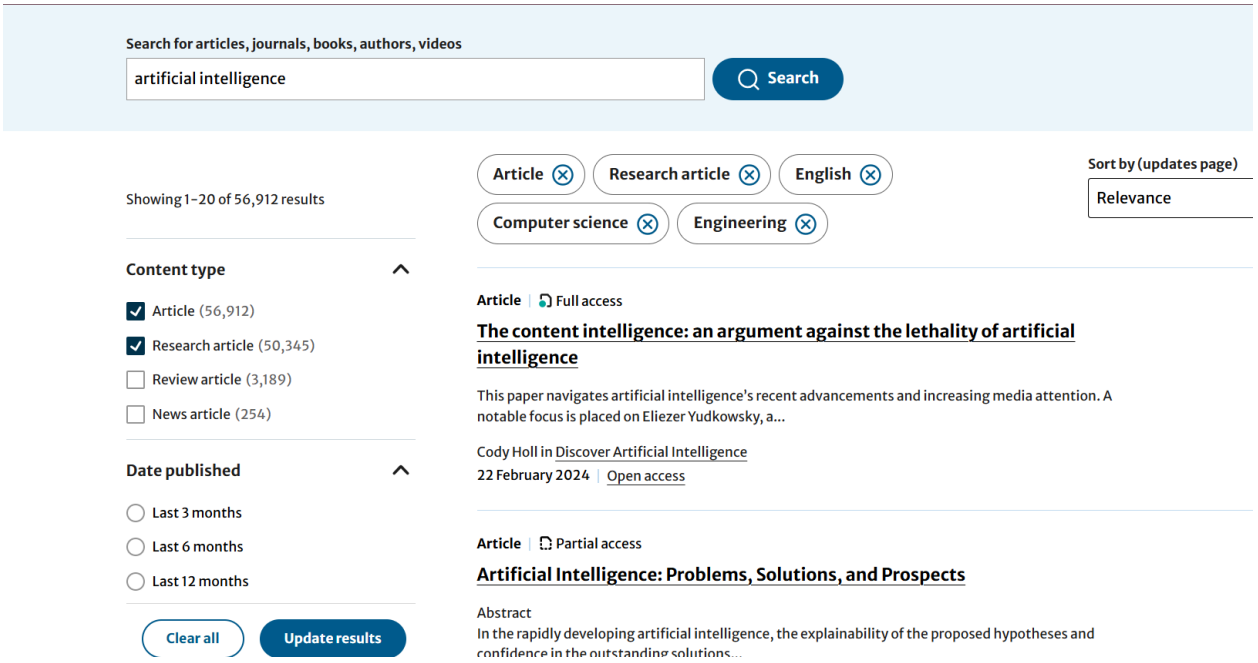
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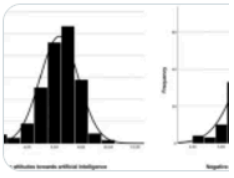
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