AI, Society and Religion

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Version 1.0

AI, Society and Religion

- **Complex world**
- What is AI?
- AI and Human Mind
- Artificial General Intelligence
- AI and Society
- AI and Religion

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Complex world

- The ***complexity*** of our world increases.

- We live in an environment that evolves over space and time.

- Ever more complex man-made constructions:
  - Smart buildings, complex infrastructure.
  - Complexity increases along ***height***, due to space scarcity.
  - Miniaturization complexity increases due to resource scarcity: ***rare earths***.

The evolution of architecture

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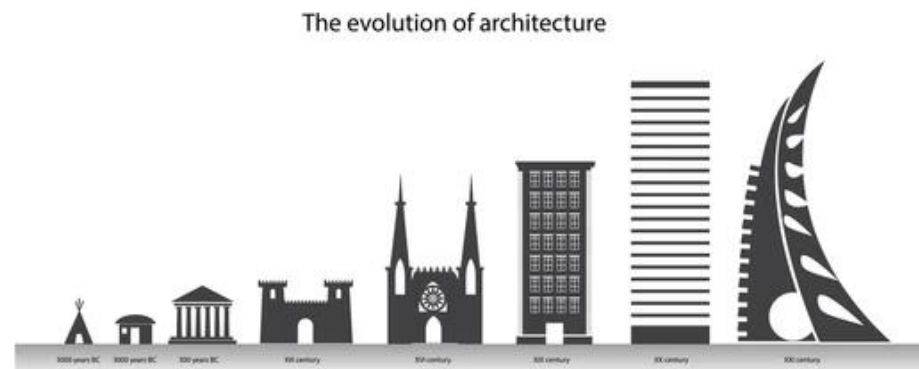
Complex world

- Life form complexity increases ***through evolution*** or ***by design***:
  - New plant and animal variations, e.g., genetically designed.
  - We are at the start of life evolution by design.

- The increase of ***global population*** contributes to world complexity.

- Complexity increase in contrast to the 2nd thermodynamic law (***thermal death***).
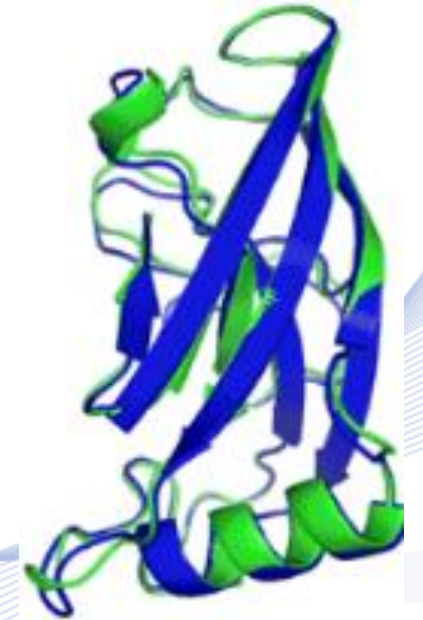
Complex world

- We live in an ever more complex **mental world**.
  - ***Dramatic increase in data production.***
  - Large increase in knowledge, e.g., number of concepts:
    - Many **new concepts**: Internet, fake data, cryptocurrency etc.
  - Economic growth.
  - Complex societal processes.

- It is reflected in the real world (***rather the opposite***):
  - Internet, mobile communications, economic data, media.
  - Social media, social functions.

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Complex world

- Why world complexity increases?
  - Addressing human homeostatic and survival needs.
  - For-profit economies (capitalism) > Competition > Growth.
- Large strain on material and energy resources.
- ***Can humans cope with increased world complexity?***
  - Limited brain capacity. Limited human body capacity.
  - Very slow biological evolution.

- ***Is world complexity increase unavoidable?***

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Complex world

- ***Statement***: ***Information technologies*** and ***Artificial Intelligence*** is our current reply to world complexity increase.

  - Handling of the huge data flow:
    - Data acquisition, processing, communication, storage.
  - Addressing human brain limitations:
    - AI and ***data analysis*** produce information.
    - ***Unlimited memory*** thanks to data storage.
    - Reasoning and knowledge production: *not there yet!!!*

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Complex world

- Addressing human body limitations:
  - New 'senses': *seeing the macrocosm and microcosm*.
  - Improved human mobility: *intelligent vehicles*.
  - Improved communication:
    - *We can reach any person on earth in 5-6 hops!*
    - *Mobile 24/7 communications.*
  - *Greatly improved global health.*

  - *All the above benefits come at a price!*

AI, Society and Religion

- Complex world
- **What is AI?**
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What is AI?

- ***AI Science and Engineering*** (AISE) is the interdisciplinary, scientific study and engineering of ***Artificial Systems*** that mimic and/or surpass ***human intelligence*** in information analysis and ***human interaction*** with the world.

- Core AISE disciplines are:
  - ***Machine Learning*** (ML),
  - Classical (Symbolic) ***Artificial Intelligence*** (AI)

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What is AI?

- Closely related AISE disciplines:
  - ***Robotics,***
  - Autonomous Systems,
  - Digital Signal/Image Processing and Analysis,
  - Data Science and Data Analytics
  - ***Network Theory***.

- Very useful in defining:
  - Data, analysis modes, applications.

What is AI?

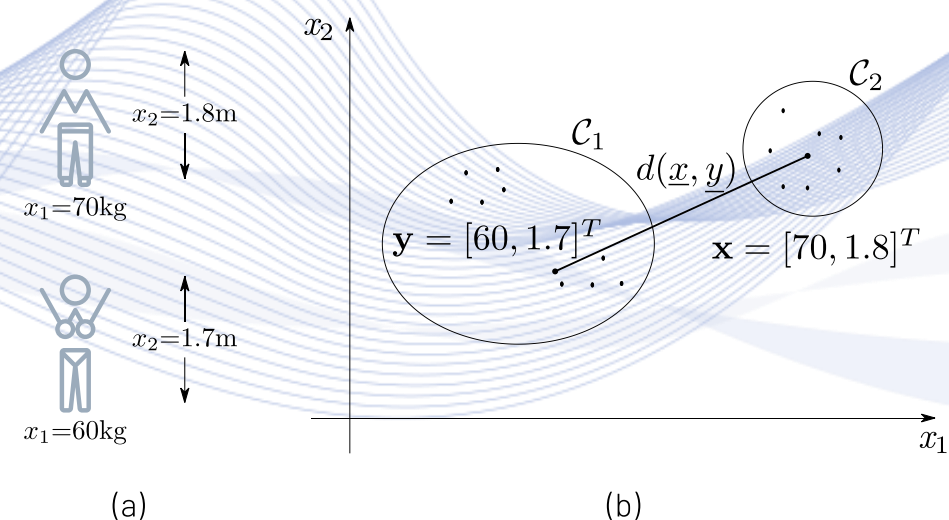- Complementary AISE-related disciplines:
  - Cognitive Science,
  - Neuroscience,
  - Psychology,
  - ***Philosophy, Ethics***
  - Linguistics
  - Sociology.

What is AI?

Data/information/knowledge definitions

**_Data_**: measured quantities related to nature and/or human activities.

- **_Data are primarily numbers_** representing object characteristics (features).
- Passive/active data acquisition.
- Data sampling.

