation styles
  • Difficult to locate referenced sources
  • Bibliography mainly consisting of URLs
  • Forgetting page reference on quotes
  • ......
Citations

- Must not copy text, ideas, analyses, etc. unless source is clearly indicated
- Must make it clear where you have used, or referred to, others’ work/ideas/comments
  - If in doubt, cite!
- Reader should be able to locate your sources
  - Some journals only allow publicly available works to be referenced
- Refer to your sources unambiguously
Citations

• Use citations when
  • Quoting verbatim
    • e.g. In their study Smith et al. (2006, p.26) concluded, “ [...] people generally ignore security warnings, if they believe there is no immediate or obvious danger to them”
  • Referring to existing research, particularly in the related work (literature review) section of a paper
    • e.g. Although people’s actual behaviour has previously been found to be non-privacy protecting [10,45,56], this may be because of poor user interfaces [23,30], or users’ goal-driven behaviour [15,21,29]
  • Use to build your “state of the art” argument
Citations

• Use citations when
  • Indicating that work or idea is by someone else
  • Paraphrasing
    • Same meaning but different words
    • e.g. Peoples’ stated privacy preferences do not match their actual privacy behaviour (Norberg et al., 2007)
  • When copying a figure, graph, or table (beware copyright)
  • There is background material you believe the reader may wish to refer to
  • Other reasons to refer to work outside your paper
Citations

- No need to cite when
  - You have discovered the facts yourself
  - It is an original idea, theory etc.
  - It is common knowledge
    - e.g. electromagnetic radiation which can be seen by the human eye is known as visible light
  - Sometimes hard to define “common knowledge”
Citations

- Good citing is almost an art – no single rule
  - Experience in writing and reading papers will help you
- Two mandatory components of a citation:
  - In the text itself
  - In the reference list
- The reference list may be
  - At the end of the paper (bibliography)
  - As footnotes (common approach for legal articles)
Citations

• Citations may look like
  • “Previous experiments indicate a possible link (Smith et al., 2006)”
  • “Previous experiments indicate a possible link [1]”
  • “Previous experiments indicate a possible link [SBW06]”

• Many different citation styles

• Generally two types
  • Author-date - e.g. (Jones, 2006)
  • Numeric - e.g. [1]
  • But there are others – e.g. [MS12]
Citation Styles in Zotero

Zotero Style Repository

Here you can find Citation Style Language 1.0.1 citation styles for use with Zotero and other CSL 1.0.1–compatible software. For more information on us

Style Search

Format: author, author-date, label, note, numeric

Fields: anthropology, astronomy, biology, botany, chemistry, communications, engineering, generic-base, geography, geology, history, humanities, law, linguistics, literature, math, medicine, philosophy, physics, political-science, psychology, science, social-science, sociology, theology, zoology

6,780 styles found:

- 3 Biotech (2013-05-10 09:45:15)
- 4OR (2013-05-10 09:45:15)
- Academic Questions (2013-05-10 09:45:15)
- Academy of Management Journal (2013-05-10 09:45:15)
- Accident Analysis and Prevention (2013-05-10 09:45:15)
- Accounting Forum (2013-05-10 09:45:15)
- Accounting History (2013-05-10 09:45:15)
- Accounting, Organizational and Information Systems (2013-05-10 09:45:15)
- Accounts of Chemical Engineering (2013-05-10 09:45:15)
- Accreditation and Quality Assurance (2013-05-10 09:45:15)


Citations

• Make sure you pick the correct citation style for the journal, conference etc. you are submitting to

• Using a bibliographic tool like Zotero you can switch between citation styles very quickly
  • www.zotero.org

• Generally, in UCL Computer Science assignments citations are numeric, e.g. [1], or hybrid, e.g. [SJ02]
Goals of citations

• Shows reader you have carried out a thorough literature survey
• Makes reader more likely to view the results of your study seriously/favourably
• Shows respect for the ideas of others