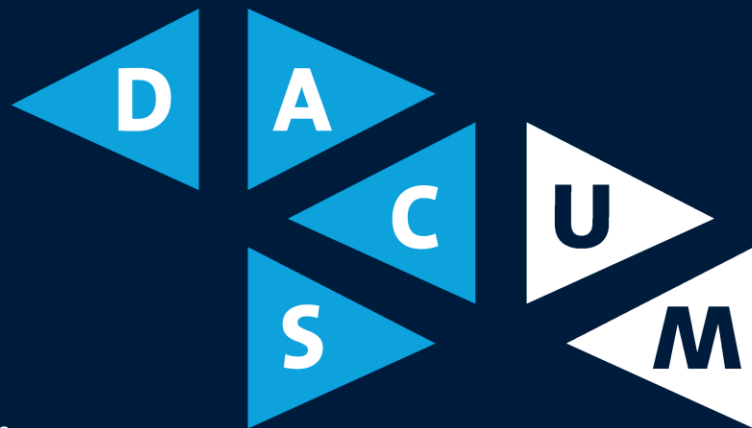


AI at Work

Promises and Myths

Frank Thuijsman

f.thuijsman@maastrichtuniversity.nl



Who are we?



Maastricht University

Faculty of Science and
Engineering

Department of Advanced
Computing Sciences



30+
scientific staff
members

years of experience in
Data Science and
Artificial Intelligence

#1

My background

- 1958: born in Arnhem
- 1977/1985: Mathematics, Nijmegen
- 1985/1989: PhD Game Theory, Maastricht
- 1989/1990: visiting positions at UCLA and Hebrew Univ. of Jerusalem
- 1990/present: Maastricht University
- Many years as director of studies
- 2014: initiated KE@Work
- 2014/2023: coordinated KE@Work
- 2016/present: full professor
- 2023/present: secretary and treasurer of the (international) Game Theory Society

DACS background

- 1987: two new UM departments Mathematics and Computer Science
- 1992: launch of “doctoraal” programme
 - Knowledge Engineeringthat led to current programmes:
 - BSc Data Science and AI
 - MSC AI
 - MSC Data Science for Decision Making
- 2005/2008: departments fully merged
- 2014 start: of KE@Work
- 2023 start: of Computer Science
- 2025 start: of CS@Work

Alan Turing



Some highlights

- 1912: born in London
- 1931/1936: Mathematics, Cambridge
- 1936: Publishes “**computable numbers**”
- 1938: PhD Princeton
- 1939/1945: Bletchley Park, cracks Enigma code
- 1950: Publishes “**computing machinery**”
- 1952: convicted on indecent behavior
- 1954: dies in Wilmslow

Alan Turing



1936 paper

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO
THE ENTSCHIEDUNGSPROBLEM

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

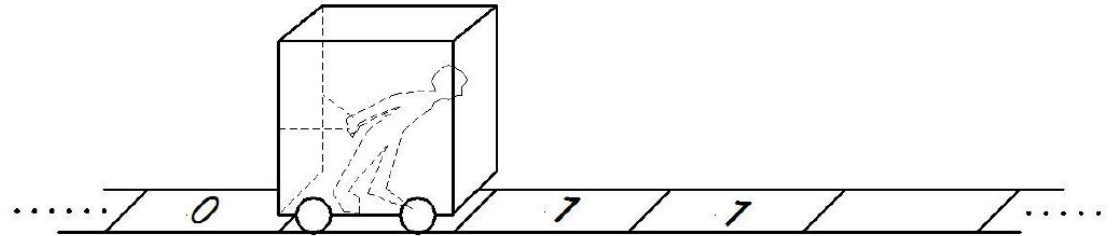
The “computable” numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means.