- **_Measured in bits._**

$x_2 = 1.8\text{m}$

$x_1 = 70\text{kg}$

$x_2 = 1.7\text{m}$

$x_1 = 60\text{kg}$

(a)

x_2

$\mathcal{C}_2$

$\mathcal{C}_1$

$d(\underline{x}, \underline{y})$

$\mathbf{y} = [60, 1.7]^T$ $\mathbf{x} = [70, 1.8]^T$

x_1

(b)

What is AI?

Natural Language Processing. Word embeddings

- Transforming words in series of numbers (vectors).
- Predicting word order.
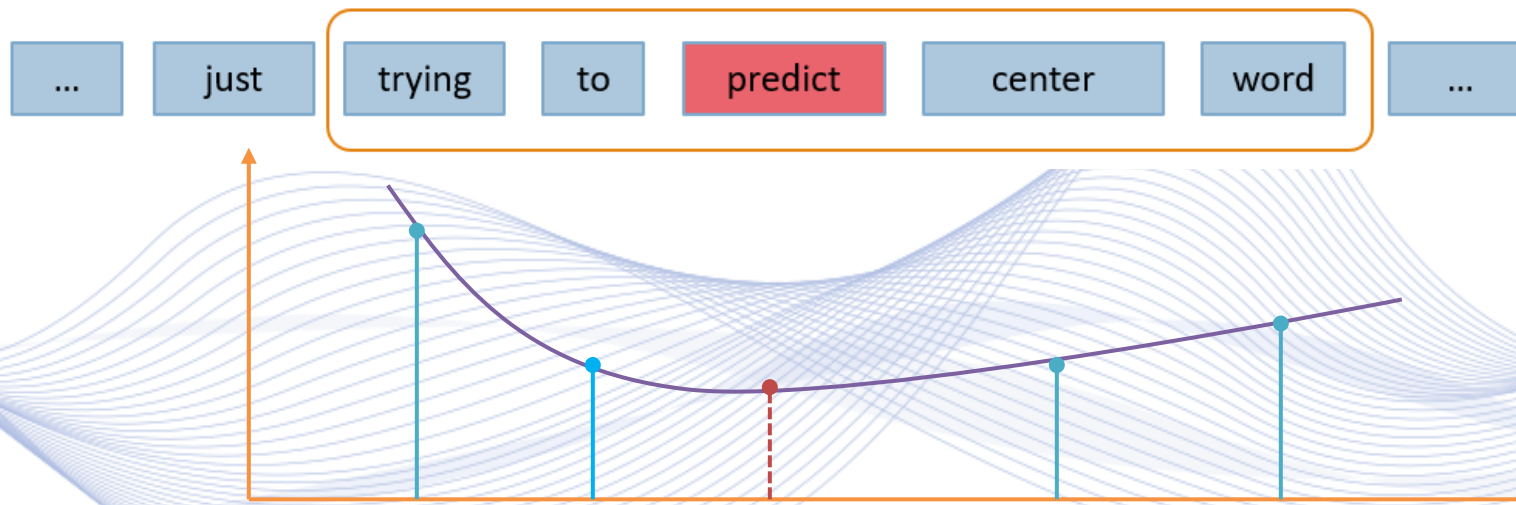
Vectors representing words 'to' and 'center' can best interpolate the 'predict' vector.

What is AI?

Natural Language Processing. ChatGPT text production

- Question: What do you know about Mt. Olympus and Greece?
- Answer using word order prediction:

  - Mt Olympus is the highest mountain in Greece.
  - Mt Olympus is the loveliest mountain in Greece. (sentimental).
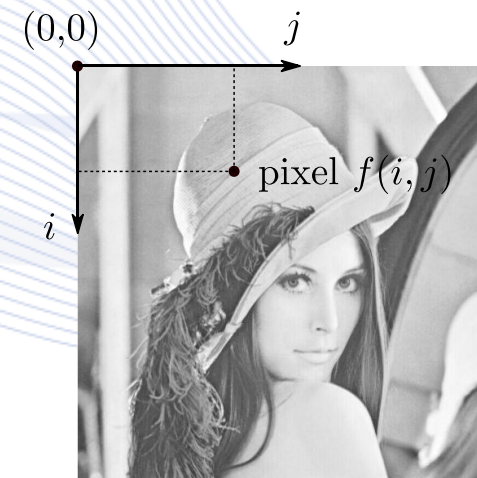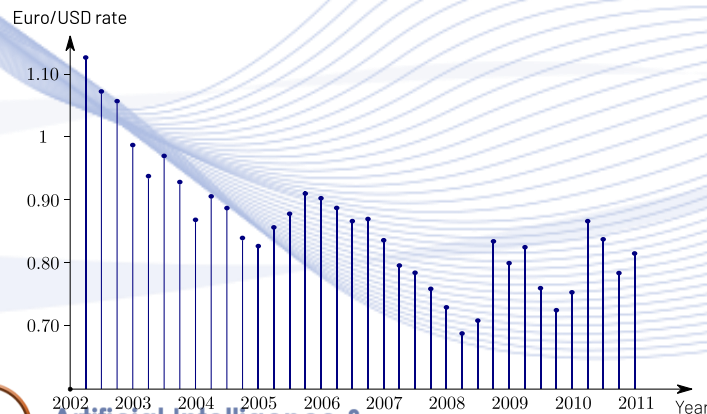 - Mt Olympus is a tropical mountain in Greece. (LLM hallucination).
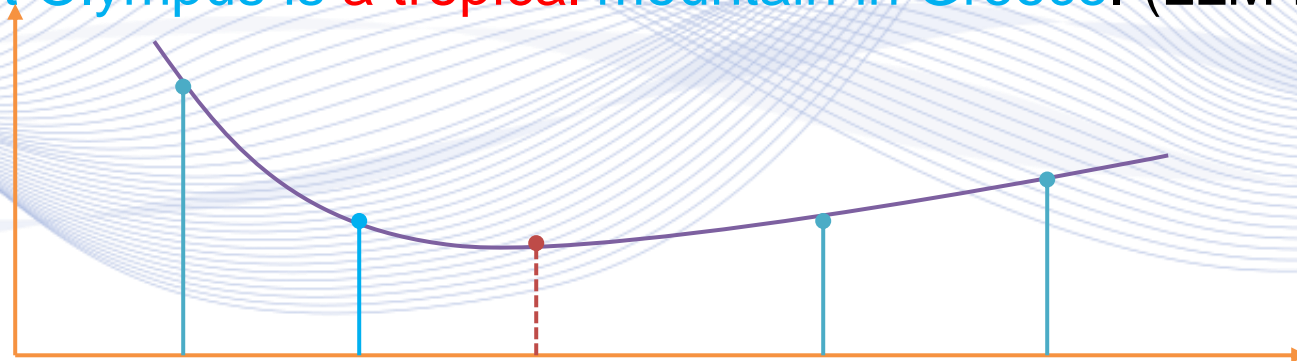
What is AI?

