TECHNISCHE UNIVERSITÄT DRESDEN

ACADEMIC SKILLS IN COMPUTER SCIENCE

Lecture 1: Introduction and Motivation

Sebastian Rudolph

Computational Logic

Slides by Markus Krötzsch

TU Dresden, 6th April 2020

Introduction and Organisation

Course Tutors

Sebastian Rudolph
Lectures

Maximilian Marx
Exercises

Organisation

Lectures

Monday, DS 2 (9:20–10:50), APB E005

Exercise Sessions (starting 21 April)

Tuesday, DS 5 (14:50–16:20), APB E001

Until further notice teaching is asynchronous and virtual, check course webpage.

Web Page

`https://iccl.inf.tu-dresden.de/web/Academic_Skills_in_Computer_Science_(SS2020)`

Lecture Notes

Slides of current and past lectures will be online.

Modules

INF-AQUA, INF-B-510, INF-B-520, INF-B-530, INF-B-540, MCL-CS

Goals and Prerequisites

Goals

- Understand key aspects of the **scientific process**
- Learn how to **write** and **present** in research and technology
- Get to know basic ideas from the **theory of science and knowledge**
- Obtain working knowledge about helpful **tools and methods**, including LaTeX
- Discuss aspects of **ethics and quality assurance**

(Non-)Prerequisites

- No particular prior courses needed

Examination

- The examination will be oral
- Most likely including a prepared part (e.g., a short presentation)

Motivation

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"(ein begründetes, geordnetes, für gesichert erachtetes) Wissen hervorbringende forschende Tätigkeit in einem bestimmten Bereich"
["research activity producing knowledge (that is justified, systematic, considered certain) in a particular domain"] – Duden, Wissenschaft

Note on English usage

Traditionally, the word science in English only referred to what are now known as the natural sciences (astronomy, biology, chemistry, physics, . . .)

- still common, e.g., “science department”
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Computer science can connect to many of these areas:

- structural science: theoretical CS, formal logic
- engineering science: software and hardware design and building
- social science: communities & online interaction; Web science
- humanities: library studies; ontology and classification; digital humanities
- and many more . . .

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“If something has been observed many times, then it will also be observed in the future (with high probability).”

Who can we trust?

Transgressing the Boundaries:
Towards a Transformative Hermeneutics
of Quantum Gravity

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Classical and Quantum Gravity

Topological field theory of the initial singularity of spacetime*

Grichka Bogdanov and Igor Bogdanov

Published 22 October 2001 • Classical and Quantum Gravity, Volume 18, Number 21

Science. 2000 Feb 11;287(5455):1022-3.

Ambipolar pentacene field-effect transistors and inverters.

Schon JH[1], Berg S, Kloc C, Batlogg B.

2]

tors based on pentacene single crystals, prepared with an amorphous aluminum
an be used for the preparation of complementary inverter circuits. The field-effec
.7 and 1.7 square centimeters per volt per second at room temperature up to 12(
eratures for hole and electron transport, respectively, following a power-law dep
on process of complementary logic circuits with these transistors, together with t
l applications of plastic electronics.

Rooter: A Methodology for the Typical Unification of Access Points and Redundancy

Jeremy Stribling, Daniel Aguayo and Maxwell Krohn

ABSTRACT

Many physicists would agree that, had it not been for congestion control, the evaluation of web browsers might never have occurred. In fact, few hackers worldwide would disagree with the essential unification of voice-over-IP and public-key pair. In order to solve this riddle, we confirm that SMPs can be made stochastic, cacheable, and interposable.

1. INTRODUCTION

Many scholars would agree that, had it not been for active networks, the simulation of Lamport clocks might never have occurred. The notion that end-users synchronize with the investigation of Markov models is rarely outdated. A theoretical challenge in theory is the important unification of virtual machines and red-black trees. To what extent can web browsers be constructed to achieve this purpose?

Certainly, the usual methods for the emulation of Smalltalk that paved the way for the investigation of rasterization do not apply in this area. In the opinions of many, despite the

The rest of this paper is organized as follows. For starters, we motivate the need for fiber-optic cables. We place our work in context with the prior work in this area. To address this obstacle, we disprove that even though the much-tauted autonomous algorithm for the construction of digital-to-analog converters by Jones [10] is NP-complete, object-oriented languages can be made signed, decentralized, and signed. Along these same lines, to accomplish this mission, we concentrate our efforts on showing that the famous ubiquitous algorithm for the exploration of robots by Sato et al. runs in $\Omega((n + \log n))$ time [22]. In the end, we conclude.

II. ARCHITECTURE

Our research is principled. Consider the early methodology by Martin and Smith; our model is similar, but will actually overcome this grand challenge. Despite the fact that such a claim at first glance seems unexpected, it is buttressed by previous work in the field. Any significant development in secure theory will clearly require that the acclaimed real-time algorithm for the refinement of write-ahead logging by

Science: Theory and Practice

Scientific theory:

- How is science justified? In fact: is it? What is “scientific”?
- Related: What is knowledge?

Scientific practice:

- What constitutes “valid” science?
- Who can we trust? How can we discover cheats and errors?
- Rules of good scientific behaviour
- And “minor” practical details: how to find research questions? how to publish? how to build a career in science?

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- Mostly natural?
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Research as a Craft: Academic research requires many skills that can be acquired through practise

- How to structure, write, and produce reports?
- How to prepare and deliver presentations?
- What makes a sound evaluation or argument?

Academic skills for the non-scientist

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Understanding science

- Be critical – tell facts from lies
- Understand how academic research works and what its weaknesses and limits are

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- Investigate a topic in detail
- Turns guesses & hopes into knowledge

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Presenting results

- Author reports, technical documents, etc.
- Present to audiences
- Your near future: seminar talks, project thesis, MSc thesis and defence

Lecture Outline (1)

- **The Research Process**
  Quality assurance; peer review; publishing in computer science; public education
- **Information Gathering**
  finding literature; how & what to cite; bibliometrics; research questions; reading
- **Writing**
  goals & genres; structuring scientific reports; specific parts;
  style; layout; language
- **Typesetting in Computer Science: LaTeX**
  key concepts; document structure guidelines; bibliographies; figures & Tikz
- **Presentations**
  goals & genres; structuring presentations; general considerations
  presentation technique
  media usage: slides, board, multimedia, etc.

Lecture Outline (2)

- **Theory of Science and Knowledge**
  Knowledge; Popper; critical theory; (un)scientific methods; argument and reason; (in)validation
- **Empirical evaluations**
  Goals, structure and content; experimental design; simple statistical evaluation; (mis)representing results; reproducibility
- **Ethics**
  scientific misconduct; (co-)authorship; conflicts of interest; ethical guidelines
- **Further advanced topics** (time permitting)
  Self management? More writing technique? Reviewing? Proposals and applications?