Overview over the Module

Research Culture in Computer Science

Welcome

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Terminology

- In my lectures “dual-specialists” means “MSc in Computer Science”.
- ACS means MSc in Advanced Computer Science (including specialisations).

Synopsis

“This module consists in lectures and seminars about
- fundamental research methodologies and
- good practice in research,
- formulation of research questions and hypotheses,
- logical reasoning,
- literature research,
- proper acknowledgement of sources,
- principles in carrying out experimental research.”

Handbook


General Structure

- Week 1/2: Introductory lectures (general).
- Week 3 - 6: Lectures by the degree scheme coordinates on research methodologies in the areas covered.
  - Typically
    - One lecture of general nature (e.g. “ethics”)
    - One lecture about research in that particular field.
- In parallel tutorials led by tutors grouped by schemas (dual specialists, ACS and specialisations).
  - Students will carry out a mini-project (in case of ACS related to their specialisation).
  - Could be an essay, a small program, a small user study.
  - Students write an essay and prepare a presentation.
- Week 7 - 9 Student presentations in tutorials.
- Week 10 Introduction into Projects and Project Selection.
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Timetable

- 3 lecture slots per week:
  - Thursday 11 - 12, Keir-Hardy 152.
  - Friday 10 -11, Talbot 224
  - Friday 13 - 14, Grove Extension, 353.
- In first 6 weeks only 2 lectures given.
- Usually lecture Friday 13 - 14 cancelled (maybe changed).
- In week 7 - 9 presentations in the tutorials take place.
- In week 10 2 lectures regarding the projects.

Assessment

- Mini project allocated by tutor:
  - One essay or project report (50 %)
  - One talk (50 %)

Choice of Specialisations

- Students in ACS please hand in by Monday 8 October in Student Information Office:
  - scheme transfer forms signed by the coordinator of the specialisation you want to move in, 
    only if you want to change specialisation,
  - or confirm in the student information office if you want to stay on your current specialisation.
- Needed for making tutorial allocation.

Module Selection

- All students please hand in module selection forms signed by the course coordinator by Monday 8 October in the student information office:
- Dual specialists: John Sharp,
- ACS:
  - Open specialisation: Roger Stein,
  - Software Technology: Roger Stein,
  - Safe and secure systems: Anton Setzer,
  - Visual Computing: Jason Xie
  - HCI: Parisa Eslimablochilar
Tutorials

- Tutorials will be allocated
  - Some for dual specialist MSc.
  - For ACS groups organised by specialisations
    (some specialisations might be grouped together).

Topics in this Module (Lecture 1 - 5)

- Anton Setzer
  1. Introduction (this lecture), Coursework Submission System.
  2. Research culture, publication process.
  4. A taster of \LaTeX\ (Word processing system)
  5. Academic Integrity (by Chris Whyley).

Topics (By Pathway Coordinators, Week 3 - 7)

- Anton Setzer
  - Specification and Verification.
  - Time Management.

- Roger Stein
  - Project Management and Planning.
  - Project Selection.

Topics (By Pathway Coordinators)

- Parisa Eslimablochilar (TBC):
  - Introduction to HCI
  - Ethics Procedure
  - The Joys of Writing.

- Jason Xie:
  - Research paper critique and review rebuttal.
  - Visual computing research topics & general methodology
Disclaimer

Most of the pictures used in this lecture are downloaded from the internet. They are not my original work.

3 Main Methodologies

- Theoretical Research.
  - Thinking.
  - Foundations of Computer Science.
    - E.g. “What is a program?”.
    - What kind of data types do exists?
  - Developing new ways of solving problems.
    - New algorithms.
    - New programming paradigms.
    - ...
  - Mathematical Research.
    - A lot of proofs carried out.
    - E.g.: Prove that algorithm A is better than algorithm B.
    - Prove that it is possible to decide that this program is correct.

- Experimental Research.
  - User Studies.
  - Software Experiments.

- Software Production.
  - Usually experimental software
  - Trying out new algorithms, paradigms, programming languages.
However most of it is Thinking Thinking Thinking

Ideas

- Creative Process.
- Ideas usually have roots in other ideas.
- Inspirations from others.
- Inspiration from other fields inside computer science, outside computer science.
- Or even arts, travelling.

Example: Greek Philosophy

- Greek philosophy origins from colonies close to Turkey, exposure to other cultures.
- Many researchers have been exposed to different cultures in early childhood.
  - Parents moving to other countries.
  - Being part of a minority in a country.

Most Important

Exchange of Ideas
Conferences

A lot of research happens at conferences, workshops.
From two to several thousands participants.
Small workshops, large conferences.
Some high prestigious by invitation only.
  - Oberwolfach (Germany)
  - Dagstuhl (Germany)
  - NII Shonan Meeting (Japan)

Social Events more Important than Lectures

Most happens during coffee breaks, lunches, dinners.
Coffee breaks often more important than lectures.

My own experience

- Good lectures give rise to new ideas even if I don’t understand what the lecturer is talking about.
Other Forms of Collaborations

- Sabbaticals.
- Visits to Research Institutes.
  - Institute for Advanced Studies (Princeton).
  - Newton Institute (Cambridge).
  - Mittag-Leffler Institute (Stockholm).
  - ...
- Research visits.
  - Between 1/2 day and several years.
- Seminars, colloquia.

Scientific Journals

- Typically called
  - Journal of ... (Journal of Symbolic Logic)
  - Annals of ... (Annals of Pure and Applied Logic)
  - Archive of ... (Archive of Mathematical Logic)
  - Transactions of ... (ACM Transactions on Human-Computer Interaction).
  - Acta ... (Acta Informatica)
  - Many more.

Proceedings

- Most published by scientific publishers.
  - E.g. Elsevier, Springer, ...
  - Subscriptions very expensive.
  - Access to electronic subscriptions at Swansea
    - On campus.
    - Off campus through Athens.
- Increasingly open access journals.
  - Produced by the scientific community.
  - Reason: Most articles submitted in directly publishable form.
    - No need for process of editing.
  - Why pay if publishers don’t add much to it.
- Proceedings of Conferences
  - Often published in
    - Springer Lecture Notes in Computer Science.
    - Electronic Notes in ... (e.g. Electronic Notes in Theoretical Computer Science).
  - Many other outlets.
  - Usually refereed.
  - Often highly competitive (acceptance rates e.g. 20 %, 10 %).
Referee Process

- Submission of article to an Editor.
- Editor sends it to Referees.
- Referees write anonymous reports.
- Editor decides about
  - Revised version required
  - Rejection
  - Acceptance.

Festschrift

- Festschrift = German for “Festive publication”.
- Proceedings in honour of somebody famous.
  - Typically 60th, 65th, 70th, 75th, ... birthday
  - or retirement
- Sometimes not of highest quality (no thorough referee process).
- Sometimes very high quality.

Good Way of Searching Quality Scientific Articles

Enable “Get it at Swansea” in Settings

Look for Doi pages (Document Object Identifier)
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Identifying Electronic Versions of Scientific Articles

Look at pages of publishers

- Springer: Springer Link.
- Elsevier: Science Direct.
- ACM: ACM Digital Library.

Main Motivation for Doing Research

- It's fun.
- Enthusiasm.
- Being amongst highly creative people.
- Going to the limit of human consciousness.
- It benefits society.
  - Top universities are hot beds for innovative companies.

Research and Teaching

- Research and teaching go hand in hand.
- Although research often beyond what is taught, it influences teaching.
- A researcher often shows not so much by what s/he is teaching, but how s/he is teaching, behaving, acting, thinking ...

Be Inspired