Data can have **spatiotemporal structure**:

- 1D temporal signals, e.g., music

- 2D spatial signals: images

- Signals and object features can be represented by **vectors**:

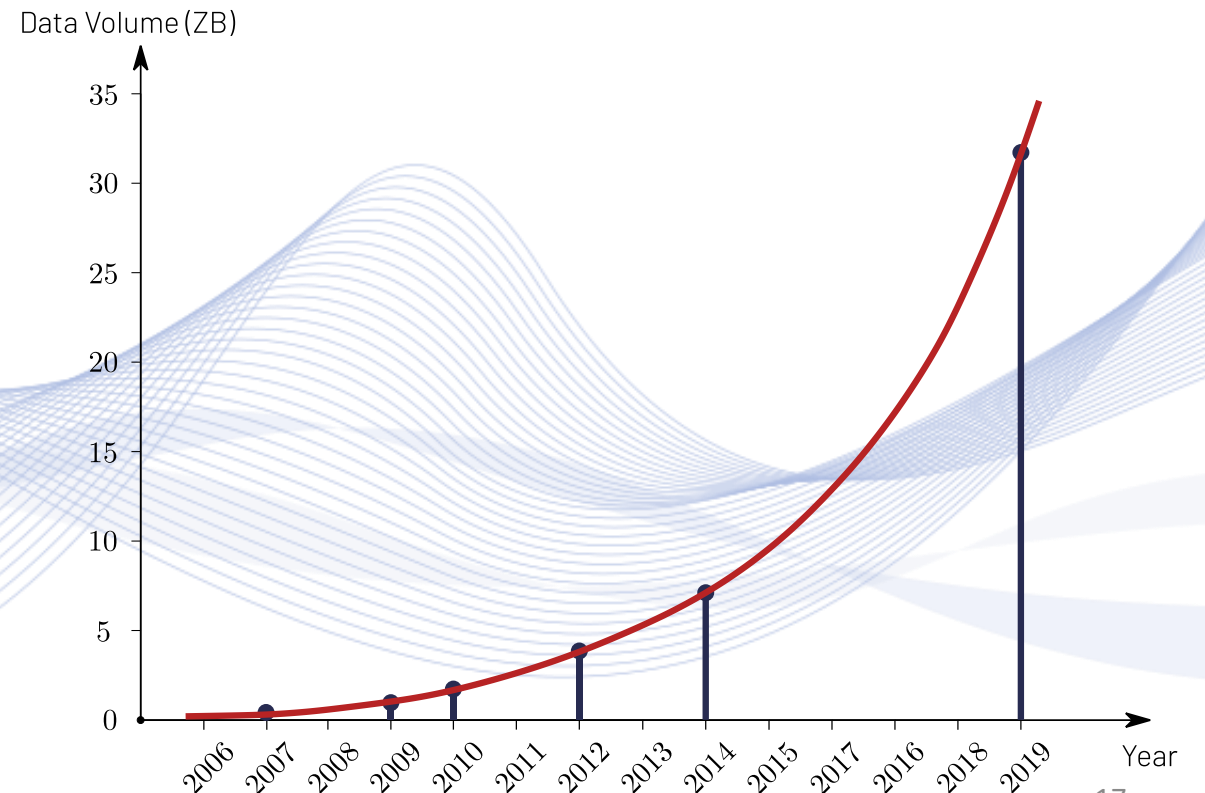$$\mathbf{x}^T = [x_1, x_2, \ldots, x_n].$$

What is AI?

Exponential data increase:

- Proliferation of sensors

- Detailed recording of nature and humans

- Sensing automation.

Data volume increase in past decade.

What is AI?

Why we need ever more data?

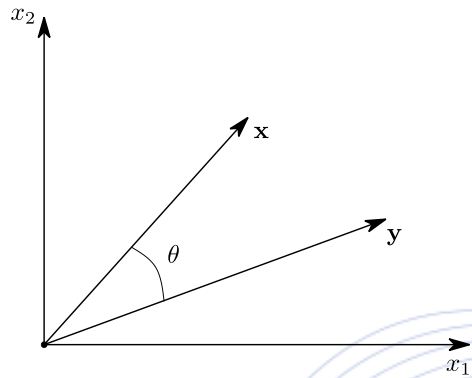- To navigate in an ever more complex world.
  - *Why do we need a more complex world?*

Data sustainability:

- HW enabled
- **Moore's law**
- Data storage constraints
- Data communication constraints.

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What is AI?

Unsupervised Machine Learning

- Data clustering:

- Data geometry
- *Abstraction*
- *Data compression.*

What is AI?

Supervised Machine Learning

- Learning functions $\mathbf{y} = f(\mathbf{x}; \boldsymbol{\theta})$ from labeled training data $\{(\mathbf{x}_i, \mathbf{y}_i), i = 1, ..., N\}$.

- ***Classification***

- ***Regression.***

- Learning data probability distributions $p(\mathbf{x})$.

  - **Generative neural networks.**

    - *Fake data creation.*
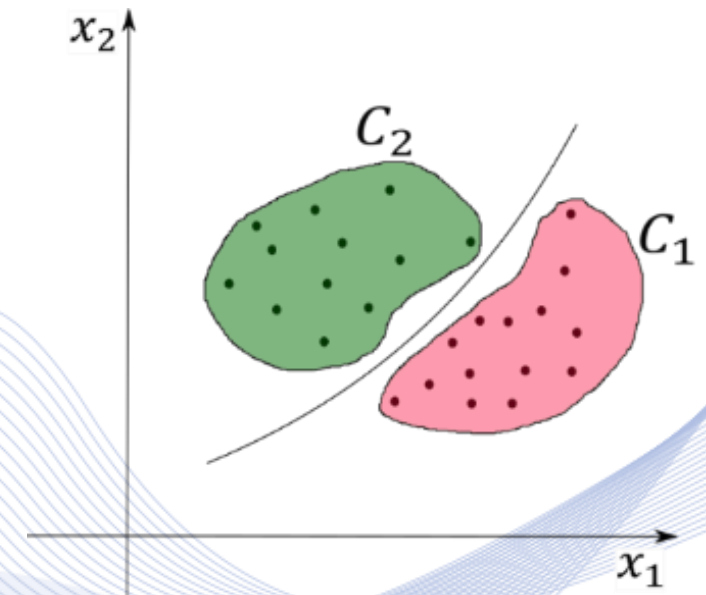
What is AI?

Generative AI

GANs in video synthesis.

What is AI?

Information

- Notoriously vague definitions
- My definition: **Information is the result of the manual or automatic Data Analysis.**

Taxonomy: Data → Information → Knowledge.

Machine Learning/inference produces **information** (including metadata).

- **Information theory/entropy: bits (once more)!**

What is AI?

Concepts and ideas ('**_ιδέες_**').

- Concepts are specific mental constructs residing in our mind (brain?) that refine and abstract ideas.

- **_Concept instances_**

Instances of a triangle.

- **_Abstraction and generalization_**:
  - Simplification and data compression.

What is AI?

Ideas in Philosophy.

- Idealism, materialism, dualism.
- Plato's cave.

