Journal of Global Awareness

Volume 4 | Number 2 Article 3

December 2023

The Coming Transformative Impact of Large Language Models and Artificial Intelligence on Global Business and Education

Eva K. Jermakowicz
Tennessee State University, USA

Recommended Citation
Jermakowicz, Eva K. (2023) "The Coming Transformative Impact of Large Language Models and Artificial Intelligence on Global Business and Education," *Journal of Global Awareness*: Vol. 4: No. 2, Article 3.
DOI: https://doi.org/10.24073/jga/4/02/03
Available at: https://scholar.stjohns.edu/jga/vol4/iss2/3

Abstract

Rapid advances in the capabilities of Large Language Models (LLM) as a basis for Artificial Intelligence (AI) applications, and their sudden wide accessibility, have garnered significant attention recently. These technologies (e.g., ChatGPT, BARD), which have the ability to predict and generate human language, have led to excitement and concerns regarding their use in various industries. This paper explores the history of LLM, examines their applications in business and education, and delves into the critical ethical concerns and challenges of these emerging technologies to ensure that their uses are not only effective, but also responsible and equitable.

Keywords: artificial intelligence (AI), large language models (LLM), natural language processing (NLP), ethical considerations

Introduction

Artificial Intelligence (AI) is a multidisciplinary field that seeks to develop intelligent machines capable of replicating many human cognitive functions, including learning, problem-solving, and decision-making. AI utilizes a diverse range of technologies and techniques, such as machine learning, natural language processing, computer vision, and more. One increasingly essential aspect of AI is reliance upon Large Language Models (LLM), advanced algorithms designed to anticipate and generate human language.

AI has experienced a monumental shift in recent years, primarily due to the emergence of LLM. These sophisticated algorithms, driven by massive neural networks, are designed to generate sequences of words, code, or other data after being given a source input called the prompt, thus having the capacity to feign understanding and generate human-like text. Thus, LLM can be "prompted" to perform a range of natural language processing tasks, given adequate examples of the task as input. From answering questions and translating languages to generating creative content and aiding in research, the emergence of large language models marks the onset of a new era in AI capabilities.

LLM, with their focus on language pattern perception and generation, find applications in various areas, including:

- Natural Language Processing[1] (NLP): Applications such as sentiment analysis[2], chatbots[3], and language translation.
- Content Generation: Enabling the automatic creation of articles, reports, and creative writing.
- Virtual Assistants: Enhancing the conversational capabilities of virtual assistants.
- Question Answering: Facilitating efficient information retrieval.
- Text Summarization: Automatically summarizing lengthy text documents (Vaswani et al., 2017; Devlin et al., 2019; Brown et al., 2020)

ChatGPT, the popular chatbot from OpenAI, was estimated to have reached 100 million monthly active users in January 2023, just two months after launch, making it the fastest-growing consumer application in history, according to a UBS study (Hu, 2023). It demonstrated the capacity to execute a broad spectrum of natural language processing tasks with minimal fine-tuning, from text generation to translation, summarization, and even code generation. GPT-3's capabilities have applications across diverse industries, from business and education to healthcare and entertainment. However, its development has also raised important ethical questions, such as concerns about biases in training data, the potential for misuse, and the need for responsible AI governance.

In this article, the author will delve into the fascinating world of large language models, exploring their evolution, applications, benefits, and ethical considerations.

The History of Large Language Models (LLM)

The story of large language models begins in the 1950s and 1960s, when computer scientists first started experimenting with Large Language Models (LLM) and Natural Language Processing (NLP). One of the earliest examples was ELIZA, a computer program intended to be a tool for emotional connection, created by Joseph Weizenbaum at MIT in 1966. ELIZA was one of the first so-called "chatbots,"

[1] A form of machine learning that can interpret and respond to human language.
[2] The process of identifying and categorizing opinions expressed in a piece of text.
[3] Short for "chat robots," a computer program that can engage in conversations with people in human language.

considered by its creator to be a "Rogerian psychotherapist," with his original impetus focused on capturing and demonstrating shallow communications between machines and humans, which laid the foundation for future, more complex LLM (Gordon, 2022).

