

The ABC of Computational Text Analysis

#1 INTRODUCTION +
WHERE IS THE DIGITAL REVOLUTION?

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Outline

1. digital revolution or hype?
2. about us
3. goals of this course

AI: A non-standard introduction

The world has changed, hasn't it?



The era of AI: Big data, big government, big business

And big empowerment

Group discussion

What makes a device looking intelligent?

AI is a moving target with respect to ...

- human capabilities
- technological abilities

Transfer of Human Intelligence



from static machines to more flexible devices

- mimicking intelligent behavior
 - perception: reading + seeing + hearing
 - generation: speaking + writing + drawing
 - moving in the physical world
- flexibility and contextual adaptability
- reproducing any media form

Seeing like a Human?



An image segmentation by Facebook's [Detectron2](#) (Wu et al. 2019)

Hearing and Speaking like a Human?

- Speech-to-Text 

robust understanding complex environments (e.g. language, accent, noise) (Radford et al. 2022)

- Text-to-Speech 

respect emotions beyond correct pronunciation

[clone your voice](#)

- Speech-to-Speech 

[voice translation](#) (Duquenne et al. 2023)

Simulating (multiple) Humans?

Beyond linear conversations

- Generate podcasts based on any text
- Generate songs following instructions



Outsmarting Humans?

Debunk some myths around ChatGPT

- is a brand, **large-language models (LLM)** is the technology
- generates fluent text, **not necessarily truthful**
- is highly **useful**, although it understands little
- what is tough for humans **might be easy for a model**; and vice-versa
- is **English**-focused, multi-linguality is limited
- generates **non-reproducible** outputs
- generated text **cannot be detected** (except verbatim parts)
- yesterday's **version** might be different than today's
- open-source is chasing OpenAI and the other Silicon Valley giants

Where does the smartness come from?

Number of words exposed

- ~100'000'000 for a typical 13-year old kid (Timiryasov and Tastet 2023)
- ~4'300'000'000 words in entire Wikipedia
- >15'000'000'000'000 for current LLMs 🤦 (Grattafiori et al. 2024)

An LLM is amazing but ...

... it is also a stochastic parrot. 

(Bender et al. 2021)

The LLM apocalypse

A post-apocalyptic take on education (Mollick 2023)

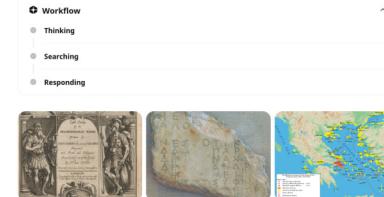
- ChatBots are another tool like Google Search
- ChatBots are your personal tutor
 - productivity tool to become faster and better
 - help you to think, not replacing thinking
 - don't trust blindly
 - be transparent

LLMs are a tool, learn how to use it 

The Future of Search

- ChatBots challenge classic search engines
 - answer with source attribution instead of ranked snippet blurring the line between search and generation
 - [Microsoft Copilot](#), [Google Gemini](#), [you.com](#)
- Agents pursuing more and complex tasks
 - ChatBots are an interface rather than a single model

explain the background, action, and consequences of the peloponnesian war



Background of the Peloponnesian War

The Peloponnesian War (431–404 BC) was a significant conflict between two of the most powerful city-states in ancient Greece: **Athens** and **Sparta**, along with their respective allies. The roots of the war can be traced back to the **Pentecontaetia**, a period of tension following the Persian Wars, during which Athens emerged as a dominant naval power and began to expand its influence through the Delian League. This expansion fostered fear and resentment among other Greek city-states, particularly Sparta and its allies, who viewed Athenian imperialism as a direct threat to their autonomy and security.

