

Ethical AI Shaping Scholarly Communication: Challenges and Opportunities

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Abstract

In this robotic era, Artificial Intelligence (AI) is revolutionizing communication of scholarly research, because it offers new avenues for research efficiency and knowledge dissemination. The proliferation of journal and research articles concerning the design and application of AI reflects the growing recognition of the importance of responsible and ethical development of AI. This paper explores the ethical dimensions of AI in the communication of research, focusing on key areas like transparency, fairness, privacy, biases, and accountability. Through the comprehensive review of existing literature and multiple case studies, it is found that the AI algorithms posed ethical challenges in areas like peer review, citation analysis, plagiarism detection, and automated content generation. Furthermore, the present study discussed the implications of AI-driven decision-making systems on academic evaluation, promotion, and tenure processes. This paper proposed recommendations for promoting ethical AI scholarly communication by fostering awareness, dialogue, and collaboration among researchers, publishers, and institutions and tried to inform that responsible AI development depends on the drawing of principles and ethical frameworks and lastly ensure that rather than undermines the integrity and trustworthiness of scholarly communication, the AI enhances the quality of researcher i.e. promote the easiest ethical scholarly communication.

Keywords: Artificial Intelligence (AI), Research Ethics, Ethical AI, Scholarly Communication, Machine Learning

1. Introduction

In this digital age, the integration and implementation of Artificial Intelligence (AI) into scholarly communication has become increasingly prevalent, revolutionizing the way researchers conduct and disseminate their work. AI technologies offer unprecedented opportunities to streamline various aspects of scholarly communication, from literature reviews to data analysis, thereby enhancing research efficiency and productivity. However, as AI continues to permeate academia, it has a host of ethical considerations that must be carefully addressed. From mitigating bias in algorithmic decision-making to ensuring transparency and accountability in research processes, the ethical use of AI is paramount to upholding the integrity and credibility of academic endeavours. As scholars navigate this evolving landscape, it is important to establish



clear guidelines and best practices to ensure that AI serves the greater good of academia while adhering to ethical principles. AI has ushered in a new era in scholarly communication, promising transformative capabilities to accelerate research and knowledge dissemination. From automating literature reviews to assisting in data analysis, AI holds immense potential to revolutionize how researchers engage with information and collaborate. However, amidst the excitement of AI's capabilities, ethical considerations loom large.

Ensuring the ethical use of AI is crucial for maintaining the integrity of academic research and upholding the trust of stakeholders. As researchers navigate this complex terrain, it is imperative to confront these ethical challenges head-on and establish guidelines that prioritize the moral principles that underpin scholarly inquiry. In any AI system, a Language Learning Model (LLM) typically refers to a machine learning model specifically designed for language-related tasks. These models are trained on large datasets to learn the intricacies of language, including grammar, semantics, and context. LLMs can perform multiple language-related tasks, such as text generation, translation, sentiment analysis, question answering, and more.

2. Artificial Intelligence vs Machine Learning

AI and Machine Learning (ML) are closely related concepts but, not the same thing. AI is a sub-field of computer science focused on creating machines or smart supercomputers that perform smart tasks that require human intelligence. It encompasses various techniques, methodologies, and approaches to convert machines to mimic human cognitive functions such as learning, problem-solving, perception, reasoning, and decision-making. AI can be differentiated into two types: Narrow AI (also known as Weak AI), designed to perform a specific task, and General AI (also known as Strong AI or AGI), which would have the ability to understand, learn, and apply knowledge across different domains like a human. AI techniques include rule-based systems, expert systems, natural language processing (NLP), computer vision, robotics, and more (BuiltIn Communit, n.d.; Spiceworks News & Insights, n.d.).

Machine Learning (ML) is a part of AI that focuses on algorithm development and statistical models, which enable the system to learn and improve its performance, without being explicitly programmed. ML algorithms learn from data and make predictions or decisions. ML can be categorized into three main types: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning involves training a model on labelled data, where the desired output is known, and the model learns to predict the output from the input data. Unsupervised learning involves training a model on unlabelled data, and the model learns to find patterns or structures in the data. Reinforcement learning includes training a model to make sequences of decisions by interacting with the environment and receiving feedback in the form of rewards or penalties (USAID Artificial Intelligence Ethics Guide, 2023).