Through the 1970s and 1980s, rules-based systems dominated the field of natural language processing. These systems relied on application-specific, customized instructions to process and generate text, thus limiting their scalability and effectiveness. Despite their limitations, they found use in applications such as chatbots and machine translation. In the 1990s, statistical methods and machine learning began to gain prominence. Researchers began leveraging large corpora of text to build probabilistic models that could predict the likelihood of one word following another. Hidden Markov Models and the emergence of the Internet as a vast source of textual data, among other tools and phenomena, led to improvements in speech recognition and machine translation systems (Bender et al., 2021).

The breakthrough in deep learning, particularly the development and broader recognition of neural networks, in the mid-2010s, changed the landscape of NLP. Researchers started experimenting with deep learning models such as recurrent neural networks (RNNs) and long short-term memory networks (LSTMs). These models showed promise in handling sequential data, such as language, and paved the way for more sophisticated language models.

The turning point in the history of large language models arrived with the introduction of transformer architecture, which makes it cheaper and more efficient to train models with enormous amounts of data. It was notably popularized by the unveiling of the Transformer Model and its variants by Vaswani et al., in their paper "Attention Is All You Need" in 2017[4].

Transformers relied on self-attention mechanisms, allowing models to consider all words in a sentence simultaneously, enabling fuller incorporation and better context usage (Vasami et al., 2017). This architectural shift unlocked the potential for training massive language models on vast datasets, leading to the birth of models like the GPT (Generative Pre-trained Transformer) series, BERT, and others. These models, with their ability to process and generate natural language, have

[4] Vasami et al. paper released in 2017 reached 91974 Google citations by the end of September 2023.

revolutionized various application domains, including NLP, chatbots, translation, and even creative content generation.

The recent pandemic accelerated the path of digital transformation. When the third iteration of the Generative Pre-trained Transformer, or GPT-3, was introduced, with 175 billion parameters and training on 570 billion text items, it marked a pivotal moment in the world's recognition of this groundbreaking technology. Within five days of OpenAI—an organization formed in 2015 by a small team of experts in technology entrepreneurship, machine learning, and software engineering—unveiling an early demo version of ChatGPT in November 2022, this chatbot had already attracted over one million users.

Although such models had been in existence for a few years, it was first with GPT-3 that individuals gained the opportunity to directly engage with ChatGPT, ask it questions, and receive comprehensive, practical responses. As people began to interact directly with the LLM in this manner, it became abundantly clear just how much impact this technology would come to exert. It demonstrated the ability to perform a wide range of natural language processing tasks with minimal fine-tuning, from text generation to translation, summarization, and code generation. In effect, a new era had begun.

Transformer models have benefited from ever-larger architecture and quantities of data. Although there is no universally agreed-upon size for the required training dataset, an LLM typically has at least one billion or more parameters. In machine learning terminology, "parameters" refer to the variables present in the model on which it was trained, which then can be used to infer new content. In 2023, Google's BARD and OpenAI's GPT-4 have increased the definition of LLM by orders of magnitude in terms of parameters at about 1.4T and 1.8T, respectively, and database sizes of 750 billion and 220 billion, respectively. Table 1 presents examples of selected LLM in terms of training parameters and data size.

Table 1

Examples of recent large language models[5]

Year	Model	# of Parameters	Database Size
2019	BERT (Google)	3.4E+08	16GB
2019	Megatron-LM (NVIDIA)	8.30E+09	174GB
2020	T-NLG (Microsoft)	170E+10	174GB
2020	GPT-3 (OpenAI)	175E+11	570GB
2021	Switch-C (Google)	1.57E+12	745GB
2023	BARD (Google)	1.37E+12	750GB
2023	GPT-4 (OpenAI)	1.76E+12	220GB

Other AI tools that have recently been launched include Poe AI, by Quora; Claude AI, by Anthropic; xAI by Elon Musk. Amazon AI has been created to help sellers write product descriptions, and GPT-5 is undergoing testing. Recently, Microsoft expanded its long-term partnership with Open AI and announced a multibillion-dollar investment to integrate LLM into its core products and accelerate AI breakthroughs worldwide (Marr, 2023). According to Bender et al. (2021), as ever-growing volumes of text are gathered from the Internet, this trend of LLM increasing in size can be expected to continue as long as it correlates with increases in performance (Bender et al., 2021). However, according to Ouyang et al. (2020), LLM can generate untruthful and even toxic outputs, suggesting that making language models bigger does not necessarily make them better at following a user's intent (Wiggers, 2020). These developments have captured the world's attention and sparked discussions about the ethical implications and potential uses of such powerful AI models.