Alan Turing



Turing Machine

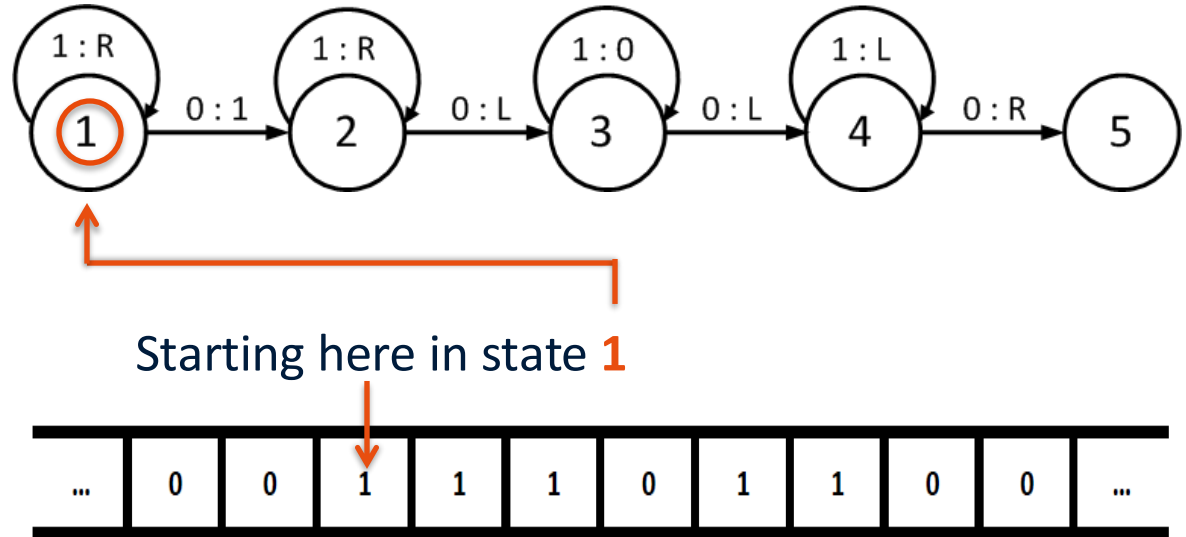
1. Input: infinite squared tape
2. Finitely many non-empty
3. Finitely many symbols
4. Operator can read, write, go L, go R, one by one
5. Operator has finite manual on what to do, consisting of finitely many “states”



Alan Turing



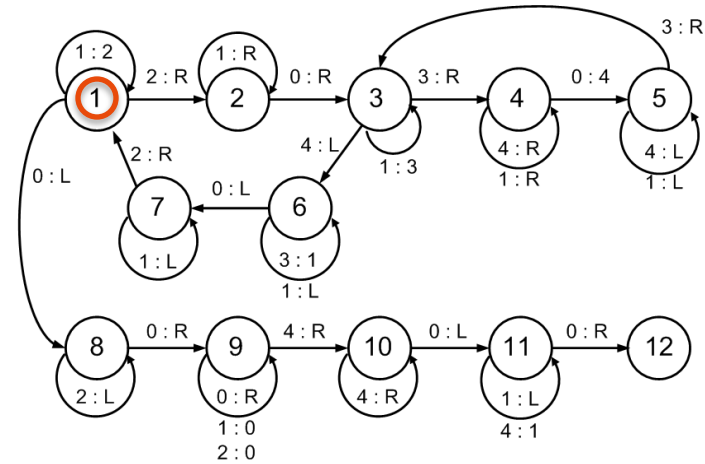
Turing Machine: $x + y$



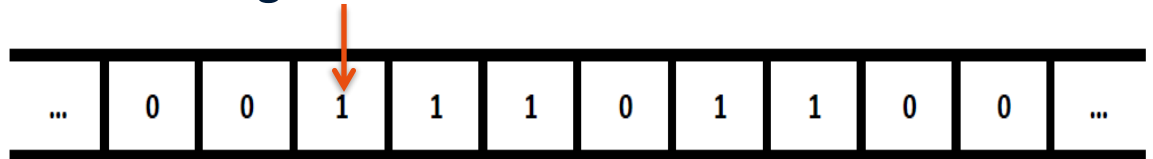
Alan Turing



Turing Machine: $x \cdot y$



Starting here in state **1**



Alan Turing



1936 paper

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO
THE ENTSCHEIDUNGSPROBLEM

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

The “computable” numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means.