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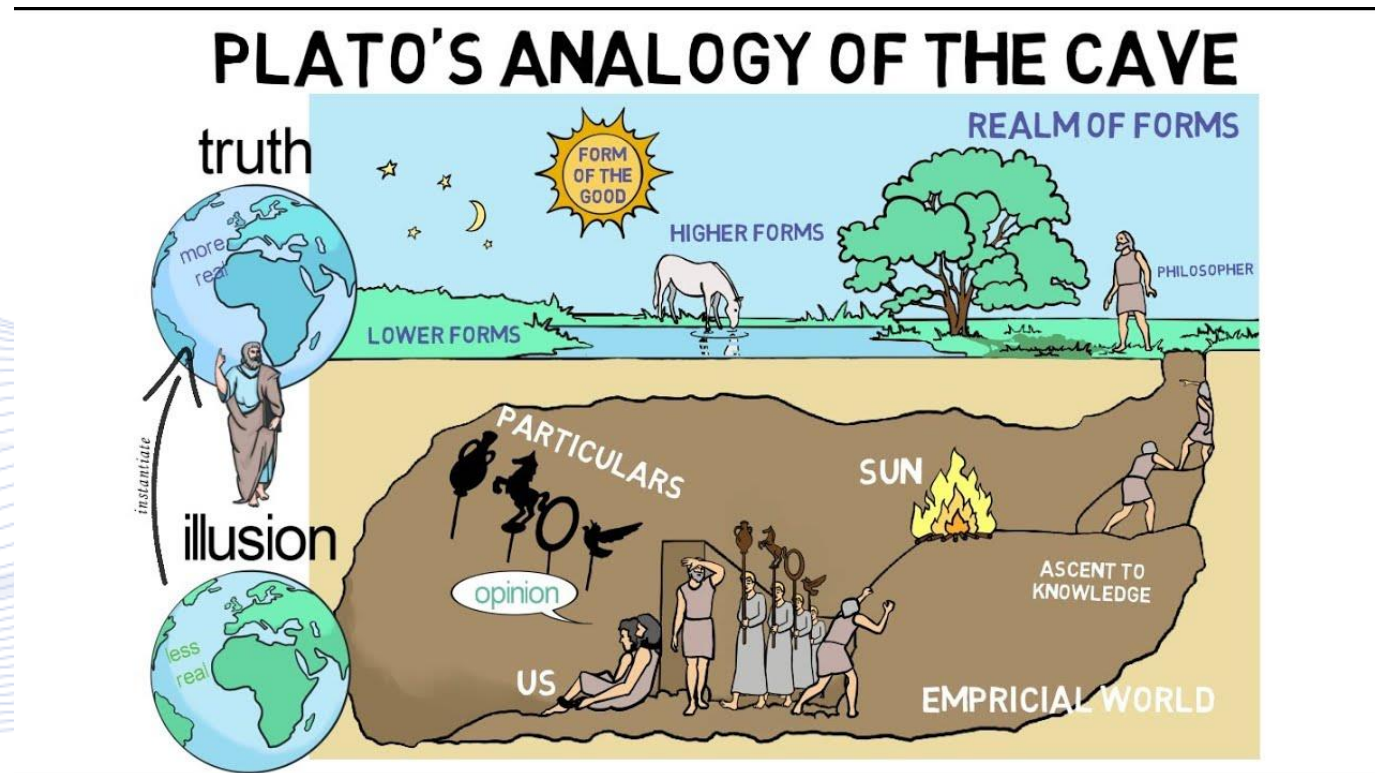
What is AI?

Symbolic AI

- A **symbol** ('**Σύμβολο**') is a **comprehensible representation** of an object, idea, concept, action, status, or relationship.
- Symbolic AI mimics and simulates high-level human intelligence and **reasoning**.
- It represents and operates on concepts and their relations though **logic** and **search**.

- **Reasoning** is one of the most complex brain activities.

What is AI?

Knowledge

- It is a familiarity, awareness, or *understanding of someone or something*:
  - Facts (propositional knowledge),
  - Skills (procedural knowledge),
  - Objects relations (relational knowledge).

- Various knowledge descriptions.

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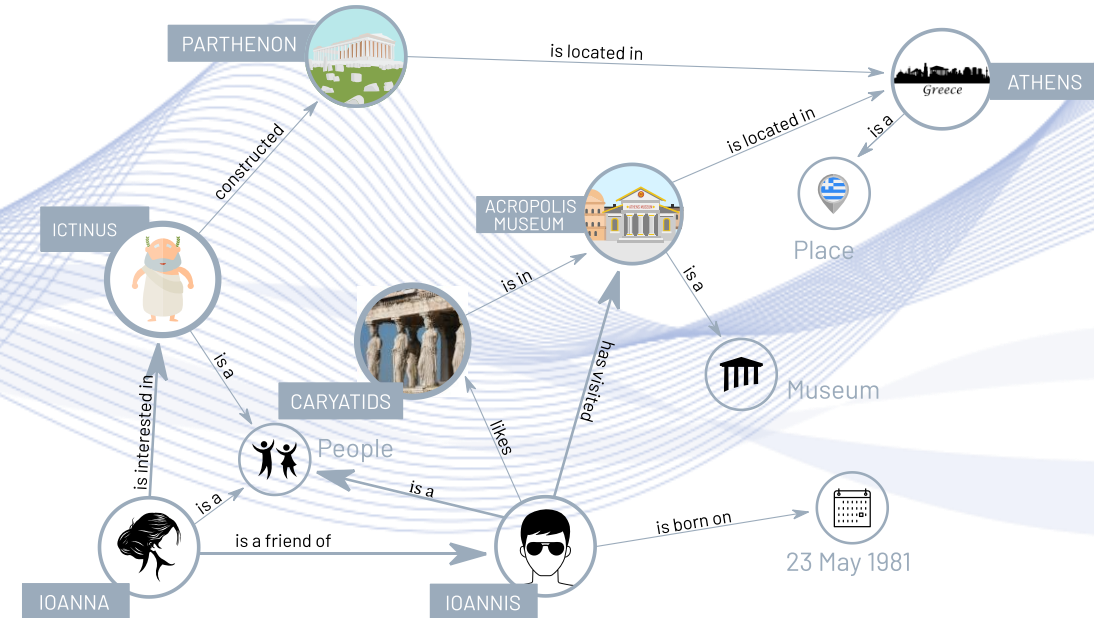
What is AI?

Knowledge is primarily a product of reasoning.

- Is knowledge finite?
- ***Can we measure knowledge?***
- Knowledge increase is linear.

- ***Encyclopedias***
- ***Research publications.***
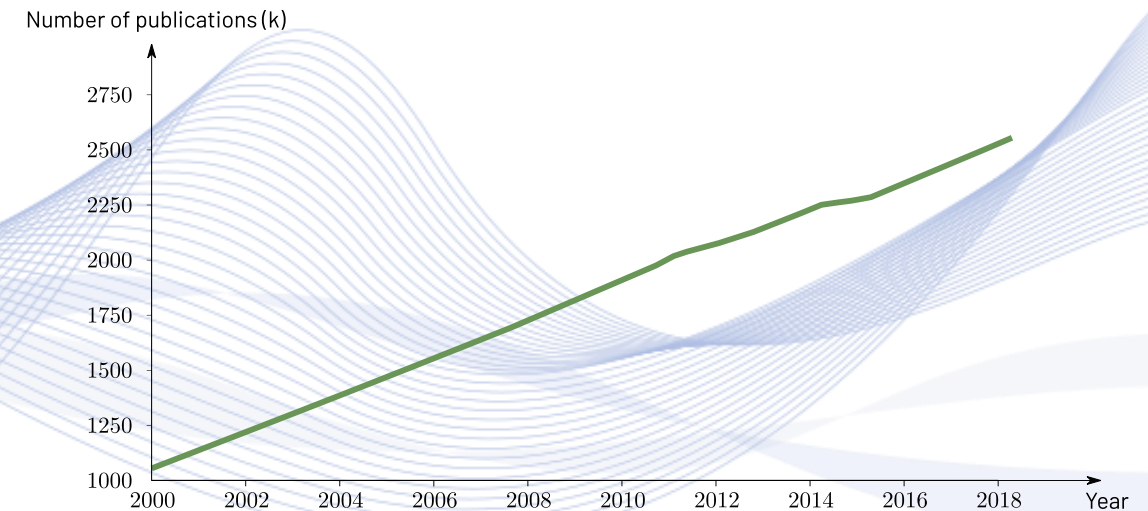
Global research output (publication) growth.