3. Literature Review

Bostrom, N. & Yudkowsky, E. (2011) focused on in-future issues or harmful aspects of AI machines, which have superhuman intelligence and abilities i.e. challenges of stating an algorithm for super ethical behaviour

of AI machines, to prevent humans and society from major harm. This paper also assesses the moral status of AI machines, in comparison to human, on the grounds of ethics, because the main aim of creating more intelligent humanoid AI machines is to ensure that their intelligence is used for the benefit of human society and the next generation.

Jugal, K. (2018) described ethics, AI, ethical issues in AI, the law of robotics, types of AI agents, Strong AI, and principles in the implementation of AI. Nyholm, S. (2021) overviewed the rapid and significant influence of various ethical issues of AI in human life. The autonomy and intelligence of AI machines raised ethical concerns related to privacy, moral and legal status, moral agency, and personhood. The present paper also identified the ethical issues generated across different periods, including short-term challenges such as autonomous systems and machine bias, mid-term concerns like AI governance and human-machine interaction, and long-term implications such as technological singularity and mass unemployment.

Miao et.al. (2023) elaborated on the ethical dilemmas of AI in academic writing, with the help of a review of Nephrology Academia i.e. highlighted the instances of ethical misconduct performed in writing scholarly research and challenges in scholarly communication. It was also suggested about solutions to mitigate unethical AI usage by adopting sophisticated AI-driven plagiarism detection systems and enhancing peer review processes with AI scrutiny. A study underscores the need for collaborative efforts of academic nephrology institutions to foster an environment of ethical AI application in academic integrity.

De Zuniga, H. G., Goyanes, M., & Timilehin, D. (2023) proposed a comprehensive definition of AI in the communication of scholarly research, as real-world capabilities non-human machines or artificial entities to perform tasks, solve problems, communicate, interact, and reason logically as it occurs with biological humans. There are two dimensions of the level of operation first, level of performance, and second, the level of autonomy in the presented study. Eleanor et.al. (2023) examined the ethical considerations surrounding the development and deployment of AI technologies. The main ethical issues identified here and the study focused on areas such as fair benefit-sharing mechanisms, responsibility assignment, worker exploitation, energy demands in light of environmental concerns, and the less certain implications of AI on human relationships.

Guleria, A., Krishan, K., Sharma, V., & Kanchan, T. (2023) explained a Large Language Model (LLM) i.e. Chat Generative Pre-Trained Transformer (ChatGPT) technology introduced by OpenAI in November 2022. This study examined the usage of ChatGPT and other chatbots, in scientific & scholarly writing and communication, focusing on potential biases, dissemination of inaccurate information, and plagiarism because privacy and security concerns are also associated with this technology.

Tang et.al. (2024) explained the integrity of generative AI tools like ChatGPT & Bard in scholarly communication and highlighted their transformative impact. It was declared that the usage of generative AI tools has been crucial for maintaining transparency and credibility in scholarly writing. It was concluded that Generative AI usage by authors and reviewers would be beneficial in ensuring consistent and responsible implementation of AI technology in scholarly research.

4. Ethical AI

Ethics refers to the principles, values, and standards of conduct that govern human behaviour, and guide individuals and organizations, in making morally sound decisions. It involves considerations of what is right or wrong? fair or unfair? and justice or injustice? in various contexts, including personal, professional, and societal domains. Ethics provides a framework for evaluating actions, intentions, and consequences, and it encompasses notions of responsibility, integrity, respect, and accountability.

Ethical AI also known as AI ethics or responsible AI, refers to the application of ethical principles and values to the development, deployment, and use of AI technologies. AI systems are mainly designed, implemented, and utilized in ways that align with ethical norms, respect human rights, and promote societal well-being. Ethical AI encompasses a range of considerations, including fairness, transparency, accountability, privacy, safety, and autonomy, to address the social, cultural, and ethical implications of AI technologies. Some key principles of ethical AI include:

4.1 Fairness

AI systems are free from bias and discrimination and treat all individuals and groups fairly and equitably.

