Artificial Intelligence

Responsible computing
Technology topics
Open technologies

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Cognitive Technologies

Artificial intelligence
Simulation of human intelligence processes

Recommendation engines
Analyze data and suggest something as per user’s interest

Predictive analytics
Predicting outcomes using statistical algorithms and machine learning

Robotics
Conception, design, manufacture, and operation of robots

Machine learning systems
Ability to learn and improve without explicit instructions

Deep learning
Machine learning with artificial neural network algorithms

Natural language processing
Ability to understand human speech as it is spoken
Some Terminology and Concepts

Compare this to Russian nesting dolls: Machine learning is a subfield of artificial intelligence. Deep learning is a subfield of machine learning, and neural networks make up the backbone of deep learning algorithms. In fact, it is the number of node layers, or depth, of neural networks that distinguishes a single neural network from a deep learning algorithm, which must have more than three.

AI mimics human intelligence. It is used to predict, automate, and optimize tasks of humans, e.g. speech and facial recognition, decision making, translation.

Deep learning is a subset of machine learning. The way in which they differ is in how each algorithm learns. A machine learning model can cluster and classify inputs.

The “deep” is referring to the depth of layers in a neural network. More than three layers can be considered a deep learning algorithm.

Neural networks mimic the human brain through a set of algorithms (4 components: inputs, weights, bias/threshold, output).

Good AI

Bad AI
Some Trust and Transparency Principles on AI

The purpose of AI is to augment human intelligence

Augment – not replace – human intelligence
Enhance and extend human capability and potential

Data and insights belong to their creator

Clients’ data is their data, and their insights are their insights

New technology, including AI systems, must be transparent and explainable

AI must be transparent. It must be clear about who trains AI systems, what data was used in that training
Data governance policies to ensure people understand how an AI system came to a conclusion or recommendation
Address the issue of data bias pro-actively and try to minimise it and continuously look for better data sets
Imperatives for Artificial Intelligence

Five imperatives for companies, based on whether they are a provider or owner (or both) of an AI system

**Designate a lead AI ethics official**
Responsible for trustworthy AI
Accountable for internal guidance and compliance mechanisms
Oversee risk assessments and harm mitigation strategies

**Different rules for different risks**
Initial high-level assessment of the technology’s potential for harm
In-depth and detailed assessment for higher-risk applications
Document assessment processes in detail to be auditable, and retain them for a minimum period of time

**Don’t hide your AI**
Promote transparency is through disclosure
Make purpose of an AI system clear to consumers and businesses

**Explain your AI**
Maintain audit trails surrounding input and training data
Make available documentation informing about confidence measures, levels of procedural regularity, error analysis

**Test your AI for bias.**
Responsibility that AI systems are fair and secure
Take remedial actions as needed, both before sale or deployment and after an AI system is operationalised
EU High Level Expert Group on AI

Ethics Guidelines on Artificial Intelligence:
The Guidelines put forward a human-centric approach on AI and list 7 key requirements that AI systems should meet in order to be trustworthy.

- Human agency and oversight
- Technical robustness and safety
- Privacy and Data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability
Standards versus Open Source

**Open Technologies**

**Standards**
- A building plan (methods, metrics, processes, protocols, …)
- Developed collaboratively in standards developing organisations in open and transparent processes
- Not controlled by one single vendor or group of vendors
- Available for free, for small administrative fee, or for sale
- May include patented technologies

**Open Source**
- Source code (Software)
- Developed collaboratively in open source projects / communities / foundations
- Open source governance for decision making
- Openly available
- Licensed under open source license (typically OSI approved license)
Standardisation and Open Source Ecosystem

Linux Foundation

Eclipse Foundation

Linux Foundation AI

IoT Eclipse

Node

Kubernetes

Many others

open source
Major Standardisation Committees Active in AI

International / global:
- ISO/IEC JTC 1 SC 42
- IEEE
- (ITU)

Regional:
- CEN
- CENELEC
- ETSI

National:
- DIN
- BSI
- NEN
- NIST
- others

Others:
- afnor
- UNINFO
Standards Under Development … Some Concrete Examples

| ISO/IEC JTC 1 SC42 | Concepts and Terminology; Definition;  
|                    | ISO/IEC 42001 – Management Systems Standard on AI (Process standard)  
|                    | ISO/IEC 24368 – Artificial Intelligence (AI) - Overview of ethical and societal concerns (TR)  
|                    | ISO/IEC 24027 – Bias in AI systems and AI aided decision making (TR)  
|                    | ISO/IEC 24028 – Overview of trustworthiness in AI (TR)  
|                    | ISO/IEC 38507 – Governance implication of the use of AI by organizations  
| IEC SEG 10         | Ethics in Autonomous and Artificial Intelligence Applications  
| IEEE               | Global Initiative on Ethics of Autonomous and Intelligent Systems (P7000)  
|                    | Governance of AI systems  
|                    | Several activities addressing Machine Learning  
| CEN/CENELEC        | Roadmap on European AI Standardisation  
|                    | Under preparation: Setting up CEN/CENELEC JTC on AI |
In a Nutshell …

AI is a broad field and differentiation on the exact technology and its use is important.

Open Technologies – open standards and open source – play a major role in addressing societal values and ethical topics around AI.

Imperatives and guidelines are available regarding a transparent and responsible use of AI.

Very concrete and relevant standards are already under way and consider European requirements, e.g. those coming from the HLEG.
Thanks very much for your attention