Artificial Intelligence in Journal Publishing

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Applications of AI

- Healthcare: diagnosis, determining the accurate dosage of drugs, AI assistant of doctors, robot-assisted surgery, etc
- Material design
- Self-driving cars
- Finance: fraud prevention, audit, etc
- Cybersecurity
- Strategic games, video games
- Military simulation
- Advertising, marketing
- Natural language processing, translation, etc
- Speech recognition, pattern recognition
- Virtual reality
- Robotics
- Numerous other areas

Short history of AI

- AI: machines that can learn and solve problems as humans do
- Turing test (1950): If a machine can engage in a conversation with a human without being detected as a machine, it has demonstrated human intelligence
- AI was established as a research field in 1950s.
- Key concepts and tools:
  - Artificial neural networks (~1950): models that enable machine learning
  - Machine learning
  - Deep learning (~1970): uncovering patterns within big data to enable data-driven decision-making.
  - Natural language processing
  - Text and data mining: discovering new knowledge from unstructured data or documents.
  - Image and speech recognition
  - Generative AI
  - Large language models
- Reasons for success: improved computer performance, enhanced algorithms, accumulation of big data

AlphaGo beat Lee Sedol in 2016

Convincing demonstration that AI can significantly surpass humans and uncover previously unknown strategies

Generative AI (e.g. ChatGPT, Claude)

- A type of AI that uses ML techniques to identify patterns in large data sets, and uses them to generate new text, image, music, code, etc.
- It can be used to
  - Answer questions
  - Generate text
  - Create summaries, abstracts, keywords
  - Assist literature search
  - Write grant applications
  - Simplify language, methods, tables, formulas
  - Translate
  - Provide new research questions
  - Provide personalized suggestions
  - Detect and correct errors
  - Generate code, images, formulas, tables, etc
  - Parse citations
  - Extract concepts
  - Detect plagiarism
  - etc

AI and journal publishing

- Language processing: A crucial aspect of intelligence.
- AI and natural language processing (NLP) are being widely used in news media and publishing of books and journals
- AI can be applied at every stage of academic journal publishing: peer review, editing, production, etc.
- AI can also assist researchers in tasks like paper writing.
- Major academic publishers such as Elsevier, Springer Nature, Taylor & Francis are collaborating with software companies to develop AI tools for application in academic journal publishing.
- With the advancement of Generative AI, the use of AI in journals is expected to rapidly expand.

AI writing of newspaper articles

- Automated journalism
- New York Times, Feb. 5, 2019:

The Rise of the Robot Reporter (https://www.nytimes.com/2019/02/05/business/media/artificial-intelligence-journalism-robots.html)
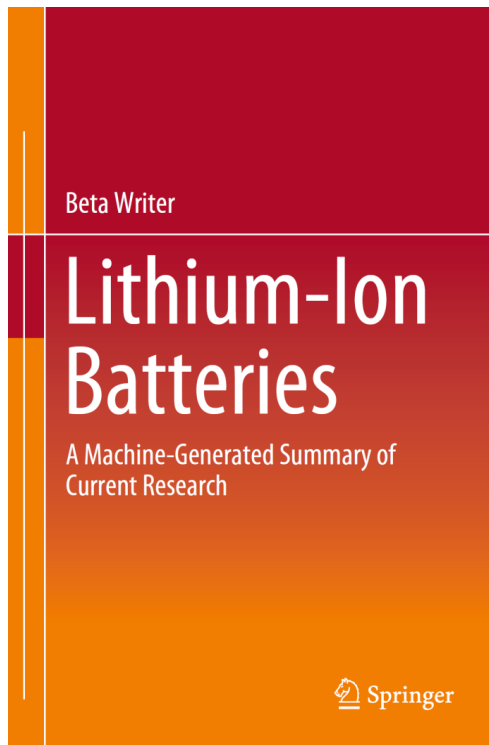
- About 1/3 of Bloomberg News is written by AI

Scholarly book written by AI

- Springer, 2019, 247 pages
https://link.springer.com/book/10.1007/978-3-030-16800-1

Beta Writer Goethe University Frankfurt/Main

Summarize about 150 papers published from 2016 to 2018 and provide an overview of the field

Beta Writer

Lithium-Ion Batteries

A Machine-Generated Summary of Current Research

Springer

AI for researchers and authors

- Research utilizing deep learning: Rapidly expanding and evolving
- AI-assisted Research: Assisting in formulating new hypotheses and optimizing experiments
- AI tools for paper writing:
  - Manuscript Writer (SciNote): Automated draft creation
  - Writefull: Assistance with references, writing style, and language
  - Manuscript Manager (Penelope AI)
- AI-based search tools:
  - Semantic Scholar
  - Yewno: Search based on ideas and concepts, not just keywords.
  - Sparrho: Personalized search