4.2 Transparency

AI systems are more transparent and understandable to users, stakeholders, and affected parties, by disclosing information about their operation, decision-making processes, and potential impacts.

4.3 Accountability

AI developers, deployers, and users are accountable for the outcomes and consequences of those systems and ensuring mechanisms for recourse, redress, and responsibility.

4.4 Privacy

Respecting and protecting the privacy rights of individuals and safeguarding sensitive data collected, processed, or used by AI systems.

4.5 Safety and Reliability

AI systems are safe, reliable, and robust against errors, failures, and adversarial attacks to prevent harm to users and society.

4.6 Human Control and Autonomy

Upholding human autonomy and agency by confirming that these systems are designed to augment human decision-making rather than replace or override human judgment.

4.7 Ethical Use and Impact

The broader ethical, social, and cultural implications of AI technologies, and their potential impacts on individuals, communities, and society.

Ethical AI involves ongoing dialogue, deliberation, and reflection to improve the ethical dilemmas, trade-offs, and challenges arising from the rapid advancement and adoption of AI technologies in diverse contexts i.e. Ultimately, ethical AI aims to transformative potential of AI for the benefit of humanity, minimizing risks with upholding of ethical standards and values in the AI systems (Golbin, I., & Axente, M. L., 2021; Axente, M. L. & Golbin, I., 2023).

5. Role of Ethics in AI

Ethics plays an important role in the development, deployment, and usage of AI systems. There are following key aspects of the role of ethics in AI systems -

5.1 Ensuring Human Well-being

Ethics in AI, ensuring that these systems are developed and used to promote human beings and societal good. This includes considerations of fairness, safety, privacy, transparency, and accountability to prevent harm to individuals and communities.

5.2 Mitigating Bias and Discrimination

Ethical AI tries to mitigate biases and discrimination in AI systems that can perpetuate inequalities and injustices, like identifying and addressing biases in data, algorithms, and decision-making processes to ensure fairness and equity for users, regardless of their race, gender, ethnicity, or other attributes.

5.3 Respecting Human Autonomy

Ethical AI respects human autonomy and agency, mostly designed and used to empower individuals and uphold their rights and freedoms. This includes respecting privacy, informed consent, and the right to meaningful human control over AI-driven decisions that affect people's lives.

5.4 Promoting Transparency and Accountability

Ethical AI promotes transparency and accountability and involves disclosing information about how AI systems work, their limitations, and potential risks to enable informed decision-making and accountability for outcomes.

5.5 Protecting Privacy and Data Security

Ethical AI protects privacy and data security by safeguarding sensitive information and preventing unauthorized access, use, or misuse of personal data. This implements robust data protection i.e. encryption, anonymization, and access controls, ensuring confidentiality and integrity.

5.6 Fostering Trust and Public Confidence

Ethical AI fosters trust and public confidence by building AI systems more reliable, transparent, and accountable. This involves engaging stakeholders, including users, policymakers, and civil society organizations, mostly in the design, development, and governance, to ensure that AI technologies serve the public interest and meet societal needs.

5.7 Addressing Ethical Dilemmas and Trade-offs

Ethical AI involves grappling with complex ethical dilemmas and trade-offs that arise in the development and usage of these systems. This includes balancing competing values, such as privacy versus security, fairness versus efficiency, and autonomy versus control, to make ethically informed decisions that maximize benefits and minimize harms (Gutzman, K., & Gatton, C., 2024; Habdija, P. A., 2024; Wikipedia, n.d.).

6. Challenges in the Usage of AI

6.1 Bias and Fairness

AI systems have inherited biases from the data, they are trained on, leading to unfair outcomes, discrimination, and perpetuation of existing inequalities.

6.2 Transparency and Explainability

Many AI algorithms operate as Black-Boxes, which makes it more difficult to understand i.e. how decisions are made. So, a lack of transparency and explainability can undermine trust and accountability.

6.3 Privacy and Data Protection

AI often relies on large amounts of data, raising concerns about privacy, consent, and data protection. Unauthorized access to important information can lead to breaches of privacy and potential harm to individuals.