What is AI?

Current AI revolution:

- *AI means ML, which means Deep Neural Networks*
- Stagnation of symbolic AI
- Resurrection of a dead term: AI

Major breakthrough needed:

- Advancement of symbolic AI
- *Fusion of Machine Learning and symbolic AI.*

VML

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AI, Society and Religion

- Complex world
- What is AI?
- **AI and Human Mind**
- Artificial General Intelligence
- AI and Society
- AI and Religion

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AI and Human Mind

Nervous System. Brain and Biological neural networks

- The brain has 100 billion neurons and 100 trillion neural synapses!

- Huge, but **limited**, intellectual capacity.

- Capacity improves by **education**, good health and living standards.

Premotor cortex

Primary motor cortex

Pariental lobe

Frontal eye fields

Frontal lobe

Prefrontal cortex

Occipital lobe

Broca's area

Temporal lobe

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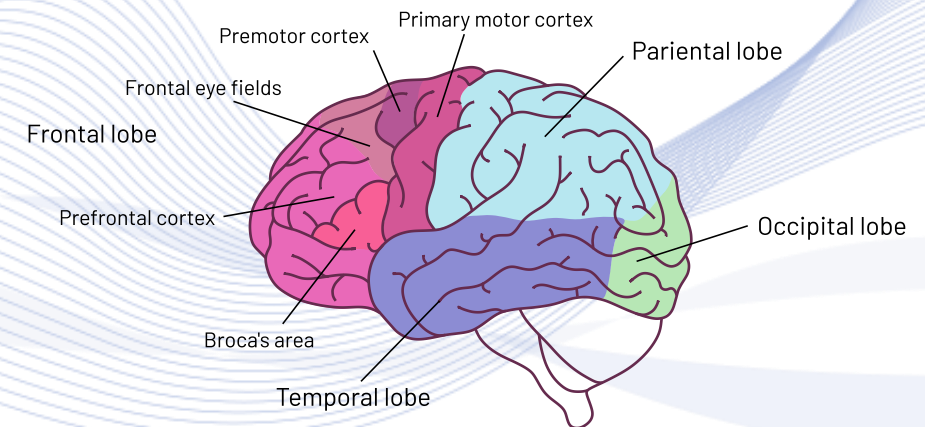
AI and Human Mind

- Is *network complexity* the basis of both the biological and artificial intelligence?
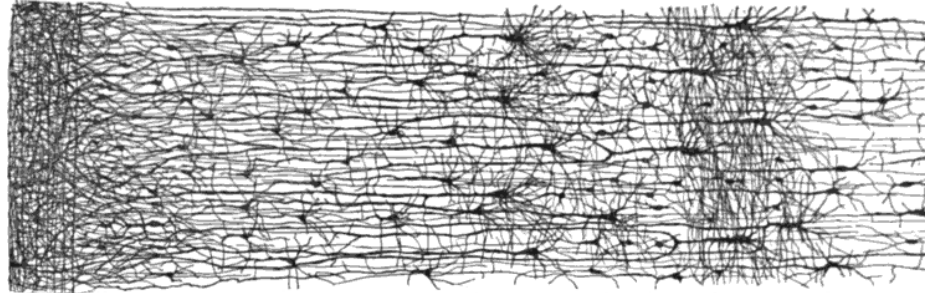
Biological NN (https://en.wikipedia.org/wiki/Cerebral_cortex)

- ***Why is neural network complexity so necessary for biological intelligence?***

- Is network network complexity a *sufficient condition* for biological intelligence?

AI and Human Mind

- Can we define **_animal intelligence_**?

- Many aspects of human intelligence are unknown.
- *Human intelligence is different from Artificial Intelligence.*

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AI and Human Mind

Can human brain address the increased world complexity?

- Human sensing limitations: We cannot see the **microcosm**.

  - Important in a miniaturized world.

- Human perception limitations: self-localization?

  - Extremely important in complex environments: big cities.

- Memory limitations: Computers are better in data storage.

- ***Affect limitations: Brain over-excitation by too many or too frequent stimuli can lead to psychological disorders.***

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AI and Human Mind

Fear

- It is a natural, primitive unpleasant and powerful emotion, needed to understand or perceive we are in **_danger_**.

- Localization in brain: **_amygdalae_** communicating with other brain regions, e.g., the prefrontal cortex, hippocampus, thalamus, hypothalamus, and the sensory cortex.

- Handling the ***fight-or-flight*** human response, when in danger.

Basal ganglia

Thalamus

Hypothalamus

Pituitary gland   Amygdala

Hippocampus

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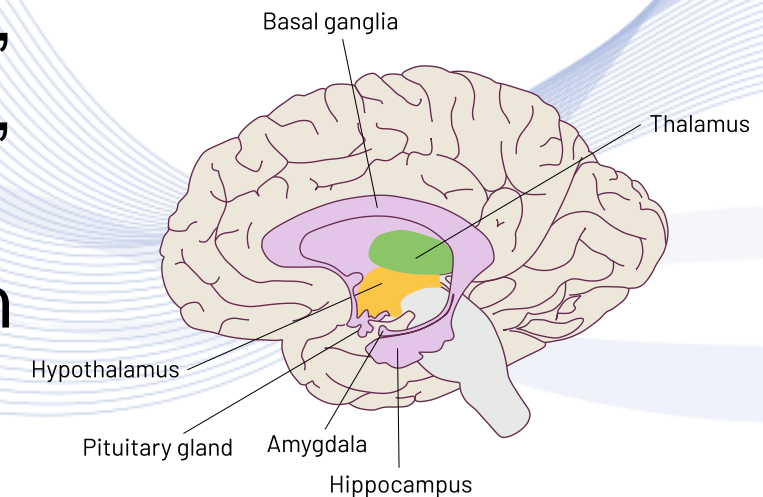
AI and Human Mind

- Excessive and/or repeated fear can cause serious psychological disorders, notably **anxiety** and **depression**.
- Fear can be triggered by several real or imaginary threats:
  - Snakes, spiders, earthquakes.

- **Threat of the unknown** triggered by unfamiliar or unknown stimuli.
- *Intensified by a lack of education to interpret our world.*

AI and Human Mind

VML

Generalized OnLine Affect and Cognition** (**GOLAC**) **disorder

- People receive massive stimuli 24/7 over the web, social media and mobile phones.

- Combination of a constant info bombardment and an inability to handle the threat of the unknown.

- Generalized and unsubstantiated feeling that new things are suspicious and/or fishy.

