AI and Identity

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Abstract

AI-empowered technologies' impact on the world is undeniable, reshaping industries, revolutionizing how humans interact with technology, transforming educational paradigms, and redefining social codes. However, this rapid growth is accompanied by two notable challenges: a lack of diversity within the AI field and a widening AI divide. In this context, This paper examines the intersection of AI and identity as a pathway to understand biases, inequalities, and ethical considerations in AI development and deployment. We present a multifaceted definition of AI identity, which encompasses its creators, applications, and their broader impacts. Understanding AI's identity involves understanding the associations between the individuals involved in AI's development, the technologies produced, and the social, ethical, and psychological implications. After exploring the AI identity ecosystem and its societal dynamics, We propose a framework that highlights the need for diversity in AI across three dimensions: Creators, Creations, and Consequences through the lens of identity. This paper proposes the need for a comprehensive approach to fostering a more inclusive and responsible AI ecosystem through the lens of identity.

Introduction

With the rise of AI, there's an emergence of complex questions about the very fabric of its existence. Whether it is politicians mulling over policy implications (Coeckelbergh 2022), civilians navigating the implications of AI in daily life (Liu et al. 2023), Educational institution's decisions on AI usage in learning and teaching (Mouta, Pinto-Llorente, and Torrecilla-Sánchez 2023), Tech organizations using AI to innovate and create business applications (Bessen et al. 2023) or military organizations strategizing defense (De Spiegeleire, Maas, and Sweijs 2017), each group views AI through its unique lens (Calo 2017). The current discourse on Artificial Intelligence (AI) reflects a complex interplay of optimism and concern regarding AI's impact on global equity (Crawford 2021). This narrative is increasingly focused on the "AI Divide," a term that encapsulates the challenges AI poses in perpetuating disparities between those who have access and those who don't (Carter, Liu, and Cantrell 2020).

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The global population is currently around 8.1 billion. As of 2023, it's estimated that there were roughly 3.4 billion people employed worldwide, with 2 billion people working within the informal economy (Dyvik 2023). The ICT sector was projected to employ 55.3 million people full-time by 2020, according to estimates made before the COVID-19 pandemic (Sherif 2023). Within this sector, a smaller number of workers are actively involved in developing or working with AI tools and systems. Looking forward, it's expected that by 2025, up to 97 million individuals will be working in the AI field. Furthermore, the US AI market is anticipated to reach 299.64 billion dollars by 2026. AI tools and systems are projected to impact nearly 40 percent of jobs globally, with this figure rising to about 60 percent in advanced economies (Howarth 2024). These changes will lead to a combination of job replacement and augmentation with the influencing factor being access to or lack of access to the internet and digital infrastructure.

This scenario underscores a significant power imbalance, where a relatively small portion of the global population has a profound influence on the lives and livelihoods of the majority as visualized in Figure 1. In this rapidly evolving landscape and widening AI divide, a notable challenge that has emerged is the significant lack of diversity among the creators, researchers, and educators in the AI field. This homogeneity within the AI workforce, if it persists into the predicted 96 million AI workforce, represents more than an issue of fairness or representation; it fundamentally affects the design, implementation, and impact of AI technologies across different populations and societies. (Stathoulopoulos and Mateos-Garcia 2019).

The concern is that while AI has immense potential for progress in areas like healthcare, agriculture, and education, its development is predominantly driven by the private sector (Abboud, Arya, and Pandi 2020) (Chui et al. 2023), raising critical questions about its applicability and fairness (Dwivedi et al. 2021). Renowned AI safety groups and industry leaders have raised alarms not just about existential risks akin to pandemics and nuclear war but also about the social inequities AI might exacerbate (Hinton et al. 2023) (Buolamwini and Gebru 2018). Scholars have highlighted the immediate dangers of AI, especially its impact on marginalized and vulnerable populations (Birhane et al. 2022). This is evidenced by the shortcomings of existing

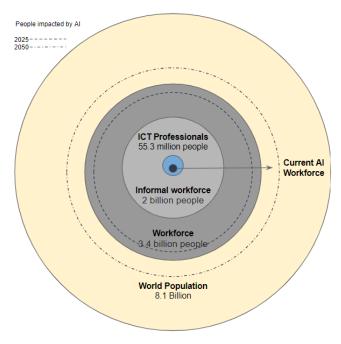


Figure 1: Representation of global workforce and AI industry impact

AI models, including facial recognition inaccuracies and the limited effectiveness of Large Language Models (LLMs) in addressing the diverse needs of global populations (Coulter 2023). Congressional testimony on the need for AI regulation and the collective call by AI researchers for a pause in AI advancements emphasize the urgency of addressing these issues (Pause Giant 2023). Moreover, the public's divided perception of AI, akin to debates in cybersecurity (Kovačević, Putnik, and Tošković 2020), points to a significant gap between the aspirational goals of various AI frameworks and principles, and the reality of their implementation, especially in diverse global contexts(Hagerty and Rubinov 2019).