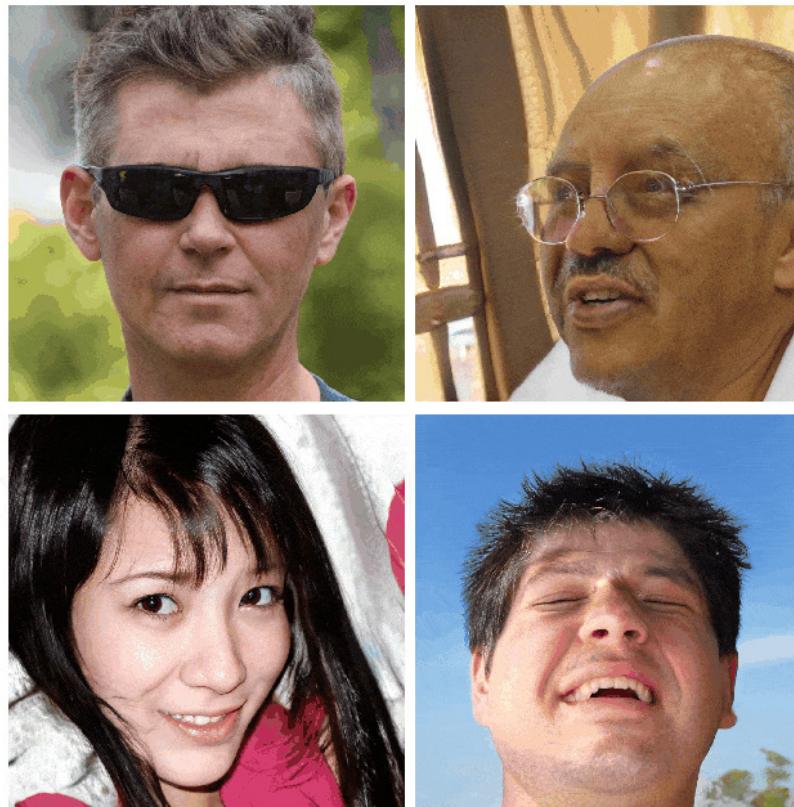
The immediate causes of the war included disputes over trade and alliances, as well as the growing power of Athens, which was perceived as aggressive and expansionist. Tensions escalated when Athens refused to dismantle its defensive walls, which had been a point of contention for Sparta. The conflict was characterized by a struggle for power and dominance in the Greek world, leading to a series of military engagements that would last nearly three decades.

More complex query on [you.com](#)

Trends towards Generative and Multimodal AI

These people do not exist

Generated Images by a Neural Network (Karras et al. 2020)



Faces generated by [StyleGAN](#). Generate [more faces!](#)!

Multimodality and guidance

Guided generation of text, audio, images, video

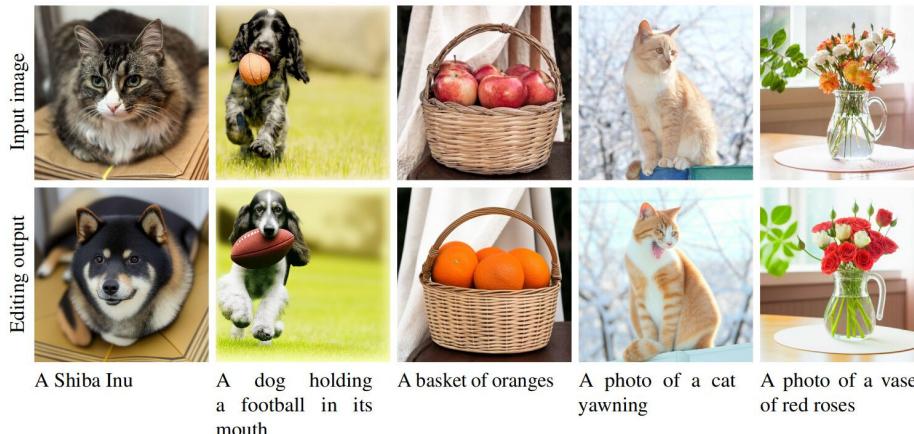
Prompt: Elephant amigurumi walking in savanna, a professional photograph, blurry background



State-of-the-Art image generation model Imagen3. (Imagen-Team-Google et al. 2024)
Use on Gemini platform.

Adapt images using text prompts

- **Generate** (Imagen-Team-Google et al. 2024)
- **Edit** (Sheynin et al. 2023)
e.g. virtual try-on of clothes
- **Enhancing**
- **Explain**



Editing pictures with Muse using natural language (Chang et al. 2023)

Erase or edit reality

For your Instagram or Politics



Modify pictures thoroughly in [Google Photos](#)

From Image to Video Generation



Synthesize any content with ever increasing quality (Bar-Tal et al.

2024; Brooks et al. 2024)

- use words and images to synthesize videos
Veo 2 constitutes the current research frontier
- real-world dubbing for movies



Performance Google Veo 2 vs OpenAI Sora (end vs start 2024)

Real-time, multimodal interaction

Fusing the digital and the physical world   

Interact with Google's [Gemini](#) using text, voice, video, or screen sharing

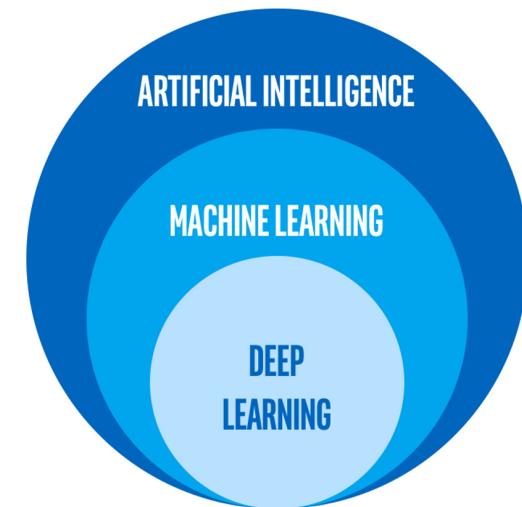
Artificial Intelligence

(Converging) Subfields

- Natural Language Processing (NLP)
- Computer Vision (CV)
- Robotics 

How does Computer Intelligence work?