[5] Updated from Bender et al. 2021

Applications of LLM in Business and Education

Business

The application of large language models in business is transforming the way organizations operate and engage with customers. LLM have prompted concern among educators, professionals, thought leaders, and others (Coker, 2023; Pittalwala, 2023) as it threatens to upend standard work practices across industries (Wiley, 2023). From enhancing customer support to streamlining content creation, these models are seemingly becoming indispensable tools for modern businesses. In fields ranging from healthcare and finance to education, marketing, and law, these models are transforming the way businesses function and engage with their customers. The advantages offered by these models include increased efficiency, improved customer satisfaction, data-driven decision-making, and cost savings. Table 2 presents examples of LLM applications in business.

Table 2

Examples of Large Language Model (LLM) Applications in Business

Enhanced Communication and Customer Service:
LLM excel in processing and generating human language. This makes them valuable for a wide range of natural language processing (NLP) applications in business. They can automate customer support through chatbots, analyze customer feedback sentiment, and even generate content for marketing and advertising.
Personalization:
These models can be used to personalize user experiences. In e-commerce, for example, they can recommend products based on a user's browsing and purchase history. Similarly, in content delivery platforms they can recommend articles, videos, or courses tailored to a user's interests. Also, they can assist people with disabilities, making business services more accessible for them.

Data Processing:
LLM can assist in data processing and analysis by summarizing lengthy documents, extracting key information, and generating reports. This can reduce the time and effort businesses invest in making data-driven decisions.
Content Creation:
LLM can generate high-quality content, including news articles, reports, and marketing materials. While not entirely replacing human content creators, they can assist in content generation and ideation, reducing the costs and time required for content creation.
Language Translation:
LLM have shown excellent capabilities in translation tasks, which can be valuable for businesses operating in multiple countries or targeting diverse audiences and markets.
Market Research:
LLM models can analyze vast amounts of textual data from social media, news, and forums to provide insights into market trends, customer sentiment, and competitive intelligence.
R&D and Innovation:
In sectors like pharmaceuticals and materials science, LLM can assist researchers in sifting through scientific literature, thus accelerating the discovery of new drugs, materials, or solutions.

Examples of LLM applications in various industries are as follows:

Accounting

- Enabling accountants to process vast quantities of financial information more efficiently and with a higher degree of accuracy, ultimately reducing the risk of human errors.
- Being instrumental in natural language processing (NLP), making it easier for accountants to comprehend complex financial regulations, interpret intricate tax codes, and extract relevant insights from financial reports.
- Playing a pivotal role in fraud detection and compliance by flagging anomalies and irregularities in financial transactions. As a result, the integration of LLM in accounting can not only boost productivity but also enhance the overall quality of financial reporting and decision-making in this critical field (KPMG 2021).

Finance

- Analyzing vast datasets in real-time, identifying trends and opportunities that human traders employing algorithmic trading might miss.
- Playing a vital role in risk management by assessing and predicting market fluctuations, enabling financial institutions to make more informed investment decisions.
- Assisting in credit scoring and underwriting by evaluating borrowers' creditworthiness based on comprehensive data analysis, making lending processes faster and more accurate.
- Impacting customer service and engagement, using natural language processing to respond to customer inquiries, providing financial advice, and offering personalized investment recommendations (Loureiro et al., 2020).

Marketing

- Generating high-quality, relevant marketing materials such as blog posts, social media updates, and email campaigns.
- Helping companies gauge public opinion and assess the success of their marketing efforts using sentiment analysis.

- Enabling more personalized and targeted marketing and enhancing customer interactions by providing instant responses and assistance, improving customer service and satisfaction (Qiu et al., 2023).

Legal Practice

- Assisting in legal research, as these systems can swiftly process vast volumes of case law, statutes, and other legal documents, helping legal professionals access relevant information more efficiently.
- Helping in contract analysis and management, automatically extracting key clauses and terms from contracts, enabling lawyers to assess agreements and identify potential risks.
- Facilitating the review of large document sets during e-discovery, saving time and costs in litigation.
- Playing a pivotal role in predictive legal analytics, offering insights into case outcomes, thus aiding in strategic decision-making for lawyers and clients (Choi et al., 2023; Shaver, 2023).

