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The ABC of Computational Text Analysis

#1 Introduction + Where is the digital revolution?

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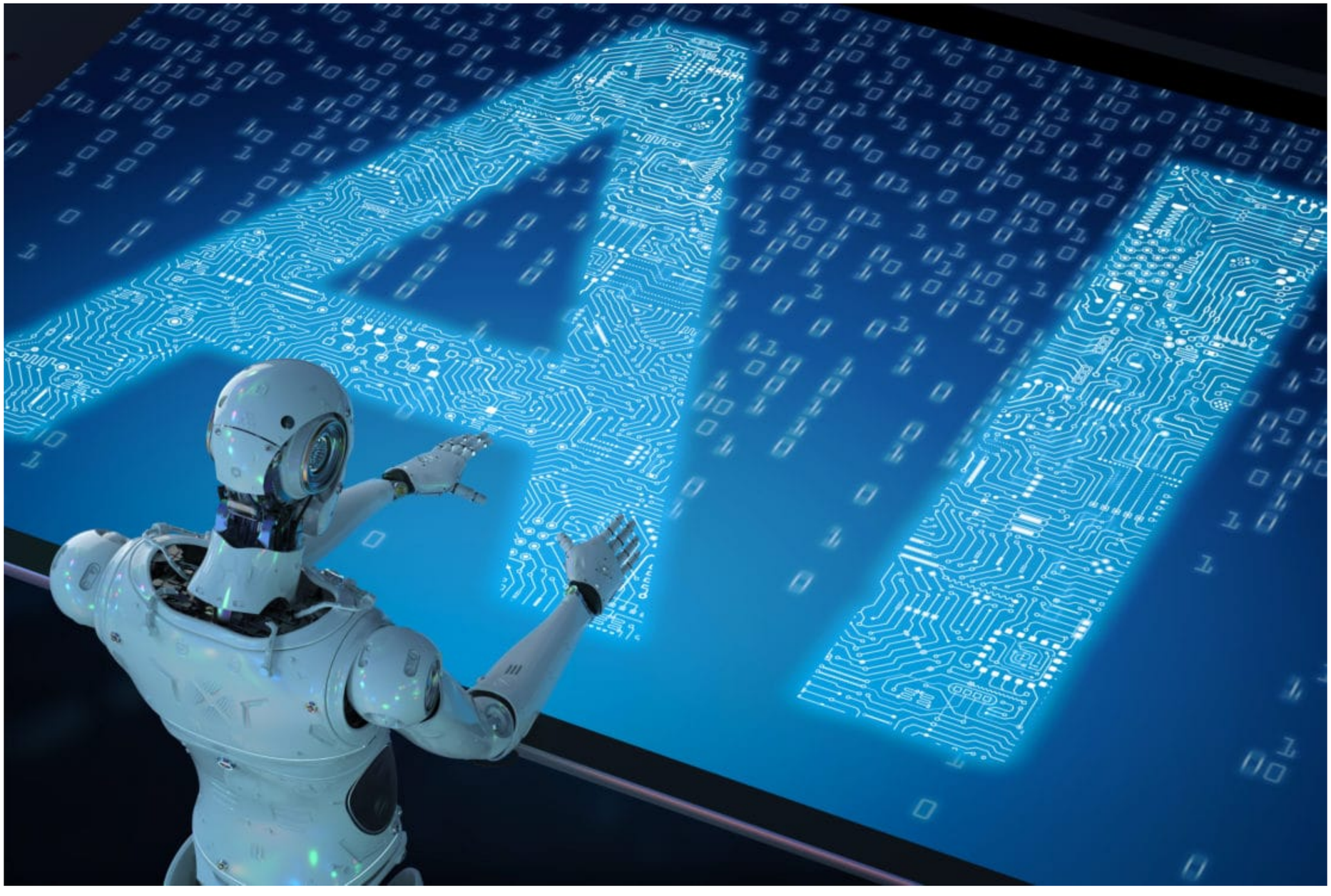
Outline

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?



An Era of Big Data + AI

Group Discussion

What makes a computer 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
  - reading + seeing + hearing
  - speaking + writing + drawing
- a sense of contextual perception
- many degrees of freedom

Seeing like a Human?

An image segmentation by Facebook's Detectron2 *(Wu et al. 2019)*

Speaking like a Human?

Speech-to-Text (STT)

Recognizing speech regardless of language, accent, speed, noise etc.

- Check out samples of Whisper (Radford et al. 2022)
- Check demo for Swiss German (Plüss et al. 2021)

Text-to-Speech Synthesis (TTS)

Personalizing voice given an audio sample of 3s

- Check out samples of VALL-E (Wang et al. 2023)

Generative and Multimodal AI

Outsmarting Humans?

ChatGPT is amazing but ...

... it is also a stochastic parrot. 🦜

(Bender et al. 2021)

Can you disenchant ChatGPT?

Experiment with ChatGPT

- What works (surprisingly) well?
- When does it fail?

Generated Images by a Neural Network

https://thisxdoesnotexist.com/

Give me *more!*

Trend towards Multimodality

A storefront with 'Muse' written on it, in front of Matterhorn Zermatt.

A surreal painting of a robot making coffee.

A cake made of macarons in a unicorn shape.

Three dogs celebrating Christmas with some champagne.