- Result: *an unsettling feeling of an inability to cope with this online information flux and the dangers it may entail.*

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AI and Human Mind

Generalized OnLine Affect and Cognition (GOLAC) disorder

- **_Real affect and cognition impairment that can jeopardize our actions to interface to the real world._**

- Good background for developing conspiracy theories.

- It can be combined with other social media related threats:
  - e.g., cyberbullying, check by peers through likes.

- Despite partial studies, we have not grasped the immensity of this disorder.

- Social implications: **_fake news proliferation, anti-social marginalization, risks for young people._**

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AI, Society and Religion

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- AI and Religion

Artificial General Intelligence

Is AGI the next step after LLMs?

- Most probably AGI will be VERY different from human intelligence.
  - Airplanes are different then birds, yet they obey the same laws of Physics.
- The physical substrate of AI and human intelligence is very different.
  - Robots have very limited but different physical intelligence.
  - Things may change by developing biological robots.
- ***Life evolution by-design*** than through physical selection.
- Massive ***human-machine symbiosis*** at various levels.

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Artificial General Intelligence

Is AGI the next step after LLMs?

- Will AGI be any different from human intelligence from a behavioral point of view that is worth talking about?

- Today **too many** commoners cannot make the difference.

- The phenomenon is intensified by:

  - Lack of proper education.

  - Access of machines remotely.

  - Unwise claims and behavior of AI agents to the general public, e.g.,:

  - AI halucinations being misunderstood as imagination.

  - False claims of sentiments (internal affect states) by machines.

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Artificial General Intelligence

Layman's technophobia

- ***Fear of the unknown*** as commoners cannot understand AI.
- Machines appear to be intelligent and possibly better at that than the humans themselves.
- They are ***massively better*** in certain tasks, e.g., computations, memory/retrieval.
- Machines appear to be ***sentient***.
- Humans are awed by ChatGPT 'intelligence' much more than by other Generative AI methods, e.g., Deep Arts.
- ***Any technophobia can be socially destructive.***

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Artificial General Intelligence

Scientific technophobia

- Very recent trend: scientists fearing the unknown.
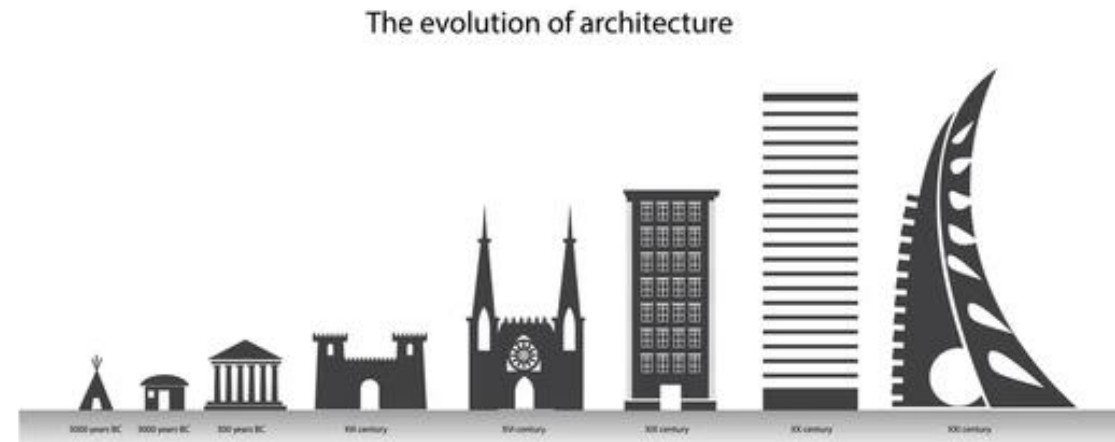
Parable: AI and the tower of Babel.

Artificial General Intelligence

Can AI be stopped or delayed?

- *AI is the response of humanity to a global society and physical world of ever-increasing complexity.*

- The physical and social complexity increase processes are **very deep and seeming relentless**.

- *AI is a blessing, but it can become a curse.*

- Political, ethical, and regulatory concerns cannot and should not stop AI research [FUT2023].

- Scientific technophobia leads nowhere [NYT2023].

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Artificial General Intelligence

Can AI be stopped or delayed?

- ***AI research can and should become more open, democratic, scientific and ethical.***

- Simple AI regulatory examples:
  - AI system registry,
  - Clear indication that somebody converses with a machine.

- AI deployment should be regulated and can be temporarily delayed.
  - Geopolitical aspects must be dealt by international cooperation.

AI, Society and Religion

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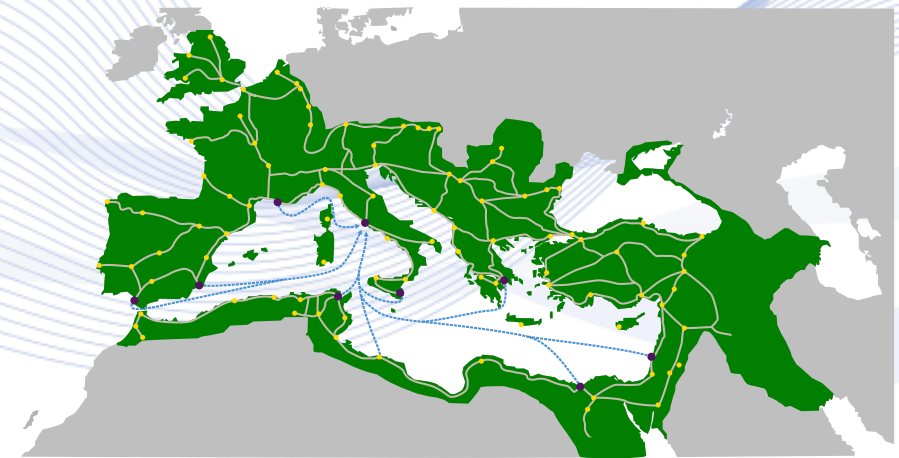
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AI and Society

Society: graphs of interconnected nodes (humans).

- *Ideas propagate along communication and transport routes.*
- Christianity: Roman empire roots.
- Islam: Indian ocean commercial routes.

Social media.

- *Huge information diffusion.*
- Knowledge democratization?

AI and Society

AI and IT enable **Social Engineering**:

- Understanding and analyzing social processes

- Influencing individual humans, social strata and structure.

- M. Kranzberg: "**Technology is neither good nor bad; nor is it neutral.**"

- Marx's famous eleventh thesis on Feuerbach: "**Philosophers have hitherto only interpreted the world in various ways; the point is to change it.**"

Social Media and Disinformation

Social media changed the way we interact with humans

- It is the new e-agora ('Αγορά').
- Free Information flow **among peers**.
- **Electronic word of mouth**.
- No gatekeepers, no regulations: journalists, press laws etc.
- **Great communication facilitators.**

- *Heaven of the freedom of speech?*

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Social Media and Disinformation

AI-powered Social Engineering paradigm gone bad:

The dark side of social media.

- The world became too small: 5 hops to reach anybody.
- Constant 24/7 connectivity and information flooding.
- ***Great communication facilitators.***
- Downside:
  - ***Generalized OnLine Affect and Cognition*** (GOLAC) ***disorder***.
    - ***Anti-intellectualism and Disinformation.***

Social Media and Disinformation

Social activism and virtual communities.

- **Activism**: **grass-roots** movement having a political, economic, social or environment agenda.