Healthcare

- Assisting in clinical decision support, helping doctors and healthcare providers make informed decisions by analyzing patient records, medical literature, and diagnostic data.
- Aiding in medical transcription and documentation, ensuring faster and more accurate record-keeping.
- Helping with patient engagement by enabling healthcare organizations to communicate with patients through chatbots and virtual assistants, providing information, scheduling appointments, and answering common healthcare queries.
- Assisting in medical research by processing vast volumes of medical literature, extracting relevant insights, and accelerating the pace of scientific discovery (Schwalbe & Wahl, 2020).

Rechman's (2023) *CPA Journal* article "Can Artificial Intelligence Become an Accounting Expert?" reported the findings of a focus group of practitioners with expertise in auditing, tax, internal auditing, risk management, and forensic accounting, asked to evaluate LLM responses to professional queries. It found that

the AI LLM's responses did not appear to have much depth, suggesting that it may require further "teaching" in order to be able to extract and synthesize complex and nuanced data into more reliable arguments. The conclusion was that AI is still a work in progress, not yet ready for prime time when it comes to simulating professional expertise (Rechman, 2023).

Education

LLM have the ability to change the way students learn, and teachers instruct. Firstly, LLM can provide personalized learning experiences, tailoring educational content to individual student needs and preferences. This adaptability can address gaps in knowledge and variations in learning styles, enhancing overall comprehension and retention, and perhaps remediating existing deficiencies in some students' backgrounds and preparations. Additionally, they can serve as virtual tutors, offering instant feedback, explanations, and assistance to students, thereby reducing the burden on educators and providing timely support for struggling learners. Furthermore, these AI models might be able to assist in the development of high-quality educational materials, automating content creation and assessment. Table 3 presents LLM applications in education.

Table 3

Examples of Large Language Model (LLM) Applications in Education

Personalized Learning:
LLM can provide personalized learning experiences. They can adapt content and assessments to individual student needs, making education engaging and, consequently, more effective.
Tutoring and Homework Help:
These models can serve as virtual tutors, helping students with homework and explaining complex topics. They can be available 24/7, filling gaps in teacher availability.

Language Learning:
Language models can aid learners with instant translations, pronunciation feedback, and conversation practice. They can also generate language exercises and quizzes, tailored to individual students' progress.
Content Generation:
Educators can use these models to quickly create educational materials, from worksheets to lesson plans. This can save teachers valuable time and resources.
Accessibility:
LLM can be used to develop tools and resources for students with disabilities, such as text-to-speech and speech-to-text systems, making education more inclusive.
Research Assistance:
In higher education, these models can assist researchers in literature reviews, data analysis, and generating research papers, potentially accelerating the pace of academic discovery.
Language Preservation:
For endangered languages, AI can help in documentation, translation, and preservation efforts, ensuring that linguistic diversity is not lost.

The potential impact of LLM in AI on education is profound and multifaceted. When ChatGPT was released, it sent shockwaves through higher education for its ability to create polished, confident-sounding text, which could be used to write essays and assignments (Milano et al., 2023). The issue is how higher education should react, with an immediate concern being its impact on student assessments. As a result of the recent pandemic, higher education has already been undergoing radical transformations driven by the need to digitalize education and training processes, but this has been impeded by the fact that many academicians may lack technological capabilities for online teaching (Garcia-Morales et al., 2021).

In March 2023, Wiley surveyed 109 accounting professors from across North America to assess how ChatGPT had impacted the higher education accounting classroom experience, after a mere six months since its debut. Notably, most accounting professors expressed ambivalence about ChatGPT's potential to improve their course materials. Only about one in five respondents have used ChatGPT to enhance their courses, and a few have yet to see it as a legitimate learning tool. Cheating is a significant concern, which most professors are not confident in their abilities to detect (Wiley, 2023).

However, most respondents believe that educators and students must embrace ChatGPT for learning. To make the tool most effective in classrooms, both educators and students must master the techniques of so-called "prompt engineering." This involves the systematic creation of prompts designed to obtain specific and desirable results from LLM. These models possess the capacity for in-context learning, which allows them to modify their behavior based on instructions provided in prompts. Mastering prompt engineering will be essential for students to maximize the advantages of LLM-assisted learning interactions (Wiley, 2023).

