

Report analyzes the impact of AI on science

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A world-first report from Australia's national science agency, CSIRO, has analyzed the impact of artificial intelligence (AI) on scientific discovery, finding scientists are adopting the technology at an unprecedented rate.

"Artificial intelligence for science" draws insights from millions of [scientific papers](#) published over 60 years to form a picture of how AI is being used across [scientific fields](#) and identifies the key issues ahead for the innovation sector.

CSIRO Chief Scientist, Professor Bronwyn Fox, welcomed the launch of the report today as part of Science at the Shine Dome.

"AI is no longer just the domain of computer scientists or mathematicians; it is now a significant enabling force across all [fields of science](#), which is something we live every day at CSIRO where [digital technologies](#) are accelerating the pace and scale of our research in fields ranging from agriculture to energy to manufacturing and beyond."

The report found that in 1960, a decade after Alan

Turing's landmark paper posed the question "can machines think?", only 14% of the 333 research fields studied were publishing on AI. By 1972, ahead of the first "AI winter," that number had reached more than half.

Today, there is evidence of AI adoption in 98% of fields, with the steepest publishing increases recorded over the past five years. Mathematics, decision sciences, engineering, neuroscience and health professions are noted as among the most prolific adopters.

"Human curiosity will always be at the heart of science, but these technologies combined with deep domain understanding are increasingly helping to open-up new frontiers for knowledge discovery," Professor Fox said.

"AI is also helping to deliver higher-impact, real-world solutions to Australia's greatest challenges, like AI to help detect disease, predict bushfires and manage the enormous amount of data we are gathering about our universe."

The rapid increase in AI uptake by scientists has been accompanied by a global rise in public and private sector R&D investment, with more than 700 AI policy and strategy initiatives developed across 60 international jurisdictions since 2017.

"To make the most of this technology for Australia, there are key issues we will need to tackle. CSIRO has one of the largest teams of digital experts in the country, but these are not issues that can be solved by one organisation alone," Professor Fox said.

"The development of trusted, responsible and ethical AI solutions will be increasingly important globally, and because we have moved quickly to build deep expertise in the field, Australia has a unique opportunity to lead in this area."

"An uplift in AI capabilities will also be needed across all scientific disciplines over the coming decades and it will be vital that we lift workforce

diversity at the same time."

"Artificial intelligence for science" lead author Stefan Hajkowicz said when thinking about the future of AI it's not about just the technology itself.

Provided by CSIRO

"It's about what happens when AI is mixed with other fields of science and research," Dr. Hajkowicz said.

"That's where many of the breakthroughs will happen," he said.

The report identifies key AI issues and trends, including:

- Software and hardware upgrades. Purpose-built processors designed for machine learning are speeding up computations, while quantum computing could lead to transformative leaps in computational power.
- The quest for better data. The era of "big data" may be transitioning into the era of better data. Recent breakthroughs have been achieved using smaller datasets that are well-curated, fit-for-purpose and provenance assured.
- Education, training and capability uplift. Between 2017-2020 alone the number of university courses teaching AI increased by 103%.
- Toward human centric [artificial intelligence](#). In the vast majority of cases AI will be augmenting not replacing the human scientist. Issues of trust, transparency and reliability will be important for scientists and reviewers working on AI systems.
- Improving workforce diversity. Improving the gender, ethnic and cultural diversity of the AI research workforce will lead to better science outcomes.
- Ethical AI. Research organizations will be challenged to develop capabilities, technologies and cultures that deliver increasingly ethical AI.

More information: AI4Science report:

www.csiro.au/en/research/techn...ai/AI4Science-report

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