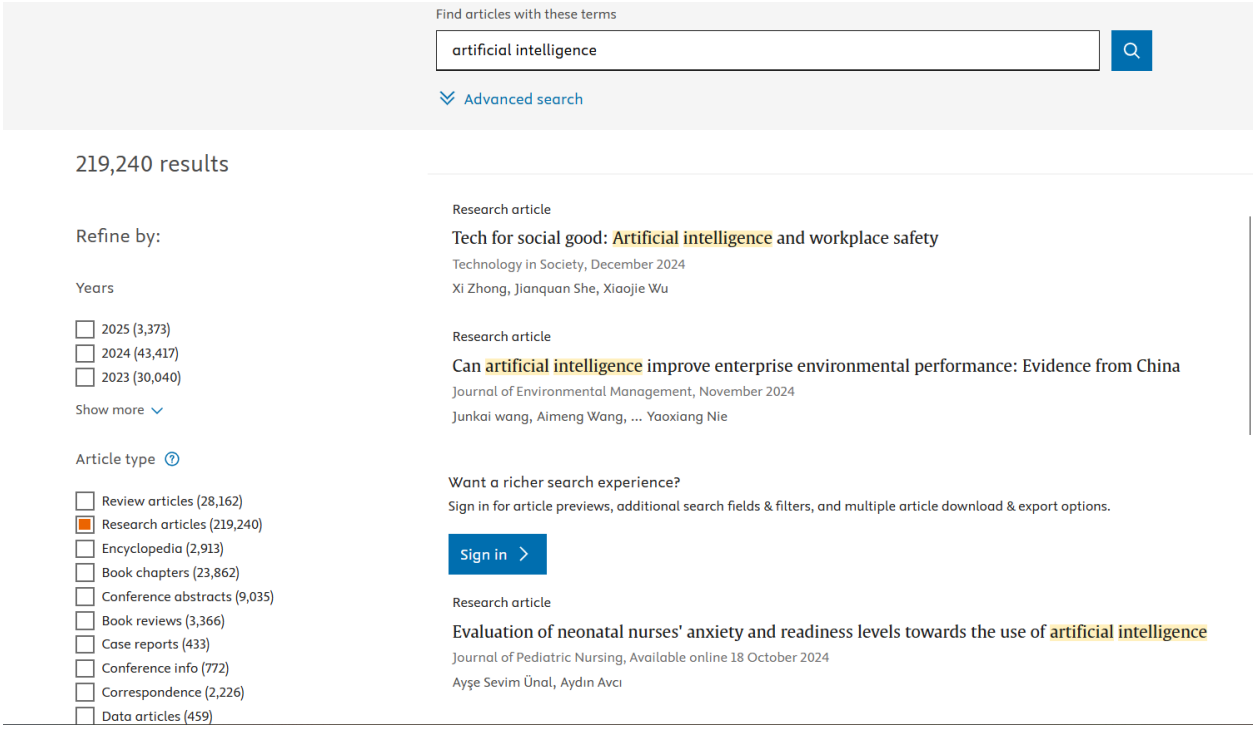
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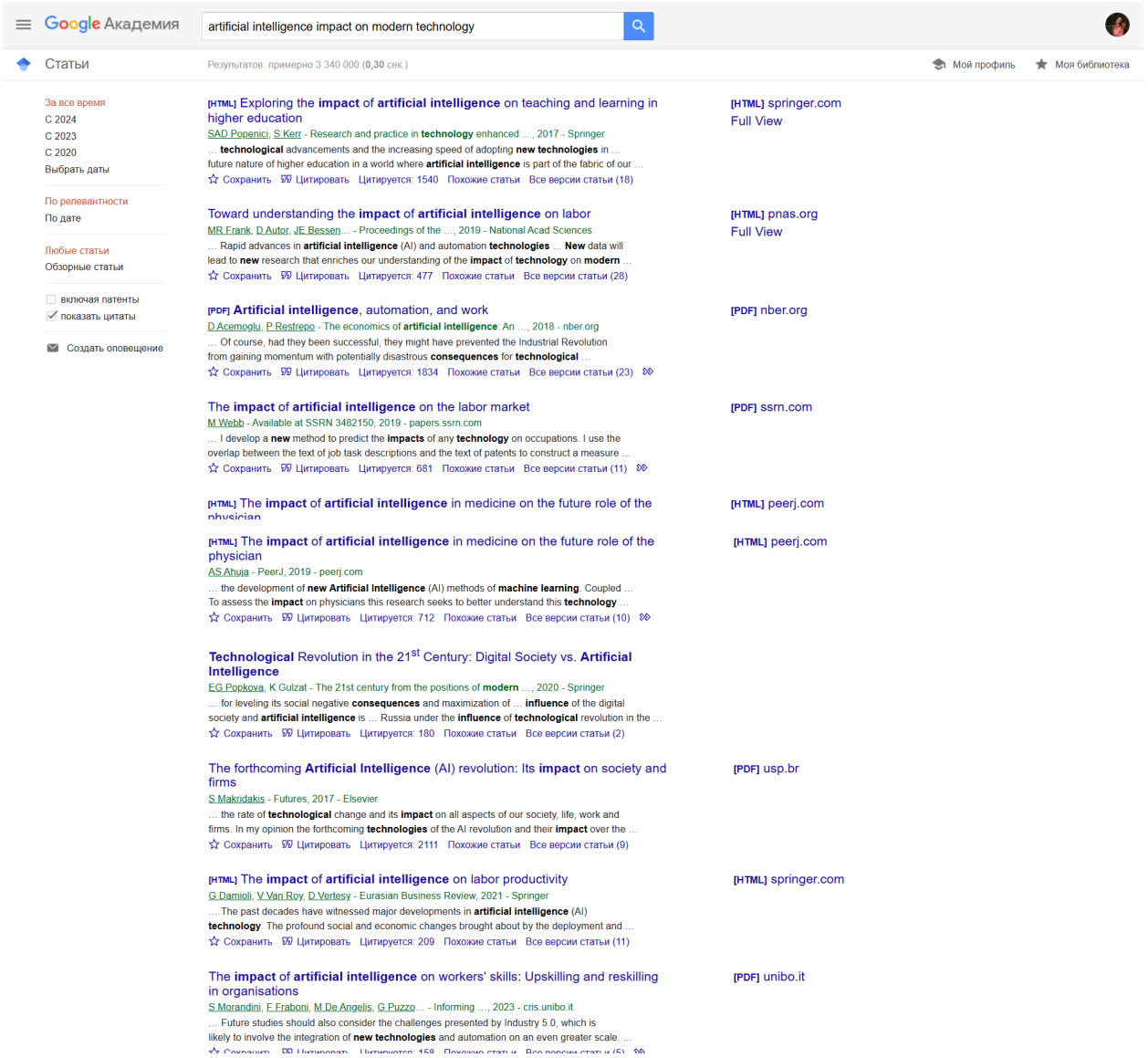
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Статьи