6.4 Accountability and Responsibility

Determining accountability when AI systems make mistakes or harmful decisions can be challenging, particularly in complex systems with multiple stakeholders involved.

6.5 Robustness and Security

Threat actors exploit vulnerabilities in AI systems i.e. malicious actors manipulate inputs to produce incorrect or harmful outputs, these are adversarial attacks. Thus, ensuring the robustness and security of AI systems basically maintaining the trust of scholars, is essential to preventing them from exploitation.

6.6 Ethical Decision-Making

AI systems may face ethical dilemmas where there is no clear “right” answer, requiring ethical decision-making frameworks to guide behaviour in ambiguous situations.

6.7 Social and Economic Impacts

AI has the capacity to disorder the labour markets, exacerbate inequality, and reshape societal structures. Ethical AI must consider the broader social and economic impacts of its deployment and strive to minimize harm.

6.8 Regulatory and Policy Frameworks

Due to lack of comprehensive regulatory frameworks and standards for ethical AI. The AI leads to inconsistencies i.e. in which way the ethical principles are applied across distinguished contexts and jurisdictions (GeeksforGeeks Sanchhaya Education Pvt. Ltd, 2024; International Business Machines Corporation, n.d.; Simplilearn Solutions Pvt Ltd, n.d.).

7. Usage of Ethical AI in Scholarly Communication

The usage of ethical AI in scholarly communication enhances various aspects of the research process and the usage of a wide range of applications software helps to improve scholarly communication. There are the following ways to utilize AI in ethical scholarly communication –

7.1 Literature Review and Discovery

Ethical AI-powered tools can guide researchers in conducting comprehensive literature reviews and discovering relevant scholarly articles. The NLP techniques enable the extraction of key concepts, themes, and relationships from vast volumes of academic literature, helping researchers identify relevant studies and gaps in existing knowledge more efficiently.

7.2 Data Analysis and Interpretation

Ethical AI algorithms easily analyze large datasets and extract insights from complex data sources, facilitating data-driven research in diverse fields. Machine learning techniques enable predictive modelling, pattern recognition, and clustering analysis, allowing researchers to uncover hidden trends, patterns, and correlations of data, that may not be recognizable through traditional statistical methods.

7.3 Content Generation and Summarization

Ethical AI technologies can generate scholarly content, such as summaries, abstracts, and even full-text articles, based on input data or existing literature. Text generation models, such as language models and neural networks, can produce coherent and contextually relevant content, aiding researchers in synthesizing information and communicating their findings effectively.

7.4 Citation Analysis and Recommendation

Ethical AI-powered citation analysis tools that help researchers recognize the relevant citations, track the citation patterns, and assess the influence of scholarly works. Citation recommendation systems leverage machine learning algorithms to suggest relevant references, in the context of a research paper. It also facilitates citation management and enhances the quality of scholarly writing.

7.5 Peer Review and Manuscript Evaluation:

Ethical AI technologies can streamline the peer review process by automating manuscript screening, plagiarism detection, and reviewer assignment tasks. AI-powered peer review systems can assess the quality, novelty, and originality of research submissions, enabling faster and more efficient evaluation of scholarly manuscripts while maintaining rigorous standards of academic integrity.

7.6 Language Translation and Multilingual Communication

Ethical AI-driven language translation tools enable researchers to overcome language barriers and communicate their findings to a global audience. Machine translation systems leverage neural networks and learning algorithms to translate scholarly documents, presentations, and other research outputs into multiple languages, facilitating cross-cultural collaboration and knowledge exchange.

7.7 Personalized Recommendation and Collaboration

Ethical AI-based recommendation systems can personalize scholarly communication by suggesting relevant research articles, conferences, and collaboration opportunities based on individual research interests and preferences. These systems leverage user data, such as publication history, citation patterns, and online behaviour, to provide tailored recommendations that enhance research productivity and networking (Master Academia, n.d.; High Wire Press, 2024; Resnik, D. B. & Hosseini, M., 2024; STM Association, n.d.).