This evolving narrative and the need to solve the AI diversity gap underscores the need for a nuanced, socio-technical approach to understanding the multifaceted identity of AI (Lee and Qiufan 2021). Through an exploration of how AI is created, applied, and perceived (Kim et al. 2023) across various societal strata, as presented in the AI identity ecosystem (Figure 2), we can answer questions like, Who creates AI? Whose values does it reflect? How is it perceived across different cultures and demographics? And, how do all these factors influence the technology's trajectory? (Bingley et al. 2023) It is intricately woven with the myriad societal dynamics that shape identity formation and influence perceptions. The answers to these questions are pivotal as they influence not only the technological trajectories of AI but also its societal implications as presented in the AI identity Framework (Figure 2). It is critical to underscore that the identity of AI isn't simply a reflection of its perception but a pathway to bridging the AI divide and improving inclusivity efforts.

Background

The process of developing the construct of "AI identity" begins with understanding the drivers and landscape of AI development (Christian 2020) which can be understood through the AI identity ecosystem (Figure 2). The AI ecosystem is a dynamic and interwoven network comprising a myriad of essential components that collectively drive the evolution and application of artificial intelligence (Jacobides, Brusoni, and Candelon 2021) (Yoo 2020). We will try to explore the various components of the AI ecosystem in this paper. Firstly, the building blocks of the system lay in the technologies and tools, such as machine learning algorithms and frameworks like TensorFlow and PyTorch (Paszke et al. 2019). Complementing these are specialized hardware solutions like GPUs and TPUs, designed to cater to the computational demands of AI (Batra et al. 2019). Data, the lifeblood of AI, flows in from diverse sources, including IoT devices and online interactions, and is stored and processed using advanced tools (Aragon et al. 2022).

However, in understanding AI's evolution it is essential to understand the confluence of various human endeavors that drive its development as mentioned above. In this section particularly we focus more on the identity of the creators as it has cascading effect on the other layers. These human contributors do more than just define AI's trajectory; they embed societal norms, values, and biases into the technology, shaping the future of our automated world (Cave and Dihal 2020). The role of research cannot be overstated, as institutions constantly push the boundaries of what's possible, often dictating the future direction of AI (Basole and Accenture 2021). Simultaneously, both tech behemoths and startups shape the AI landscape with their innovative products and platforms. Open-source communities bolster this growth, fostering collaboration and ensuring that AI tools remain accessible to all (Quan and Sanderson 2018).

As the influence of AI permeates society, regulatory and ethical bodies are stepping in to ensure its deployment is responsible and aligned with societal values (Minkkinen, Zimmer, and Mäntymäki 2021). End-users and consumers, both individuals and businesses, are the final and important piece of the puzzle, adopting AI solutions and applications and influencing their development through feedback. Integral to all these components and often the ones that shape the direction of development is the financial pillar of investors and funding entities that fuel the growth of AI across sectors (Khanna 2023). Lastly, the AI ecosystem is enriched by educational institutions and platforms that impart knowledge, nurturing the current and future generations of AI enthusiasts and professionals through AI literacy (Long and Magerko 2020) and AI education (Schiff 2022).

The identity of AI continues to extend beyond just its creators and the diversity within the field. It encompasses a range of social considerations that shape its existence and impact(Cole 1991). Ethical concerns surrounding AI, such as bias in algorithms, privacy issues, and the societal implications of AI, require careful attention and mitigation (Amershi 2020). Human-AI collaboration is evolving to where AI can augment human capabilities and automate tasks, necessitating the exploration of inclusive ways for hu-

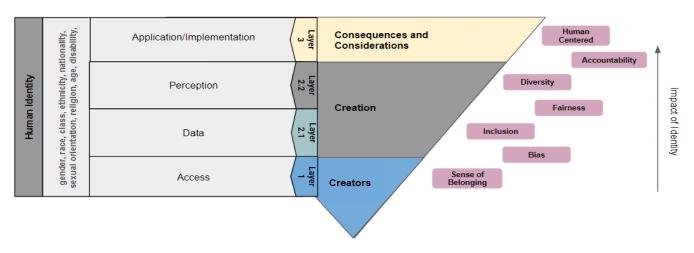


Figure 2: The AI Identity Research Framework

mans and AI to collaborate seamlessly (Amershi et al. 2019). The tendency for humans to personify or anthropomorphize AI systems raises psychological and sociological questions about the implications of interacting with AI, especially in education (Maher, Tadimalla, and Dhamani 2023) and work environments (Mirbabaie et al. 2022). Moreover, public sentiment around AI is often polarized based on users' backgrounds, leading to inaccurate narratives about AI in society(Prahl and Goh 2021). These narratives and biases, combined with the digital divide that exists in society and computer science exclude some and inhibit many's access to AI careers, especially for certain groups of underrepresented minorities, and women (Shams, Zowghi, and Bano 2023).