1.



4.1 Introduction

Rapid advances in the field of artificial intelligence have profound implications for the economy as well as society at large. These innovations have the potential to directly influence both the production and the characteristics of a wide range of products and services, with important implications for productivity, employment, and competition. But, as important as these effects are likely to be, artificial intelligence also has the potential to change the innovation process itself, with consequences that may be equally profound, and which may, over time, come to dominate the direct effect.

Consider the case of Atomwise, a start-up firm that is developing novel technology for identifying potential drug candidates (and insecticides) by using neural networks to predict the bioactivity of candidate molecules. The company reports that its deep convolutional neural networks "far surpass" the performance of conventional "docking" algorithms. After appropriate training on vast quantities of data, the company's AtomNet product is described as being able to "recognize" foundational building blocks of

Iain M. Cockburn is the Richard C. Shipley Professor of Management at Boston University and a research associate of the National Bureau of Economic Research. Rebecca Henderson is the John and Natty McArthur University Professor at Harvard University, where she has a joint appointment at the Harvard Business School in the General Management and Strategy units, and a research associate of the National Bureau of Economic Research. Scott Stern is the David Sarnoff Professor of Management and chair of the Technological Innovation, Entrepreneurship, and Strategic Management Group at the MIT Sloan School of Management, and a research associate and director of the Innovation Policy Working Group at the National Bureau of Economic Research.

We thank Michael Kearney for extraordinary research assistance. For acknowledgments, sources of research support, and disclosure of the authors' material financial relationships, if any, please see http://www.nber.org/chapters/c14006.ack.

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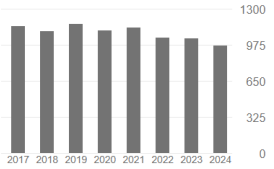
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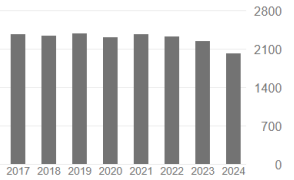
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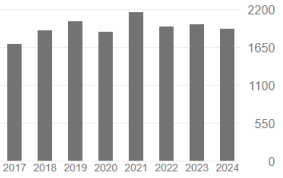
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- Similarities between the Industrial, digital and artificial intelligent revolutions.
- The future of employment and wealth distribution when machines could perform all tasks.
- Will the Artificial Intelligence revolution create a utopian or dystopian future?

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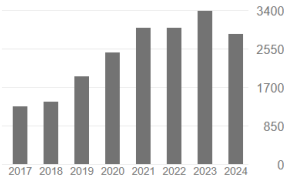
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Abstract

Artificial intelligence (AI) is producing highly beneficial impacts in many domains, from transport to healthcare, from energy distribution to marketing, but it also raises concerns about undesirable ethical and social consequences. AI impact assessments (AI-IAs) are a way of identifying positive and negative impacts early on to safeguard AI's benefits and avoid its downsides. This article describes the first systematic review of these AI-IAs. Working with a population of 181 documents, the authors identified 38 actual AI-IAs and subjected them to a rigorous qualitative analysis with regard to their purpose, scope, organisational context, expected issues, timeframe, process and methods, transparency and challenges. The review demonstrates some convergence between AI-IAs. It also shows that the field is not yet at the point of full agreement on content, structure and implementation. The article suggests that AI-IAs are best understood as means to stimulate reflection and discussion concerning the social and ethical consequences of AI ecosystems. Based on the analysis of existing AI-IAs, the authors describe a baseline process of implementing AI-IAs that can be implemented by AI developers and vendors and that can be used as a critical yardstick by regulators and external observers to evaluate organisations' approaches to AI.