8. Ethical AI Tools for Researchers



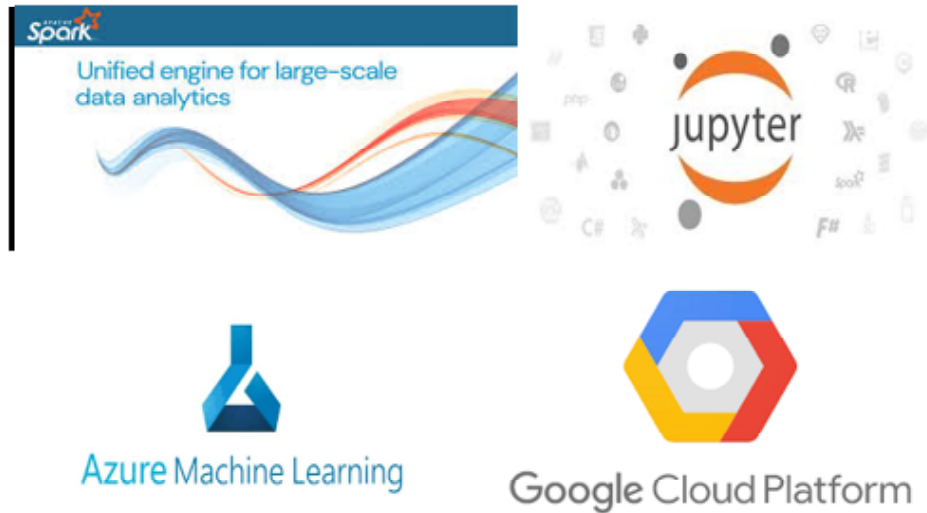


Figure 1: AI Tools for Researchers

8.1 ResearchRabbit

It is a reference management tool designed to help researchers, organize their academic literature and streamline their research process. It allows users to import and organize references, annotate documents, generate citations and bibliographies, collaborate with colleagues, and discover new research materials. Research Rabbit aims to simplify the often-complex task of managing academic literature, making it easier for researchers to stay organized and focused on the work. Its key features and functions are:

- 8.1.1** Add/show earlier or later relevant research papers related to your subject or area of research.
- 8.1.2** Based on those papers generate a network of recommended papers.
- 8.1.3** Add recommended papers, suggest good authors, and visualize the connection.
- 8.1.4** Help to build literature maps i.e. add key articles and, relationships of earlier, later, and similar works.
- 8.1.5** Saved work/search and sent updates.

The official website of this tool is - <https://www.researchrabbit.ai/mission>

8.2 TensorFlow

TensorFlow is an open-source machine learning framework developed by Google Brain and widely used for building and training neural networks. It provides extensive support for deep learning algorithms and offers flexible deployment options. Its key features and functions are:

8.2.1 It offers multiple standard datasets, data pipelines, pre-processed common inputs, and tools to consolidate, clean, and validate large datasets.

8.2.2 It used a graph neural network to analyse relational data or images.

8.2.3 It provides robust capabilities to deploy models on any environment like servers, devices, browsers, mobile, microcontrollers, etc.

8.2.4 It helps in data automation, model tracking, performance monitoring, and model retraining, etc. for researchers of engineering, IT, computer sciences, etc.

To explore more about this tool use this website - <https://www.tensorflow.org/>

8.3 PyTorch

PyTorch is another popular open-source machine learning library developed by Facebook's AI research lab and used more for its more flexible intuitive model building and dynamic computational graph. Its key features and functions are:

8.3.1 It supported cloud platforms for frictionless development and easy scaling.

8.3.2 Its tools and libraries support development in computer vision, NLP, etc.

8.3.3 It offers flexibility in eager mode, transitioning to graph mode, and functionality in C++ runtime environments.

The function of this tool more clear with the help of following link - <https://pytorch.org/>

8.4 OriginLab

OriginLab is a software company known for developing Origin and Origin Pro, a powerful data analysis and graphing software used by scientists and engineers in the area of academia, research, and industry. In 1992, Origin Lab was founded by a group of former employees from MicroCal Software and Origin Pro known for its scientific software, widely used data visualization, statistical analysis, curve fitting, and signal processing. It offers a user-friendly interface combined with advanced functionality for both beginners and experts in data analysis. Its key features and functions are:

8.4.1 Easy to create and customize publication and quality graphs with ~300 graph templates.

8.4.2 Option of customization and creation of your own idea with point and click.

8.4.3 Provide facility of export/copy-paste graphs applications to/from other applications.

8.4.4 A wide range of Apps and data processing tools are available for further extension like importing, graphing, analysis, data reduction, filtering, querying, stacking, unstacking, etc.