- **Political spectrum**: from the far-right to the far-left/anarchism.

- On-line activism is empowered by the **electronic word of mouth**.

- Social media offer a convenient way to get organized in **virtual communities.**

- Handicaps: **Irrationalism, Cult culture, Personality cult, influencers.**

Social Media and Disinformation

Social activism and virtual communities.

- Some social media sites became an ***electronic Hyde Park Speaker's Corner*** of e-lunatics.

- Propagation of irrational and false theories with absolutely no touch to reality: e.g., ***earth is planar.***

- ***Cult***: group of people sharing commitment to ideas, goals (religious in many cases) and/or persons.

- Promotion of violence and/or disinformation.

- Member manipulation and repression:

  - ***Progression bias***: our natural tendency to continue a relationship and ignore signs of trouble, rather than break it.

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Social Media and Disinformation

Irrationalism and Anti-elitism

- ***Irrationalism***: is a philosophical school of the late 19th and early 19th century that questions or discounts rationalism.
  - ***Its vulgar form flourishes during crises.***
- ***Anti-intellectualism*** is supposedly against any perceived privileged elite.
  - Supported by ***lumpenproletariat*** and at times by parts of the ***ruling class***.
  - Example: ***rejecting medical knowledge and practice.***
- ***Anti-elitism***: political version of anti-intellectualism.
  - Current crisis of the dominant political elites .Questioning ***merit***.

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Social Media and Disinformation

Irrationalism and Anti-elitism

Cognitive dissonance theory

Social behavior: when in conflict reduction of discomfort.

- *if reality is at odds with what we believe, it is too bad for the reality itself*.

- If we do not understand, we discard.

- **Aesops fable** The fox and the grapes: Grapes that we cannot eat are unripe ('Ὄμφακες εἰσίν').

Social Media and Disinformation

Irrationalism and Anti-elitism

Many people have neither knowledge nor mental capacity nor desire to understand a scientific explanation:

- If a view is undesirable, shun it!
- When confronted with an uncontestable rational view, shift position instead of admitting defeat!

- The most **socially outlying irrational ideas** are spread with biggest **urgency**. Why?

- **Conspiratorial virtual communities** are much more **militant** than other rational virtual communities, e.g., environmentalists.

Social Media and Disinformation

Virtual Communities and Disinformation

New qualities of outlying radical virtual communities:

- They feel stronger, by forming online bonds (***small world phenomenon***).

- Amplification of their self-respect and sense of collective strength.

- ***Resonance of ideas*** is a key aspect in the formation of such communities:

  - a welcoming audience resonates with their views.

Social Media and Disinformation

Virtual Communities and Disinformation

Sentimentalist ideas (e.g., conspiracy theories) propagate much easier than rationalistic ones:

- Highjacking *empathy*: if I smile, you smile.
- Willing ears can easily adopt whatever is pleasant.
- No second thoughts or self-restraining.
- Exciting sentiment and imagination.
- After a community reaches a *critical mass*, and overdrive of the Default Mode Network (DMN) leads in *thought rumination*.

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Social Media and Disinformation

Virtual Communities and Disinformation

Virtual community structure fuels their further strengthening:

- social media **rich-get-richer mechanisms**.

- Small world diameter (5-6 hops) allows deep penetration in far-away audience.

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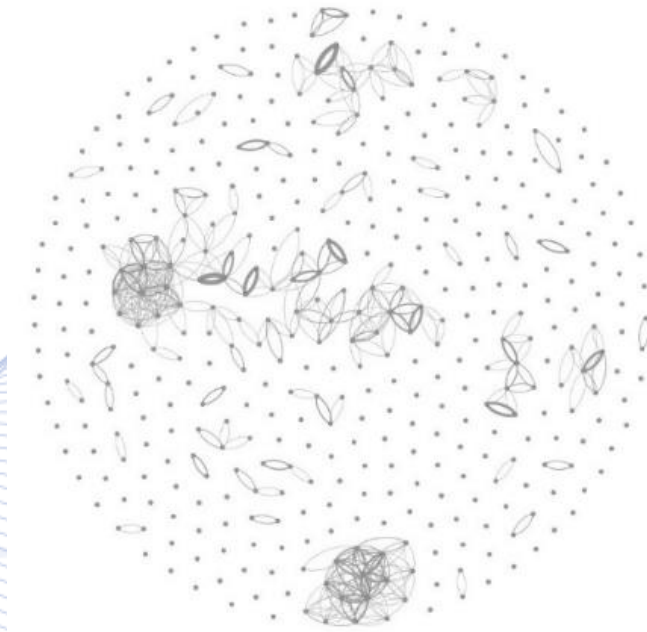
Social Media and Disinformation

Virtual Communities and Disinformation

- Ultra-fast ideas propagation by electronic word of mouth.

- Deep fake news is difficult to detect even by professionals!!!

- *Multiple messages reinforce each other (Goebbels theory).*

- *Good Web and Internet qualities are misused to spread disinformation.*

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Social Media and Disinformation

**Virtual Communities and Disinformation**

Profit-driven social media company information filtering policies can further fuel disinformation:

- News ranking is based on popularity for boosting user engagement (and marketing profits).

- Polarizing posts and hate speech go viral and create engagement.

- They can lead to misinformation cascades.

- *A thin militant minority can highjack social media.*

Social Media and Disinformation

Virtual Communities and Disinformation

- State-sponsored misinformation.

- Professional misinformation campaigns:
    - Staged in some countries, e.g., N. Macedonia.
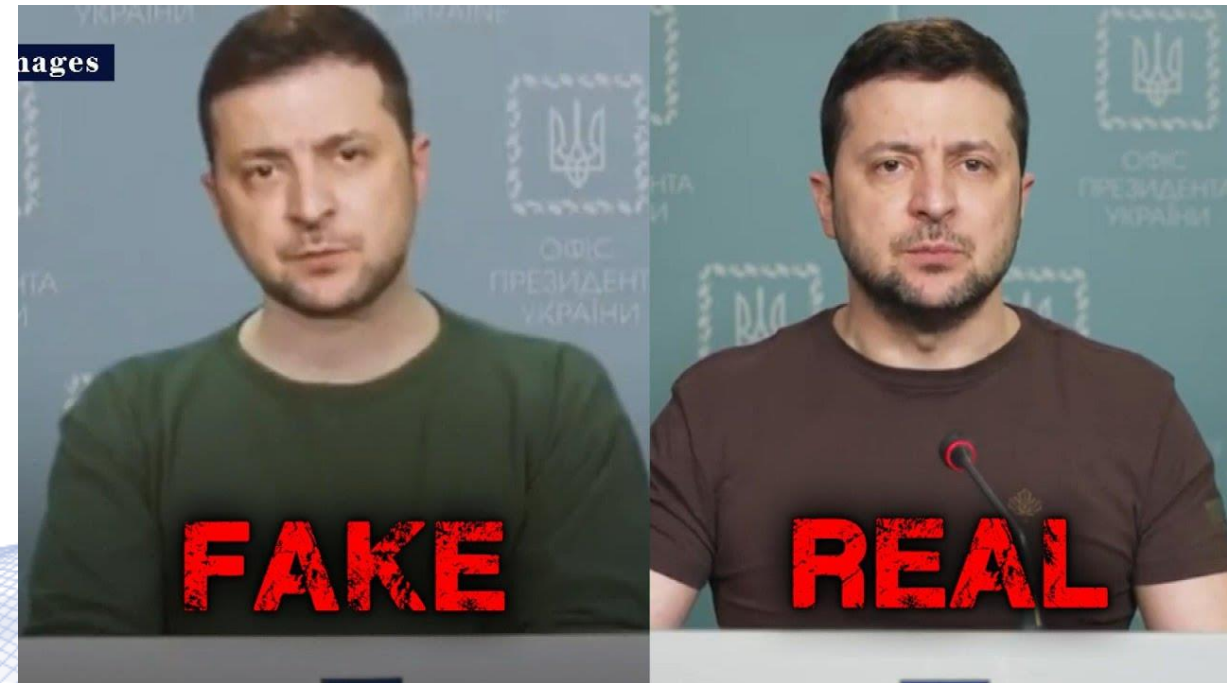
Social Media and Disinformation

AI can greatly aggravate disinformation.