- concepts with overlapping meaning
 - Artificial Intelligence (AI), Machine Learning (ML), **Deep Learning** (DL)
- learn **patterns** from lots of data
 - more recycling than genuine intelligence
 - theory agnostically
- supervised **training** is the most popular
 - learn relation between input and output



AI is different to Human
Intelligence



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AI is also hype

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AI = from humankind import solution
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- Wir unter/überschätzen AI zugleich
 - Wer denkt Entwicklung verstanden zu haben, hat sie nicht verstanden
 - grossen gesellschaftlichen Einfluss: positiv/negativ
 - Was uns aktuell fasziniert, ist dass AI nun auch Neuigkeit/Kreativität automatisiert
- Systeme haben spezifisches Anwendungssgebiet und keine Autonomie
 - wenn Zwecke für Menschen wenig definiert sind, wird es auch für Computer schwierig
 - Mehrstufige Planung/Strategie/Verhandlung/Zweck von sozialen Prozessen statt nur Game (Vermeidung GameOver)
 - Probleme mit Generalisierung, Performance hängt von Task familiarity ab und nicht von Task complexity
- Weg zu AGI ist weiterhin unbekannt
 - keine Angst vor Computer, die Welt übernehmen
 - schon gar nicht als Roboter

Looking beyond the technology

Trends in AI

- **smarter:** ever more powerful
- **cheaper:** intelligence is getting commoditized
- **democratized (?)**: open vs closed models
- **competitive:** geopolitical rivalry
- **unecological:** raising ecological costs

Jevons Paradox (Luccioni, Strubell, and Crawford 2025): increased efficiency offset by increased demand

Why this matters for Social Science

Computational Social Science

data-driven research

- computational social science (Lazer et al. 2009, 2021; Salganik 2017)
Digital Humanities, Computational History, Data Science
- new, interdisciplinary approaches to long-standing questions
- machine learning empowers researchers (Lundberg, Brand, and Jeon 2022)
- early computational history already in 1960s (Graham, Milligan, and Weingart 2015)

Group discussion

What kind of data is there?

What data is relevant for social science?

- data as traces of social behaviour
 - tabular, text, image
- datafication
 - sensors of smartphone, digital communication
- much of human knowledge compiled as text

About the mystery of coding

coding is like...

- cooking with recipes
- superpowers

... to tackle complex problems on scale

A woman with short brown hair, wearing a red and blue superhero-style costume with a cape, is flying through a bright blue sky filled with white clouds. She is positioned in the center of the frame, angled slightly upwards and to her left. A large, semi-transparent rectangular box covers the upper half of the image, containing the text.

Women have coding
powers too!

About us



Personal example

directed country mentions in UN speeches



Goals of this course



What you learn

- collect and curate **data**
- **computationally analyze**, interpret, and visualize **texts**
- **digital literacy** + scholarship
- problem-**solving** capacity

Learnings from previous courses

- too much content, too little **practice**
- programming can be overwhelming
- **learning by doing**, doing by **googling (ChatGPT?!)**

Levels of proficiency

1. **awareness** of today's computational potential
2. **analyzing** existing datasets
3. **creating** + analyzing new datasets
4. applying advanced **machine learning**

How I teach

- computational **practises**
- **critical perspective** on technology
- lecture-style introductions
- hands-on coding sessions
- discussions + experiments in groups

Provisional schedule

Date Topic

TL;DR 

You will be tech-savvy...
...yet no programmer applying fancy machine learning

Requirements

- no technical skills required 
- self-contained course
- laptop (macOS, Win11, Linux) 
- update system
- free up at least 15GB storage
- backup files

Grading



- 2 assignments during semester
 - no grades (pass/fail)
- mini-project with presentation
 - backup claims with numbers
 - work in teams
 - data of your interest
- optional: writing a seminar paper
 - in cooperation with Prof. Sophie Mützel

Organization

- seminar on Thursday from 2.15pm - 4.00pm
 - additionally, streaming via Zoom
- course website [KED2025](#) with slides + information
- readings on [OLAT](#)
- communication on [OLAT Forum](#)
 - forum for everything except personal
 - subscribe to notifications
 - direct: alex.flueckiger@doz.unilu.ch

Registration via UniPortal



Registration period: 3 February – 9 March 2025



Assignment #1



- get/submit via OLAT
 - starting tonight
 - deadline: 1 March 2025, 23:59
- discuss issues on OLAT forum

Course Website





Questions?

References

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