Thus, LLM presents both opportunities and challenges for educational practices and experiences. Institutions should re-evaluate their academic integrity, equity, and accessibility policies in response to generative AI, considering the need for updated learning goals, curricula, and assessments. Addressing data security and confidentiality concerns is especially crucial.

According to Milano et al. (2023), practicing academic writing is a common way to teach and assess logical argumentation and critical thinking (which ironically are necessary skills to evaluate an LLM's output). However, adopting LLM as part of standard practice raises serious risks of negative operational, financial, pedagogical, and ethical consequences for universities. For example, OpenAI is under no obligation to cater to the needs of educational institutions when it comes to maintenance of and access to its model, or how it was trained and what data it is built upon, thus creating fundamental operational issues if this forms part of the assessment. Also, there should be concern about the resources needed for running LLM, as well as other so-called environmental impacts. In addition, excitement about ChatGPT and other LLM tools foreshadows the huge political issue of who owns and sets the standards for education in the age of AI (Milano et al., 2023).

Birhane et al. (2023) indicate that it is imperative for scientists to be more vocal about the potential negative impacts of this technology on the scientific community. By raising awareness and demanding further research on and development of safeguards—for example, the development of accurate tools to detect LLM-generated text—the scientific community can contribute to the responsible and ethical use of LLM.

According to findings of a project conducted by the University of Stockholm, currently, there is little understanding of ethics concerning deploying AI in the education sector. This is partly due to the scant attention that ethical concerns have received compared to the systems' increased efficiency and cost-effectiveness. This project addresses fundamental ethical and legal challenges that AI technologies bring to learning and teaching in higher education. It will contribute knowledge about how to conceptually and empirically approach these challenges, but most importantly, how to deal with ethical issues in practice (Stockholm University, 2023).

Thus, LLM present both opportunities and challenges for educational practices and experiences. Institutions should thoroughly reassess their academic integrity, equity, and accessibility policies in response to generative AI, while also contemplating the necessity of revising learning objectives, curricula, and assessment methods. It is of paramount importance that data security and confidentiality concerns be addressed, as they play a particularly significant role in this context (Zeide, 2019).

Ethical Considerations and Challenges

Ethical concerns and other challenges must be carefully addressed to ensure that the integration of LLM in business and education maximizes benefits while mitigating potential risks. Figure 1 presents the various ethical considerations and challenges in the application of LLM.

Figure 1. Ethical Considerations and Challenges in the Application of Large Language Models (LLM) in Artificial Intelligence (AI)

Regulatory Frameworks

LLM often operate in a legal and ethical gray area, especially in the contexts of data privacy, content moderation, and bias mitigation. Striking a balance between enabling innovation and safeguarding against potential harm is a delicate task for regulators. Additionally, LLM can generate vast amounts of content, some of which may be misleading, harmful, or offensive, making it difficult to establish clear liability and accountability (e.g., hallucination[6]). According to Rosenbush et al. (2023), hallucinations are one of the primary shortcomings of these models, prompting calls for human oversight of LLM and their outputs. Moreover, the rapid pace of technological advancement often outpaces regulatory frameworks, perhaps leading to a disconnect between the capabilities of LLM and the ability of laws to

[6] when a model produces responses that are not based on facts or reality, but are presented as such.

address them effectively. Consequently, striking the right regulatory balance that ensures responsible use and innovation remains a formidable challenge in the evolving landscape of LLM applications (Reed 2018).

Bias and Fairness

LLM learn from vast datasets collected from the Internet, which can contain implicit biases, stereotypes, and non-representative perspectives. Consequently, these models may generate or reinforce biased content, perpetuating discrimination, inequality, and misinformation. Striking the right balance between free expression, diversity, and responsible content generation remains an ongoing and challenging endeavor in the development and deployment of LLM (Weidinger et al., 2021).

Privacy

LLM often require access to large amounts of personal and sensitive data to function effectively. This raises concerns about data security, consent, and the potential for misuse. When not adequately regulated or controlled, these models can inadvertently expose individuals' private information or generate content that violates privacy norms. Weidinger et al. (2021) list risks from private data leaks or LLM correctly inferring sensitive information among those ethical and social risks of harm from generative AI. Thus, striking a balance between leveraging the capabilities of LLM for various applications and protecting individuals' privacy rights is a delicate and evolving challenge.