- Journal selection tool
  - FindMyJournal
- Wizdom.ai tool for researchers
  - Determine the emerging hot spots and research trends
  - Identify researchers and institutions at the forefront
  - Analyze the grant trends
  - Visualize personal research graphs of publications, citations and grants
  - Find and cite key papers

personalization, specificity, efficiency, up-to-the-minute relevancy

AI for editing and publishing

- Automation using AI
  content classification and indexing (metadata tagging)
  technical checks
  plagiarism detection
  detecting fabricated data and images
  verification of statistical data
  validation of references
  summarizing the key ideas and new results of manuscripts
  selection of appropriate peer reviewers
  scope matching and journal recommendation to authors
  copy-edit level recommendation
  automated copy-editing
- Better, faster, cheaper editing and production

Technical checks

- author guidelines
- copyright infringement
- conflict of interest
- ethical compliance
- language quality
- potential plagiarism
- figures, tables, references
- funding

Human editors show better precision on most checks. However, humans miss more errors than machines.

Expected to be replaced by AI within a short period

Plagiarism, fraudulent data, statistical error

- Detection of fabricated data and images, Plagiarism: Using AI, it is possible to detect papers crafted to bypass existing verification programs.

- Flawed reporting and statistics: check if crucial aspects of the research are missing or if incorrect statistics have been used

- AI can also identify cases where data has been altered to achieve desired results.

Peer Review

- Selection of reviewers using AI:

  overcome human bias

  exclusion of reviewers with conflicts of interest

  reduction in peer review rejection rates

- Examples: Reviewer Connect (Clarivate), OpenReview, FairFlow, PeerReview4All, Toronto Paper Matching System

- AI Reviewers:

  review results are similar to those assessed by humans

  AI may exhibit systematic bias

- AI is expected to handle a significant portion of paper reviews in the near future.

The age of AI peer reviews

Automated software can help review papers, but the decision-making stays with humans.

BY DOUGLAS HEAVEN

Most researchers have good reason to grumble about peer review: it is time-consuming and error-prone, and the workload is unevenly spread, with just 20% of scientists taking on most reviews.

Now peer review by artificial intelligence (AI) is promising to improve the process, boost the quality of published papers — and save reviewers time. A handful of academic publishers are piloting AI tools to do anything from selecting reviewers to checking statistics and summarizing a paper's findings.

In June, software called StatReviewer, which checks that statistics and methods in manuscripts are sound, was adopted by Aries Systems, a peer-review management system owned by Amsterdam-based publishing giant Elsevier. And ScholarOne, a peer-review platform used by many journals, is teaming up with UNSILO of Aarhus, Denmark, which uses natural language processing and machine learning to analyse manuscripts.

UNSILO uses semantic analysis of the manuscript text to extract what it identifies as the main statements. This gives a better overview of a paper than the keywords typically submitted by authors, says Neil Christensen, sales director at UNSILO. "We find the important phrases in what they have actually written," he says, "instead of just taking what they've come up with five minutes before submission."

UNSILO identifies which of these key phrases are most likely to be claims or findings, giving editors an at-a-glance summary of the results. It also highlights whether the claims are similar to those from previous papers, which could be used to detect plagiarism or simply to place the manuscript in context with related work in the wider literature. "The tool's not making a decision," says Christensen. "It's just saying: 'Here are some things that stand out when comparing this manuscript with everything that's been published before. You be the judge.'"

"It doesn't replace editorial judgement but, by God, it makes it easier," says David Worlock, a UK-based publishing consultant who saw the UNSILO demonstration at the Frankfurt Book Fair in Germany last month.

Worlock notes that there are several similar tools emerging. He is on the board of Wizdom.ai in London, a start-up owned by publishers Taylor & Francis, which is developing software that can mine paper databases and extract connections between different disciplines and concepts. He says that this kind of tool will be useful beyond peer review, for tasks such as writing grant applications or literature reviews.

> *"It doesn't replace editorial judgement but, by God, it makes it easier."*

Many platforms, including ScholarOne, already have automatic plagiarism checkers. And services including Penelope.ai examine whether the references and the structure of a manuscript meet a journal's requirements. Some can flag up issues with the quality of a study, too. The tool statcheck, developed by Michèle Nuijten, a methodologist at Tilburg University in the Netherlands, and her colleagues, assesses the consistency of authors' statistics reporting, focusing on P values. The journal *Psychological Science* runs all its papers through the tool, and Nuijten says that other publishers are keen to integrate it into their review processes.

When Nuijten's team analysed papers published in psychology journals, they found that roughly 50% contained at least one statistical inconsistency (M. B. Nuijten *et al. Behav. Res. Meth.* **48**, 1205–1226; 2016). In one in eight papers, the error was serious enough that it could have changed the statistical significance of a published result. "That's worrisome," she says. She's not surprised that reviewers miss such mistakes, however. "Not everyone has time to go over all the numbers. You focus on the main findings or the general story."