For details information copy and paste this link on browser - <https://www.originlab.com/>

8.5 Scikit-learn:

Scikit-learn is a Python library, that provides efficient tools for data mining and data analysis, with a wide range of ML algorithms for clustering, regression, classification, and dimensionality reduction. Its key features and functions are –

8.5.1 Effective and efficient predictive data analysis.

8.5.2 Accessible to everyone and reusable in contexts.

For the usage of this library, user have to visit this address - <https://scikit-learn.org/stable/>

8.6 Keras

Keras is a high-level neural networks API (application programming interface) written in Python and capable of running on TensorFlow, Theano, and Microsoft Cognitive Toolkit (CNTK), also provides a user-friendly interface for building and training neural networks. Its key features and functions are:

8.6.1 Used in the implementation of neural networks and supports multiple backend neural network computations.

8.6.2 Provides rapid prototype, high-level abstraction, user friendly environments, with cross-platform compatibility.

This site is useful to find the high-level neural networks - <https://keras.io/>

8.7 Jupyter

Jupyter is a notebook, that provides interactive computing environments, which allow researchers to create and share documents having codes, equations, visualizations, and narrative text. Its key features and functions are:

8.7.1 It is widely used in AI research for prototyping, experimentation, and collaboration.

8.7.2 Provides exploratory data analysis, live interaction with code, data visualization and language independency.

The mentioned notebook used by this URL link - <https://jupyter.org/>

8.8 Apache Spark Assistant

It is an open-source distributed computing system have an interface for programming, with implicit data parallelism and fault tolerance. It is used in processing large-scale datasets and running distributed machine learning algorithms. Its key features and functions are –

8.8.1 Used as a multilanguage engine for fast executing data engineering, advance data science & analysis, and machine learning on single-node machines/clusters.

The large-scale dataset and Multilanguage interface available here- <https://spark.apache.org/>

8.9 Azure Machine Learning Studio

Azure Machine Learning Studio is a cloud-based integrated development environment (IDE) for building and deploying machine learning models. It provides a drag-and-drop interface for building workflows and supports various programming languages and frameworks. Its key features and functions are:

8.9.1 Its no-code environment is used to build models for clustering, regression, classification, anomaly detection, recommendation and data, statistical, and text analysis.

This studio explores by this official site- <https://azure.microsoft.com/en-in/products/machine-learning>

8.10 Google Cloud AI Platform – is a suite for building, training, and deploying machine learning models at scale. Its key features and functions are:

8.10.1 It provides tools for data pre-processing, model training, hyperparameter tuning, and deployment.

8.10.2 It has facility of nature interaction, enterprises grade scalability, building Chabot based on collection of documents and information.

Navigate on this platform by - <https://cloud.google.com/vertex-ai/docs/start/introduction-unified-platform>

9. Conclusion

Ethical AI for research scholars is essential for ensuring that AI technologies are developed, deployed, and utilized responsibly in the research process, by adhering to ethical principles, research scholars can mitigate potential risks, promote fairness, and transparency, and maximize the societal benefits of AI-driven research. These challenges require the development of comprehensive ethical guidelines, regulatory frameworks, and technical solutions, with the help of collaboration among researchers, policymakers, industry stakeholders, and civilians. With the potential to reshape the entrenched moral frameworks, moral theories, and ethical methodologies, AI stands poised to alter our fundamental understanding of morality. AI advances, bringing forth machines and technologies that rival or surpass human capabilities. Now, humanity is confronted with a profound challenge to its longstanding self-conception as the apex moral agent. Consequently, the trajectory of ethical AI remains unpredictable, yet AI promises to unfold as an ethical AI, with remarkable changes and unforeseen developments.

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