Safety and Transparency

LLM can sometimes generate harmful, biased, or inappropriate content, raising concerns about their safety for users and society at large. At the same time, achieving transparency is complicated, as these models are often considered "black boxes" where their decision-making processes are not easily understandable or explainable. This lack of transparency can result in biased or unfair outcomes that are difficult to identify and rectify (Weidinger et al., 2021).

Data Security

LLM depend on vast datasets, and protecting this data from breaches, leaks, or unauthorized access is paramount. The storage and transmission of these data can be vulnerable to cyber threats, and if compromised, they can result in severe privacy

violations and misuse. Moreover, the processing power required to run LLM can be resource-intensive and may involve cloud-based systems, which require robust security measures to safeguard against unauthorized entry points. This challenge is critical in the application of LLM in various fields, such as healthcare, finance, and customer service.

Accountability

Accountability ensures that those who employ LLM do so with transparency, ethics, and a clear understanding of the consequences. It demands that developers, organizations, and users alike consider the potential biases, misinformation, and ethical dilemmas that can arise from LLM outputs and take steps to mitigate these issues. According to Birhane et al. (2023), through robust accountability measures, we can harness the benefits of LLM while minimizing their risks, fostering a more ethical and beneficial integration of AI into our lives.

Responsibility

LLM outputs have the potential for bias, misinformation, and harm, and their responsible application involves recognizing these risks and implementing proactive measures to minimize them. Users, developers, and organizations must be accountable for the decisions and actions they take with LLM, so their application will be aligned with ethical values, societal well-being, and the betterment of humanity as a whole. For example, Naik et al. (2022) focus on errors within healthcare procedures or protocols, highlighting the potentially severe consequences for patients who become victims of such mistakes facilitated by AI applications. According to Naik et al. (2022), there are presently no clearly defined regulations to tackle the legal and ethical challenges that might emerge from the utilization of AI in healthcare settings.

Intellectual Property Rights

LLM are the result of extensive research, development, and creativity. Protecting intellectual property rights is crucial to encourage innovation and reward creators for their efforts. In the context of LLM, these rights encompass both the content generated by the models and the algorithms and underlying technology that powers them. By respecting intellectual property rights, incentives for continued research

and development in the field of AI are maintained, ensuring that creators and organizations can benefit from their intellectual endeavors.

Job Displacement

LLM are capable of performing tasks previously carried out by humans, potentially leading to significant changes to the workforce. Jobs that involve routine data entry, content writing, or simple information retrieval may be particularly susceptible. It is crucial to address this challenge by retraining and upskilling the workforce to adapt to the evolving job market. The potential for job displacement underscores the importance of thoughtful implementation of LLM and the need to consider the broader societal consequences of their adoption (Rodrigues, 2020).

Environmental Impact

LLM, being highly data-intensive, require massive computing infrastructure, which often relies on energy-intensive data centers. The environmental impact stemming from the energy consumption and cooling needs of these data centers is a substantial concern, given its contribution to greenhouse gas emissions and climate change. To tackle these environmental issues, it is essential to concentrate on enhancing the energy efficiency of data centers and exploring greener, sustainable alternatives for powering these computational processes.

Misinformation and Manipulation

LLM are incredibly versatile and can generate text that mimics human language, making them susceptible to misuse. Thus, the potential for misinformation and manipulation in using LLM is a critical concern in the digital age. Malicious actors can exploit LLM to create convincingly false information, “deepfakes,” or misleading content, which can be used for disinformation campaigns, online fraud, or social engineering. Also, as these models are data-driven, they can inadvertently perpetuate biases in their training data, further exacerbating issues related to misinformation and discrimination. It is essential for developers, organizations, and platforms to implement stringent safeguards, fact-checking measures, and ethical guidelines when deploying LLM to combat the spread of misinformation and manipulation (Floridi & Chiriatti, 2020; Ouyang et al., 2020).

Therefore, deploying LLM models without human oversight can lead to unintended consequences. Incorporating human judgment and ethical guidelines into AI decision-making processes is crucial.