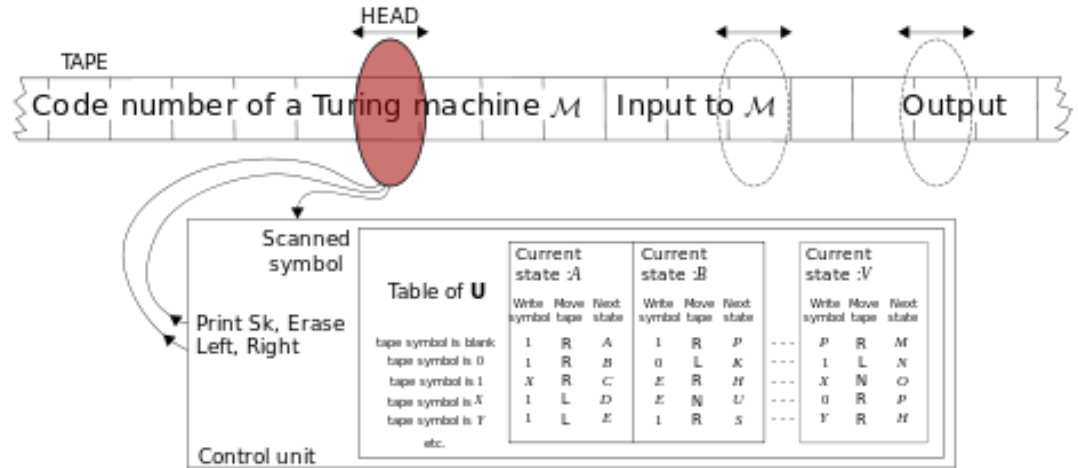
6. *The universal computing machine.*

It is possible to invent a single machine which can be used to compute any computable sequence. If this machine \mathcal{U} is supplied with a tape on the beginning of which is written the S.D of some computing machine \mathcal{M} ,

Alan Turing



The Universal Machine



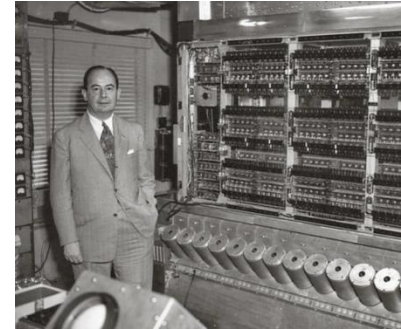
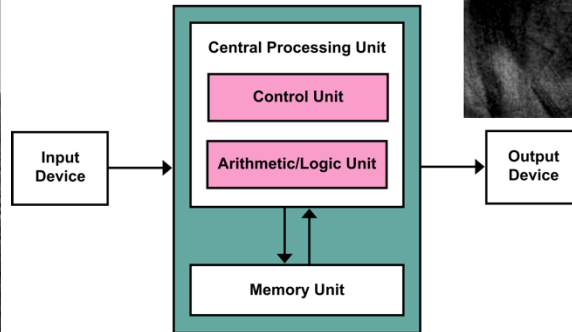
Alan Turing