Breakthrough by combining language processing and image generation with Muse *(Chang et al. 2023)*

Deepfakes? Yes, they are real!

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

Video is just the last barrier...

Synthesize any content with ever increasing quality

- Checkout this demo trailer for authentic dubbing
- Use words and images to synthesize new videos with Gen-1(Esser et al. 2023)

Artificial Intelligence

Subfields

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

How does Computer Intelligence work?

- interchangeably (?) used concepts

  Artificial Intelligence (AI), Machine Learning (ML), **Deep Learning** (DL)

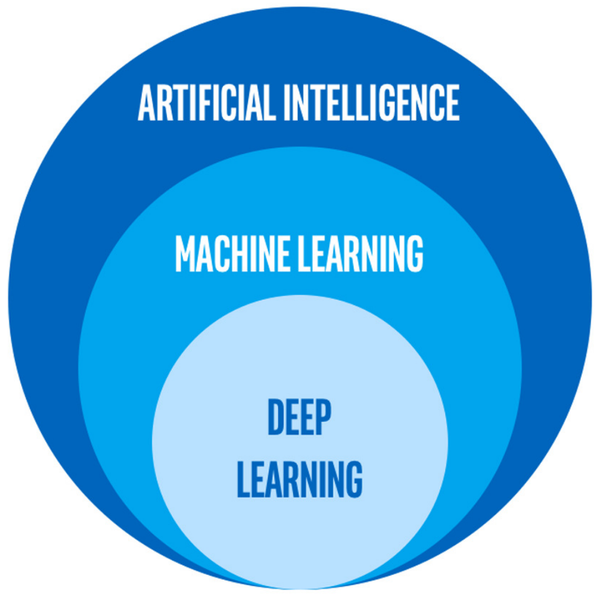
- learn **patterns** from lots of data

  more recycling than genuine intelligence

  theory agnostically

- supervised **training** is the most popular

  learn relation between input and output



AI is also Hype

```
AI = from humankind import solution
```

AI is different to Human Intelligence

Why this matters for Social Science

Computational Social Science

data-driven research

- computational social science (Lazer et al. 2009; Salganik 2017)

  Digital Humanities, Computational History, Data Science

- highly interdisciplinary
- 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

Women have coding powers too!

Where the actual Revolution is

Coding is a **superpower** …

- flexible
- reusable
- reproducible
- inspectable
- collaborative

… to tackle complex problems on scale

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**

  command line + Python
- **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**

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
23 February 2023	Introduction + Where is the digital revolution?
02 March 2023	Text as Data
09 March 2023	Setting up your Development Environment
16 March 2023	Introduction to the Command-line
23 March 2023	Basic NLP with Command-line
30 March 2023 (Zoom)	Learning Regular Expressions
06 April 2023 (Zoom)	Working with (your own) Data
~~13 April 2023~~	*no lecture (Osterpause)*
20 April 2023	Ethics and the Evolution of NLP
27 April 2023	Introduction to Python + VS Code
04 May 2023	Data Analysis of Swiss Media
11 May 2023	NLP with Python
~~18 May 2023~~	*no lecture (Christi Himmelfahrt)*
25 May 2023	NLP with Python II + Working Session
01 June 2023	Mini-Project Presentations + Discussion

🖥️ There are two digital lectures via Zoom.

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 ✍️

- 3 exercises 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 KED2023 with slides + information
- readings on OLAT
- communication on OLAT Forum

  forum for everything except personal

  subscribe to notifications

  direct: alex.flueckiger@doz.unilu.ch

Who are you?

Please fill out this questionnaire

Questions?

Reading

Required

Lazer, David, Alex Pentland, Lada Adamic, Sinan Aral, Albert-László Barabási, Devon Brewer, Nicholas Christakis, Noshir Contractor, James Fowler, Myron Gutmann, Tony Jebara, Gary King, Michael Macy, Deb Roy, and Marshall Van Alstyne. 2009. “Computational Social Science.” *Science* 323(5915):721–23.

(via OLAT)

Optional

Graham, Shawn, Ian Milligan, and Scott Weingart. 2015. *Exploring Big Historical Data: The Historian’s Macroscope*. Open Draft Version. Under contract with Imperial College Press.

online

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Chang, Huiwen, Han Zhang, Jarred Barber, A. J. Maschinot, Jose Lezama, Lu Jiang, Ming-Hsuan Yang, et al. 2023. “Muse: Text-To-Image Generation via Masked Generative Transformers.” arXiv. https://doi.org/10.48550/arXiv.2301.00704.

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Lundberg, Ian, Jennie E. Brand, and Nanum Jeon. 2022. “Researcher Reasoning Meets Computational Capacity: Machine Learning for Social Science.” *Social Science Research* 108 (November): 102807. https://doi.org/10.1016/j.ssresearch.2022.102807.

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Salganik, Matthew J. 2017. *Bit by Bit: Social Research in the Digital Age*. Illustrated edition. Princeton: Princeton University Press. https://www.bitbybitbook.com.

Wang, Chengyi, Sanyuan Chen, Yu Wu, Ziqiang Zhang, Long Zhou, Shujie Liu, Zhuo Chen, et al. 2023. “Neural Codec Language Models Are Zero-Shot Text to Speech Synthesizers.” arXiv.