Toward Global AI Regulation

International organizations (e.g., OECD, UN) advocate for national policies and international collaboration to promote investment in research and development, as well as support the broader digital ecosystem for AI. The OECD.AI Network of Experts formulated the OECD Framework for Classifying AI Systems to serve as a tool for policy-makers, regulators, legislators, and others. This framework enables them to assess the potential advantages and drawbacks of various AI systems and provides insights to shape their national AI strategies. The Framework establishes a connection between the technical attributes of AI and the policy considerations outlined in the OECD AI Principles (OECD, 2023). Figure 2 presents the OECD's AI Framework.

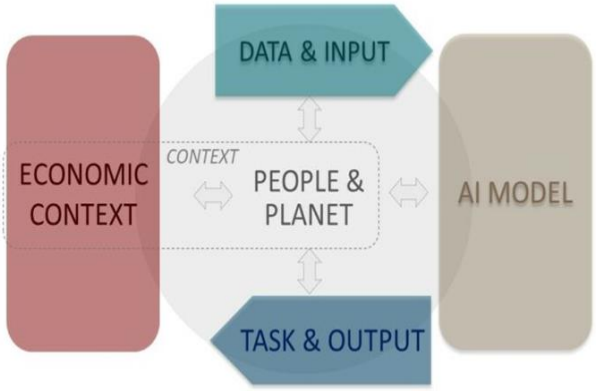

Figure 2. OECD's Framework for Classifying AI Systems

In the U.S., the National AI Initiative Act of 2020 was enacted into law on January 1, 2021, establishing a coordinated program spanning the entire government. This program aims to expedite AI research and its applications, contributing to the

economic prosperity and national security, and to lead the world in the development and use of trustworthy AI in the public and private sectors (https://www.ai.gov; https://www.state.gov/artificial-intelligence/).

In Europe, the Resolution of the European Parliament was based on research commissioned, supervised, and published by the policy department for "Citizens' Rights and Constitutional Affairs" in response to a request from the European Parliament's Committee on Legal Affairs. The report emphasizes the critical nature of a resolution calling for the immediate creation of a legislative instrument governing robots and AI, capable of anticipating and adapting to any scientific breakthroughs anticipated in the medium term (EU, 2021).

Concluding Remarks

Large language models (LLM) in AI are powerful tools with the potential to revolutionize various industries. As these models undergo further development, we can anticipate additional transformative changes in the future, further blurring the lines between human and machine intelligence. Embracing this evolution and harnessing the potential of LLM will be the key to staying competitive and advancing knowledge in the digital age. However, many indicate that these models, at their current stage, lack in-depth analysis and human judgment. LLM is analogous to a person with perfect or very good memory, but with no powers of creativity. Perhaps, eventually, that element, arguably the essence of intelligence, might be made susceptible to automation, but that condition has seemingly not yet been achieved.

The emergence of LLM presents an array of challenges and ethical considerations that cannot be overlooked. Developing comprehensive regulatory frameworks for LLM is essential. These frameworks should encompass issues like bias mitigation, data privacy, misinformation, environmental issues, accountability, and responsibility to ensure ethical compliance. Ethical considerations, such as transparency, human oversight, beneficence, regulatory frameworks, and the role of human judgment, should guide the development and deployment of LLM to ensure they serve as a force for good in society. As AI continues to advance, ethical and responsible AI practices must remain at the forefront of innovation to create a future where AI benefits all of humanity.

References

Bender, E., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021, March 01). On the dangers of stochastic parrots: Can language models be too big? *FAccT '21: Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–623. https://doi.org

Birhane, A., Kasirzadeh, A., Leslie, D. & Wachter, S. (2023). Science in the age of large language models. *Nature Reviews Physics, 5*, 277–280. https://doi.org

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., ... & Agarwal, S. (2020). Language models are few-shot learners. https://arxiv.org; https://doi.org/

Choi, J. H., Hickman, K. E., Monahan, A., & Schwarcz, D. B. (2023, January 23). ChatGPT goes to Law School. *Journal of Legal Education*, 387. http://dx.doi.org

Coker, J. (2023, February 3). IT leaders reveal cyber fears around ChatGPT. Infosecurity Magazine. https://www.infosecurity-magazine.com/

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). BERT: Bidirectional encoder representations from transformers. https://arxiv.org/abs/1810.04805

EU (2021). Report on the proposal for a regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation). Europarleuropaeu. Available online at https://eur-lex.europa.eu/ (accessed October 18, 2023).

