Fundamental Computer Science

Alastair Abbott & Enikő Kevi

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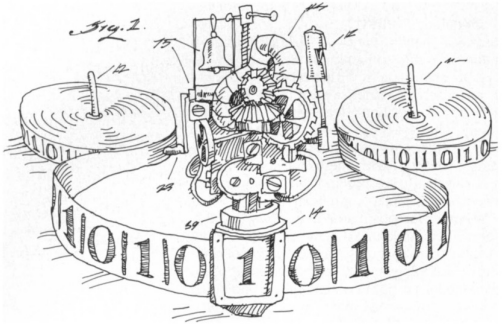
Foundational motivation:

- What does it mean to “compute”? What is an algorithm?
- What problems can be solved by a computer?
- Are some problems intrinsically harder than others?

Theoretical Computer Science to the rescue:

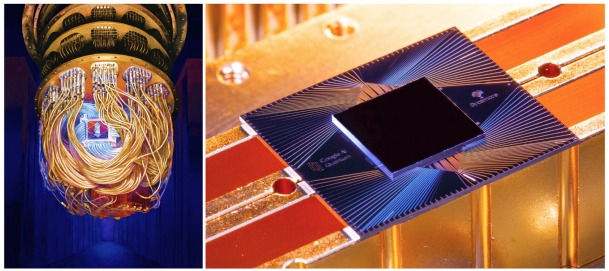
- Formal models of computation, abstracted from hardware/language
- Mathematical formulation & classification of problems

Course content



- Turing machines: a universal computational model
- Introduction to computational complexity & NP-completeness
- Approximation algorithms and probabilistic computations
- Quantum computing

> Objective: Gain a theoretical perspective on computational problems and novel ways to approach and analyse them



Course structure

- **Lecturers:** Alastair Abbott and Enikő Kevi
- **Structure:** 11 courses (1.5 hours CM, 1.5 hours TD)
  - > No labs
- **Evaluation:**
  - > 70% exam, 30% internal: topical group presentations on research articles

- **Prerequisites:**
  - > Mathematical reasoning and proofs
  - > Basic discrete mathematics, logic, linear algebra
  - > A curiosity to understand the theoretical foundations of computer science