2014 movie



Alan Turing - late thirties - John von Neumann



Alan Turing

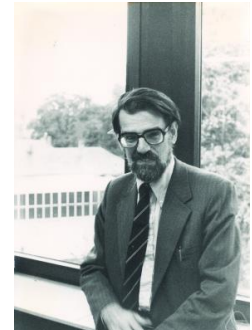


John von Neumann



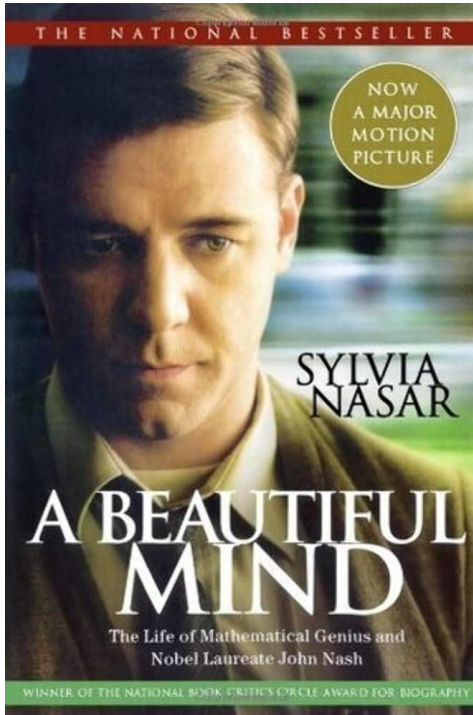
John Nash

- late forties -



Lloyd Shapley

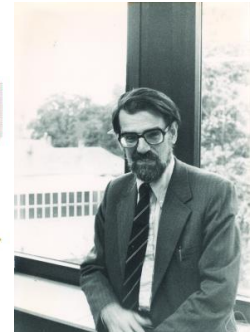
2001 movie



Code Breaking

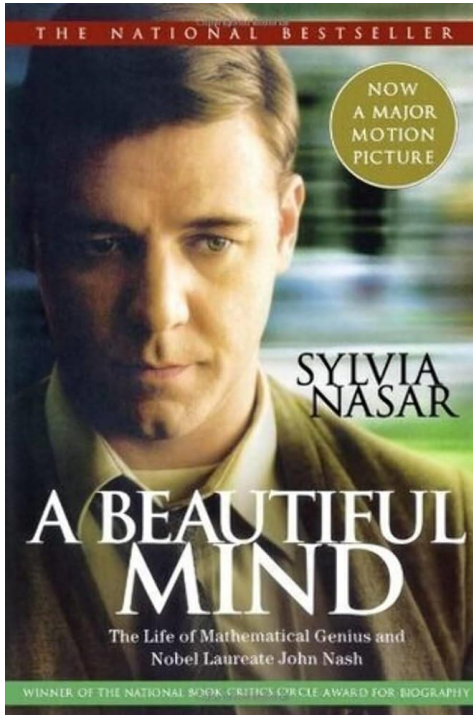


John Nash



Lloyd Shapley

2001 movie



Game Theory

1994



John Nash

Nobel Prizes

2012



Lloyd Shapley

Alan Turing



1950 paper

MIND
A QUARTERLY REVIEW
OF
PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND
INTELLIGENCE

BY A. M. TURING

1 *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to

Alan Turing



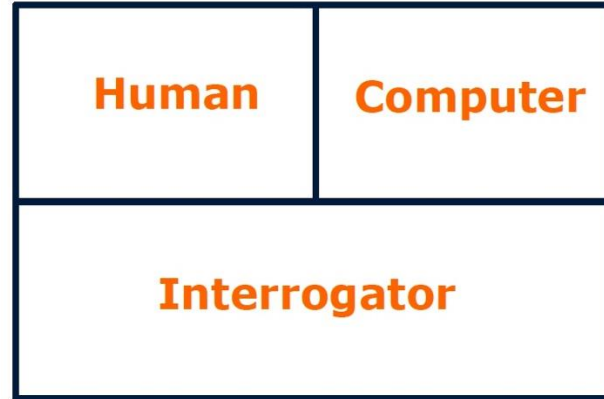
Turing Test



Alan Turing



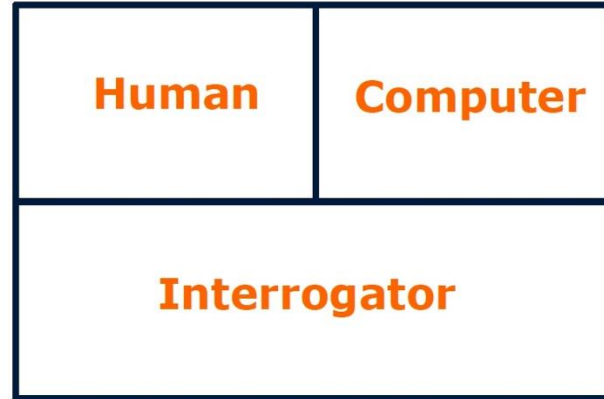
Turing Test



2014 movie



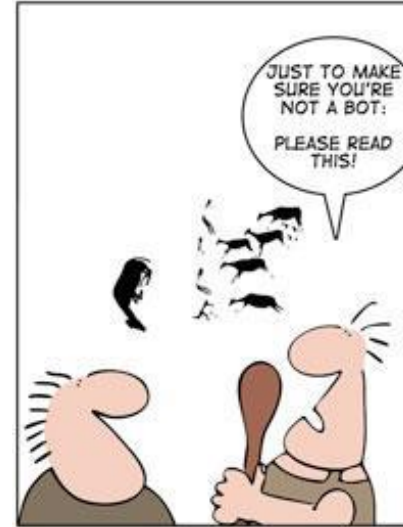
Turing Test



Alan Turing

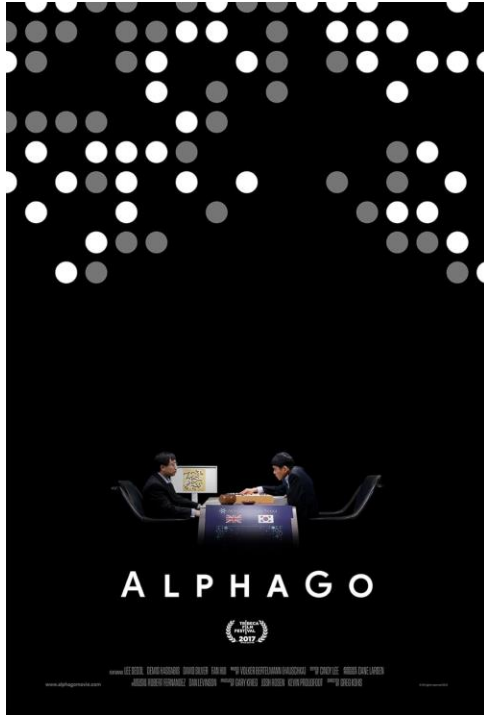


CAPTCHA



Completely Automated Public Turing test
to tell Computers and Humans Apart

What can **YOU** do to know more about AI?