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Journals	02692821, 15737462	1986-2023	Homepage How to publish in this journal

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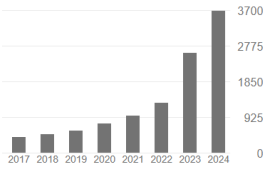
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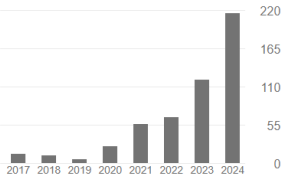
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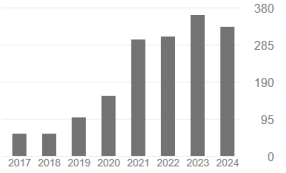
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By **Yoshua Bengio**, Dept. IRO, Université de Montréal, Canada, yoshua.bengio@umontreal.ca

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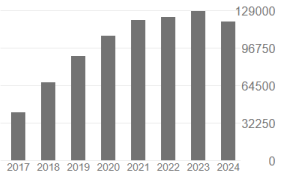
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Foundations and Trends in Machine Learning

Годы охвата Scopus: от 2008 до 2024

Издатель: Now Publishers Inc

ISSN: 1935-8237 E-ISSN: 1935-8245

Отрасль знаний: Computer Science: Software | Computer Science: Artificial Intelligence | Computer Science: Human-Computer Interaction

Тип источника: Журнал

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Pre-trained models: Past, present and future

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Abstract

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Abstract

Large-scale pre-trained models (PTMs) such as BERT and GPT have recently achieved great success and become a milestone in the field of artificial intelligence (AI). Owing to sophisticated pre-training objectives and huge model parameters, large-scale PTMs can effectively capture knowledge from massive labeled and unlabeled data. By storing knowledge into huge parameters and fine-tuning on specific tasks, the rich knowledge implicitly encoded in huge parameters can benefit a variety of downstream tasks, which has been extensively demonstrated via experimental verification and empirical analysis. It is now the consensus of the AI community to adopt PTMs as backbone for downstream tasks rather than learning models from scratch. In this paper, we take a deep look into the history of pre-training, especially its special relation with transfer learning and self-supervised learning, to reveal the crucial position of PTMs in the AI development spectrum. Further, we comprehensively review the latest breakthroughs of PTMs. These breakthroughs are driven by the surge of computational power and the increasing availability of data, towards four important directions: designing effective architectures, utilizing rich contexts, improving computational efficiency, and conducting interpretation and theoretical analysis. Finally, we discuss a series of open problems and research directions of PTMs, and hope our view can inspire and advance the future study of PTMs.

