

OECD *Multilingual Summaries* **Artificial Intelligence in Society**

Summary in English



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Machine learning, big data and computing power have enabled recent AI progress

The artificial intelligence (AI) technical landscape has evolved significantly from 1950 when Alan Turing first posed the question of whether machines can think. Coined as a term in 1956, AI has evolved from symbolic AI where humans built logic-based systems, through the AI “winter” of the 1970s to the chess-playing computer Deep Blue in the 1990s. Since 2011, breakthroughs in “machine learning” (ML), an AI subset that uses a statistical approach, have been improving machines ability to make predictions from historical data. The maturity of a ML modelling technique called “neural networks”, along with large datasets and computing power, is behind the expansion in AI development.

AI systems predict, recommend or decide an outcome to influence the environment

An AI system, as explained by the OECD’s AI Experts Group (AIGO), is a “machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. It uses machine and/or human-based inputs to perceive real and/or virtual environments; abstract such perceptions into models (in an automated manner e.g. with ML or manually); and use model inference to formulate options for information or action. AI systems are designed to operate with varying levels of autonomy”.

The AI system lifecycle phases are i) planning and design, data collection and processing, and model building and interpretation; ii) verification and validation; iii) deployment; and iv) operation and monitoring. An AI research taxonomy distinguishes AI applications, e.g. natural language processing; techniques to teach AI systems, e.g. neural networks; optimisation, e.g. one-shot-learning; and research addressing societal considerations, e.g. transparency.

AI can improve productivity and help solve complex problems

The AI economic landscape is evolving as AI becomes a general-purpose technology. Through cheaper and more accurate predictions, recommendations or decisions, AI promises to generate productivity gains, improve well-being and help address complex challenges. Leveraging AI requires complementary investments in data, skills and digitalised workflows, as well as changes to organisational processes. Therefore, adoption varies across companies and industries.

AI investment and business development are growing rapidly

Private equity investment in AI start-ups accelerated from 2016, after five years of steady increases. Private equity investment doubled from 2016 to 2017, reaching USD 16 billion in 2017. AI start-ups attracted 12% of worldwide private equity investments in the first half of 2018, reflecting a significant increase from just 3% in 2011 in a trend seen across all major economies. These investments are usually

large, multi-million dollar deals. With maturing technologies and business models, AI is progressing towards wide roll-out.

AI applications abound, – from transport to science to health

AI applications are experiencing rapid uptake in a number of sectors where it is possible for them to detect patterns in large volumes of data and model complex, interdependent systems to improve decision making and save costs.

- In the transport sector, autonomous vehicles with virtual driver systems, high-definition maps and optimised traffic routes all promise cost, safety, quality of life and environmental benefits.
- Scientific research uses AI to collect and process large-scale data, to help reproduce experiments and lower their cost, and to accelerate scientific discovery.
- In healthcare, AI systems help diagnose and prevent disease and outbreaks early on, discover treatments and drugs, propose tailored interventions and power self-monitoring tools.
- In criminal justice, AI is used for predictive policing and assessing reoffending risk.
- Digital security applications use AI systems to help automate the detection of and response to threats, increasingly in real time.
- AI applications in agriculture include crop and soil health monitoring and predicting the impact of environmental factors on crop yield.
- Financial services leverage AI to detect fraud, assess credit-worthiness, reduce customer service costs, automate trading and support legal compliance.
- In marketing and advertising, AI mines data on consumer behaviour to target and personalise content, advertising, goods and services, recommendations and prices.

Trustworthy AI is key to reaping AI's benefits

Alongside benefits, AI raises public policy considerations and efforts are needed to ensure trustworthy, human-centred AI systems. AI – notably some types of ML – raises new types of ethical and fairness concerns. Chief among them are questions of respect for human rights and democratic values, and the dangers of transferring biases from the analogue into the digital world. Some AI systems are so complex that explaining their decisions may be impossible. Designing systems that are transparent about the use of AI and are accountable for their outcomes is critical. AI systems must function properly and in a secure and safe manner.

National policies are needed to promote trustworthy AI systems, including those that encourage investment in responsible AI research and development. In addition to AI technology and computing capacity, AI leverages vast quantities of data. This increases the need for a digital environment that enables access to data, alongside strong data and privacy protections. AI-enabling ecosystems can also support small and medium-sized enterprises as they navigate the AI transition and ensure a competitive environment.

AI will change the nature of work as it replaces and alters components of human labour. Policies will need to facilitate transitions as people move from one job to another, and ensure continuous education, training and skills development.

AI is a growing policy priority for all stakeholders

In view of the transformative benefits of AI as well as its risks, AI is a growing policy priority for all stakeholders. Many countries have dedicated AI strategies that consider AI as an engine of growth and well-being, seek to educate and recruit the next generation of researchers, and consider how best to address AI challenges. Non-governmental stakeholders – business, technical organisations, academia, civil society and trade unions – and international bodies including the G7, G20, OECD, European Commission and United Nations and are also taking action.

In May 2019 the OECD adopted its Principles on Artificial Intelligence, the first international standards agreed by governments for the responsible stewardship of trustworthy AI, with guidance from a multi-stakeholder expert group.

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doi: 10.1787/eedfee77-en