Floridi, L. & Chiriatti, M. (2020, November 1). GPT-3: Its nature, scope, limits, and consequences. http://dx.doi.org

García-Morales V. J., Garrido-Moreno A, & Martín-Rojas R. (2021). The transformation of higher education after the COVID disruption: Emerging challenges in an online learning scenario. *Front Psychol, 12*. https://doi.org/

Gordon, R. (2022). ELIZA wins Peabody Award. MIT News. https://www.csail.mit.edu/

Hu, K. (2023, February 2). ChatGPT sets record for fastest-growing user base - analyst note. Reuters. Retrieved from https://www.reuters.com/

KPMG. (2021). Dynamic audit technology content series: natural language processing point of view. Retrieved on May 5, 2023 from https://assets.kpmg.com

Loureiro, S., Guerreiro, J. & Tussyadiah, I. (2020). Artificial intelligence in business: State of the art and future research agenda. *Journal of Business Research*, 129. https://doi.org

Marr, B. (2023, May 19). A short history of ChatGPT: How we got to where we are today. *Forbes.* https://www.forbes.com/

Milano, S., McGrane, J.A. & Leonelli, S. (2023). Large language models challenge the future of higher education. *Nature Machine Intelligence, 5*, 333–334. https://doi.org/

Naik N., Hameed B. M. Z., Shetty D. K., Swain D., Shah M., Paul R., Aggarwal K., Ibrahim S., Patil V., Smriti K., Shetty S., Rai B. P, Chlosta P. & Somani B. K. (2022) Legal and ethical consideration in artificial intelligence in healthcare: Who takes responsibility? *Frontiers in Surgery*, 9: 862322. https://doi.org

OECD (2023). OECD Framework for the Classification of AI Systems: A tool for effective AI policies. Accessed at: https://oecd.ai/en/classification

Qiu, L., Singh, P. V. & Srinivasan, K. (2023, July 17). How much should we trust LLM results for marketing research? https://ssrn.com/

Ouyang, L., et al. (2020). Training language models to follow instructions with human feedback. https://doi.org/

Pittalwala, I. (2023, February 2). Is ChatGPT a threat to education? University of California. https://www.universityofcalifornia.edu

Rechtman, Y. (2023). Can artificial intelligence become an accounting expert? *The CPA Journal* July/August. https://www.cpajournal.com/

Reed, C. (2018). How should we regulate artificial intelligence? *Philosophical Transaction of the Royal Society A*, August 6. https://doi.org

Rodrigues R. (2020). Legal and human rights issues of AI: Gaps, challenges and vulnerabilities. *Journal of Responsible Technology 4*:100005. https://doi.org/

Rosenbush, S., Bousquette, I., & Lin, B. (2023). Want to know the AI lingo? Learn the basics, from NLP to neural networks. A guide to some of the most important concepts to demystify the technology that has everyone talking. *WSJ*, October 15. https://www.wsj.com/

Schwalbe N, & Wahl, B. (2020, May 16). Artificial intelligence and the future of global health. *Lancet*, *395*(10236):1579-1586. https://doi.org/

Shaver, N. (2023). The use of large language models in LegalTech. LegalTech Hub (February 18). Retrieved from: https://www.legaltechnologyhub.com/

Stockholm University (2023). Research project. Ethical and legal challenges in relationship to AI-driven practices in higher education. https://www.su.se/english/research

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, L., & Polosukhin. I. (2017). Attention is all you need. arXiv:1706.03762 [cs.CL]. https://doi.org/

Weidinger, L. et al. (2021). Ethical and social risks of harm from Language Models. arXiv:2112.04359 [cs.CL. https://doi.org

Wiggers, K. (2020). OpenAI's massive GPT-3 model is impressive, but size isn't everything. *VentureBeat*. https://venturebeat.com/

Wiley. (2023). ChatGPT and accounting education. Retrieved from: https://www.wiley.com/

Zeide, E. (2019, Summer). Artificial intelligence in higher education: Applications, promise and perils, and ethical questions. *Educause Review*, *54*(3). https://ssrn.com/