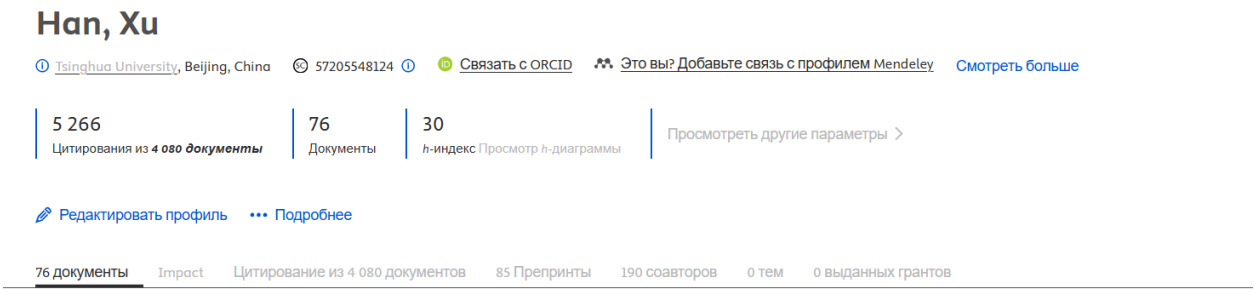
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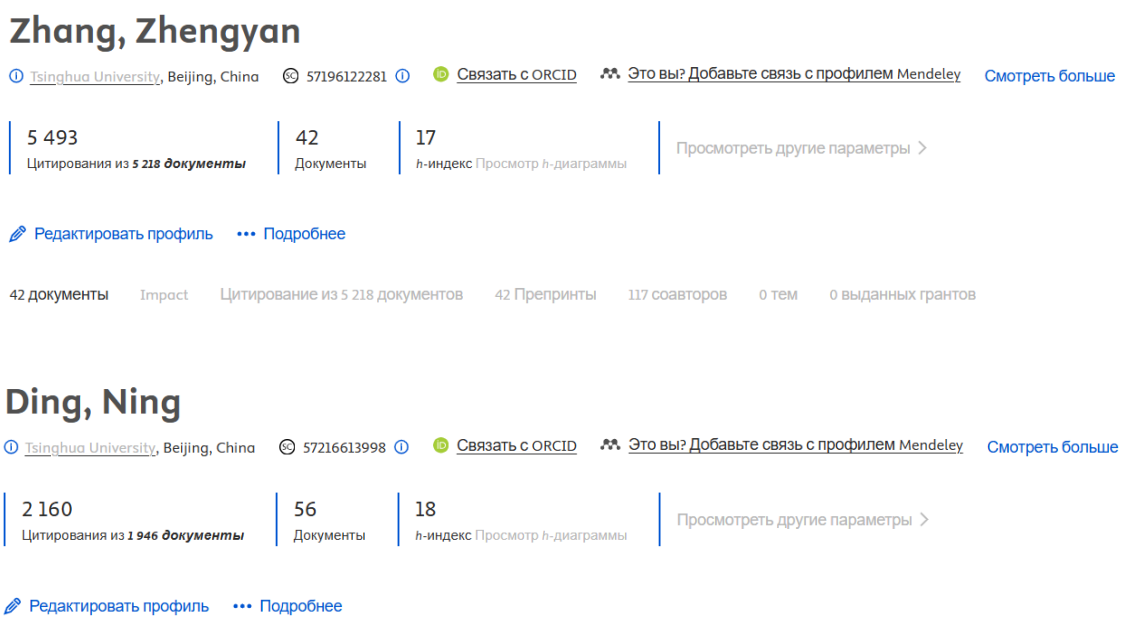
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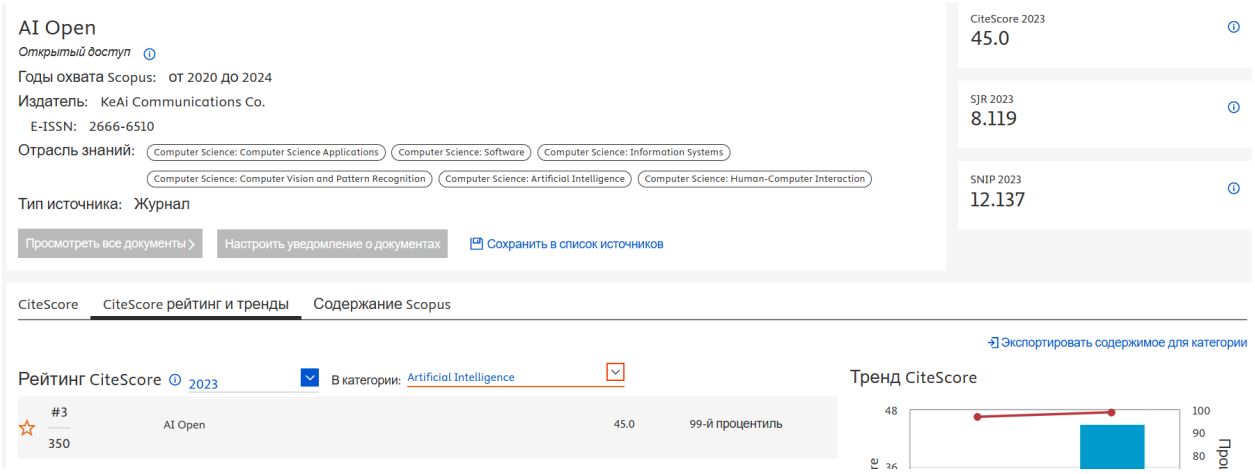
Pre-trained models; Language models; Transfer learning; Self-supervised learning; Natural language processing; Multimodal processing; Artificial intelligence

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