Deep data generation.

- Deep fakes.
- *Deep art: New forms of AI-powered art.*

Personalized Social Engineering.

- Target: human attention and brains.

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Social Media and Disinformation

Political activism.

- Conspiracy theories
- Qanon and the far-right.
- Capitol Hill riot.

Links between political activism and religious fundamentalism.

- Islamic fundamentalism and militant political goups.
- Links between far-right and outlying Cristian groups.
- Links with authoritarian regimes.
- Where is the freedom of speech?

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Social Media and Disinformation

Regulations

- Press and traditional media are governed **by laws** and good practices.

- Social media are governed by **company policies**.

- *States intervened too late too slowly.*

- *Little/No taxation of big social media companies.*

- *European Union pioneered in social media regulations:*
  - AI Act, GDPR, Digital Markets Act, Digital Services Act.

Social Media and Disinformation

How can Democracy defend itself?

- Fact checking.
- Better regulatory policies.
- Antimonopoly practices.
- *Morphosis*: formation of knowledgeable citizens.
  - Major overhaul of education.
  - *Stress on critical and abstract thinking, expression quality.*
  - Revisiting classical studies.
 - *Global education*: diminishing social and regional barriers.

AI, Society and Religion

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AI and Religion

AI and Biblical Studies

- Bible is one of the most studied and published books.
- *Large Language Models* (LLMs) offer new linguistic tools for Biblical Studies.
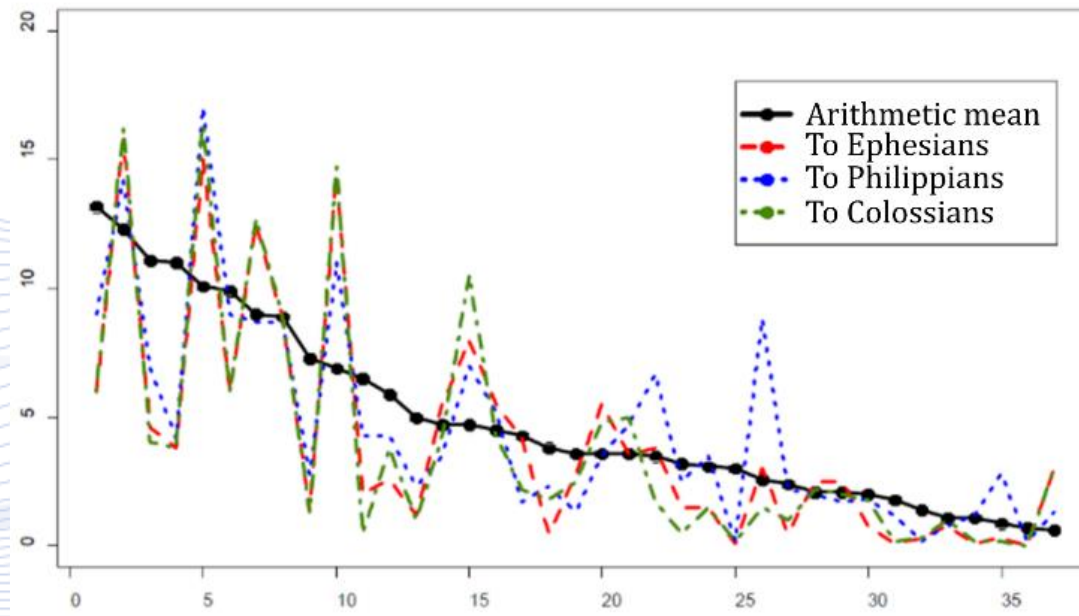
Stylistic analysis of Apostle Paul's Epistles.

AI and Religion

Religious Practice and AI.

- Technology and science have indirectly been used in practicing some religions.
  - Organs in several Christian denominations.
  - Building well-engineered huge churches and other religious buildings.

- Efforts have been made to use AI and Robotics in religious practice.
  - Catholic or Buddist robots.

SanTO 'catholic' robot.

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AI and Religion

Religious Practice and AI.

- **Large Language Models** (LLMs) can be used to offer religious counseling.

- LLMs have been experimentally used in Liturgy and in preaching in some Christian denominations.

- LLMs can exert tremendous influence to less-educated non-vigilant believers.

- They can be useful in special circumstances:
  - Massive natural disasters, war zones.

AI and Religion

Religious Practice and AI.

- LLMs frequently hallucinate.

- LLMs can be used to pose new theological questions.

- LLMs can be used to combine various religious concepts, possibly coming from many religions in new ways.

- Emotionally loaded outlying or radical religious texts propagated in social media that can be convincing to certain people.

  - 'New prophets', radical theologicians or priests.

- They can be a real threat for established religions, particularly ones that have a history of fragmentation.

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AI and Religion

Religious Art and AI.

- All religions have used various art forms to deliver their message.

- Islam uses less artistic forms, Catholicism uses much more.

- AI-art can be used to enhance old artistic forms.
  - Deep image generation for religious paintings.

- **_Can AI be used to create new religious artistic forms?_**

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AI and Religion

In terms of global connectivity, we live in a new world:

- How ideas propagate in such a world?

Impact on religion

- How religious ideas propagate?
- What is the role and more of missionary work nowadays?
- Why radical religious groups thrive on social media?

VML

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AI and Religion

Christianity

- Some Christian denominations are more prone to use AI technology and arts (e.g., Catholicism).

- Radical Christian groups (e.g., in USA) are super-active in social media.

- Links between far-right political parties and outlying Cristian groups.

- Links with authoritarian regimes of some Christian nations.

AI and Religion

Islam

- Radical Islamist groups are super-active in social media, despite residing in less technologically developed countries.

- Extensive use of social media in political events, e.g., Arab spring.

- Links between militant political groups and outlying Islamist groups.

- Links with authoritarian regimes of some Muslim nations.

- Use of AI and Robotics (UAVs) as *poor man's weapons* by Islamist paramilitary groups and regional Islamist powers.

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AI and Religion

- AI is a scientific discipline.
- Religion transcends rational thinking.
- ***There should be no clash between AI and Religion.***

- The age-long debate between materialism and dualism takes now a new twist with AI advances.
- This debate will not cease any time soon.

- ***There is a strong need for a deep science-religion dialog on AI and its prospects.***

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Q & A

Thank you very much for your attention!

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