Watch this 2017 Google DeepMind documentary
Full movie is freely available on YouTube:
<https://www.youtube.com/watch?v=WXuK6gekU1Y>

What can **WE** do for you?

Create insights from data



Learn from customer behaviour,
informed decision-making,
predict outcomes

Automate and support

Optimize complex processes

What can **WE** do for you?

Create insights from data



Harness the power of
artificial intelligence and
robotics

Automate and support

Optimize complex processes

What can **WE** do for you?

Create insights from data

Automate and support



Optimize production and logistic processes for the best cost, distance or time

Optimize complex processes

We participate in H2020 projects

Leading: CoRoSect – Automating insect farms

- AI and robotics to allow scaling up of insect farming
- Our focus:
 - > Robotic actions planning and control
 - > Cognitive robots and smart mechatronics
 - > Human-robot collaboration



We participate in H2020 projects

AI for healthcare: ICT4Life

- AI alerts the doctor if a patient with dementia needs urgent attention
- Based on different data sources, e.g. live video and wearable sensors



DACS Research Themes

- Data Science
- Systems and Control
- Algorithms
- Cognitive Systems
- Explainable Artificial Intelligence
- Games
- Quantum & High-Performance Computing
- Computing Sciences Education
- Health and AI

DACS Full Professors

- Mathematical Aspects of Knowledge Engineering
- AI and Computer Science
- Strategic Optimization and Data Science
- Machine Reasoning
- Data Science
- Data Fusion and Intelligent Interaction
- Explainable Artificial Intelligence
- Computational Social Sciences
- Text-Mining
- e-Infrastructure
- Application of Emerging Technologies

Potential research partnerships

Student projects



- Academic bachelor or master level
- Internships, theses or projects
- **KE@Work** and our new **CS@Work**

Government co-funded research

Consulting & contract research

Potential research partnerships

Student projects



PhD and PostDoc projects
through public-private partnerships
like H2020

Government co-funded research

Consulting & contract research

Potential research partnerships

Student projects

Government co-funded research



Highly flexible:

- From advice to complete project
- Short or long term

Consulting & contract research

Potential research partnerships

Contract or co-funded research: ICAI and ELSA Labs



- National ecosystem
- Topical labs around 5 PhD students
- Increase AI knowledge dissemination
- Locally retain international AI talent

Potential research partnerships

Student projects: KE@Work



- Top 25% of our bachelor's students
- 2 years, half-time at your organization
- AI, Data Science or Optimization **challenge**
- Academic co-supervision

201 contracts with 70+ partner organizations



About KE@Work

- Part of DACS Honours programme for years 2 and 3 of **Bachelor** Data Science & AI
- Only for excellent and highly motivated students (GPA at least 7.5)
- Students work on Data Science & AI challenge at regional companies and organizations
- This is done at a 50-50 base for 2 to 5 days per week, except from exam weeks
- Quality control by academic and company supervisors
- 3-party internship contract for 23 months
- Student gets € 550/month 1st year, € 600/month 2nd year
- DACS gets € 375/month/student for individual supervision



CS@Work
1-year programme
on software engineering

What students?

2014-2024

A world map with countries colored in shades of orange and grey. The orange areas represent the origin of students, while grey areas represent non-student origins. The map shows a high concentration of students from Europe, North America, and Australia, with a significant portion from non-EU countries.

app. 50 starting Sept. 2025

201
students

78%
non-Dutch

28%
non-EU

To summarize

- **Maastricht University**
Department of Advanced Computing Sciences
- We combine artificial intelligence, data science, computer science, robotics and mathematics
- 30+ years of experience
- Open to collaborate



Ready to join?

Just reach out!

Frank Thuijsman

f.thuijsman@maastrichtuniversity.nl

0 6361 6661 0

Paul-Henri Spaaklaan 1
6229 EN Maastricht

Learn more about us at
www.maastrichtuniversity.nl/dacs



Ready to join?

Just reach out!

Frank Thuijsman

f.thuijsman@maastrichtuniversity.nl

0 6361 6661 0

Paul-Henri Spaaklaan 1
6229 EN Maastricht

Learn more about us at
www.maastrichtuniversity.nl/dacs