For now, statcheck is limited to analysing ▶

UNSILO

- UNSILO Evaluate (Cactus Communications): Manuscript analysis tool based on AI and NLP

  - Provides the main statement, overview, and summary of the manuscript
  - Enables overall comparisons with many other papers
  - Searches for plagiarism and internal conflicts
  - Verifies the quality of sentences, accuracy of citations, self-citations, and the precision of tables and figures

- A useful tool not only for editing and publishing but also for researchers and authors.

KGL (KnowledgeWorks Global Ltd.)

- Smart Suite 3.0
- Smart Review, Smart Edit, Smart Compose, Smart Proof, Smart Track, Smart Report
- Automatic conversion of a submitted manuscript to an appropriate XML file
- Automation of manuscript editing and production

Enago

- AuthorOne
- Manuscript screening
- Journal recommender
- Scope intelligence
- Concept intelligence
- Copy-edit level recommender
- AI copy-editing

Aries Systems

- Elsevier
- Editorial Manager: manuscript submission and peer review system
- ProduXion Manager: production tracking system

Wizdom.ai tool for publishers

- Development of a software that can deduce the relationships among various fields and concepts through a mining of the database of papers

- Visualize emerging research trends from full text analysis of submitted articles

- It can be used in writing proposals and review papers

Statcheck

- Verification of statistical data
- https://michelenuijten.shinyapps.io/statcheck-web/

statcheck on the web

To check a PDF, DOCX or HTML file for errors in statistical reporting, upload it below. See the FAQ page for more information about what statcheck can and cannot do.

Upload files (pdf, html, or docx):

Browse...   No file selected

Settings:

☐ Try to identify and correct for one-tailed tests

SciScore

- American Association for Cancer Research
- Improving the reproducibility of research results
- Searching and evaluating the method section of submitted papers

AIRA

- Artificial Intelligence Review Assistant (Frontiers)
- potential conflicts of interest
- whether a paper is about a controversial topic
- language quality
- Selection of peer reviewers

AI research advisor, evaluator?

AI tools can
- deduce the relevance of a paper through an extensive comparison with other papers
- find suitable and relevant references
- suggest new directions of research
- complement the current way of evaluating journals and researchers based mainly on the number of citations

AI writer, reviewer, researcher?

Potential issues with AI

- Increase of unemployment
- Inequality
- Humanity: How do machines affect our behavior and interaction? Technology addiction
- Artificial stupidity: AI can do worse than humans
- Racist robots: AI can also have biases
- Security
- Evil genies: Terminator!
- Singularity: What if AI becomes more intelligent than humans?
- Robot rights: reward for AI

Ethical issues with the use of generative AI in journal publishing

- Authorship and copyright ownership of AI-generated content: the need for new laws and regulations
- Citation practices: missing or fictitious citations, bias in citations (Matthew effect)
- Production of misleading or inaccurate content
- Detecting AI abuse in plagiarism, fabrication, and falsification
- Etc.

COPE position statement on authorship and AI tools

- AI tools cannot be listed as an author of a paper.

- AI tools cannot assert the presence or absence of conflicts of interest nor manage copyright and license agreements.

- Authors who use AI tools in the writing of a manuscript must be transparent in disclosing how they were used. Authors are fully responsible for the content of their manuscript, even those parts produced by an AI tool.

Elsevier AI policies

- AI technologies should only be used to improve readability and language of the work and not to replace key authoring tasks.
- Authors should disclose in their manuscript the use of AI.
- Authors should not list AI as an author or co-author, nor cite AI as an author.
- Elsevier does not permit the use of generative AI to create or alter images in submitted manuscripts.
- Editors should not upload a submitted manuscript or any part of it into a generative AI tool.
- Editors should not upload their letters into an AI tool, even if it is just for the purpose of improving language and readability.
- Generative AI technologies should not be used by editors to assist in the evaluation or decision-making process of a manuscript.
- Etc.

STM Best Practice Principles for Ethical, Trustworthy and Human-centric AI

STM Association

Development of best practice principles across five key categories:

- Transparency and Accountability

- Quality and Integrity

- Privacy and Security

- Fairness

- Sustainable development

Conclusion

- The application of AI technology to editing and publishing of scholarly journals will be expanded to a great degree at a rapid pace.

- Tasks such as manuscript validation, reviewer selection, automated manuscript editing, the retrieval, organization, and sharing of information are expected to be significantly influenced by AI.

- It is expected that AI will handle the evaluation of journals and researchers, and support paper writing, peer review, and academic research.

- When effectively utilized, AI has the potential to lead to the discovery of new knowledge, improvement in the quality of papers, and savings in time, money, and effort.

- However, given that AI itself can pose various problems, caution should always be exercised.

- Ongoing discussion and consensus building are essential for addressing ethical issues in the use of generative AI.