By examining the roles, interactions, and contributions of these diverse stakeholders as presented in the AI Ecosystem (Figure 3) we can gain a comprehensive understanding of how AI systems are created, operate, and evolve. By foregrounding these concepts, we aim to dissect how they influence AI creators and their creations. Through the depiction of layers and various pipelines (connections) across the layers that lead to various consequences or issues in the AI landscape, Figures 1 and 2 together show the myriad ways AI technologies can either reinforce existing societal disparities or potentially pave the way for a more inclusive and equitable future.

By dissecting these relationships, we can better comprehend and address the disproportionate consequences and impacts that AI can have on various segments of society. The construct of human identity is influenced as depicted in the image is present across the layers, present in the identities, data, perceptions, and experiences of end users in the AI ecosystem. Here Human Identity, as defined within intersectionality (Crenshaw 2013) and identity theory(Jenkins 2014), encompasses the multifaceted and interconnected aspects of an individual's social categories, including race, gender (Scheuerman et al. 2020), class (Inaba and Togawa 2021), sexuality (Keyes, Hitzig, and Blell 2021), and disability (Trewin et al. 2019), nationality and age (Pollack 2005) etc, recognizing that these overlapping

identities shape unique experiences of privilege and oppression (Benjamin 2019).

AI Identity

Sociology Literature provides a comprehensive exploration of how individuals' identities are formed (Stets and Burke 2000), negotiated (Jenkins 2014), and transformed (Collins and Bilge 2020) within the context of social structures and interactions, offering insightful analysis on the complexity of identity as both a personal and social construct (Albert 1998). This concept also extends to objects, organizations, and technology (Wood and Smith 2004), illustrating how identity formation transcends individual experiences to encompass broader societal interactions and constructs (Hirsch 1992). Often discussions and models involving identity in the AI landscape and ecosystem are heavily centered on the technological and economic aspects (Mitchell 2020). With efforts focused on defining and explaining what AI is (Wang 2019) and how to understand its usage (Devedzic 2022) (Touretzky, Gardner-McCune, and Seehorn 2023), how AI perceives the human identity (Scheuerman et al. 2020) (Schlesinger, O'Hara, and Taylor 2018) (Tian et al. 2017), how humans perceive AI (Ragot, Martin, and Cojean 2020) (Lima et al. 2020) (Shinners et al. 2022), how humans interact with the AI (Keyes, Hitzig, and Blell 2021) (Ashktorab et al. 2020) and how AI influences the human identity in various scenarios (Cao et al. 2023). This includes discussions on algorithms (Noble 2018) (Pasquale 2015), data(Aragon et al. 2016) (Aragon et al. 2022), hardware infrastructure (Batra et al. 2019), application areas (Huang and Rust 2021), market growth, company roles (Alahmad and Robert 2020), and investment trends (Mir, Kar, and Gupta 2022). While these aspects are undeniably crucial, they often overshadow the deeper, more intricate layers of AI's perception and relationship with the concept of identity.

We define "AI Identity" in two dimensions: internal and external.

Internally, AI Identity includes the collective characteristics, values, and ethical considerations embodied in

the creation of AI technologies. Externally, AI identity is shaped by individual perception, societal impact, and cultural norms.

These dimensions form a comprehensive view of AI identity, highlighting the interplay between the creation of technology itself and its broader interaction with society. This means understanding the place of AI in society, its development, interactions with individuals (Gutoreva 2024), and the nuances of its impact on various facets of human life. The identity of AI is intricately linked to various ethical dilemmas, including responsibility, accountability, fairness, transparency, and trust (Benjamin 2019). These issues are central to the ongoing discussions surrounding the regulation and governance of AI, as well as its cultural and social impacts(Arora et al. 2023). Furthermore, it is vital to recognize the role of media representations of AI in popular culture, as they significantly shape public attitudes and beliefs about this technology. In this context, the emergence of Human-Centered AI (HCAI) (Shneiderman 2021), with its emphasis on considering human values and agency, represents a pivotal shift in the AI landscape. International organizations like the European Union and research and education institutions are advocating for HCAI, promoting a humanistic and ethical approach that enhances human capabilities while addressing the multifaceted challenges associated with AI identity and its broader societal implications (Capel and Brereton 2023). These dynamic changes in the AI landscape and the important role that education plays in creating opportunities for minorities to participate in AI (Salas-Pilco, Xiao, and Oshima 2022), led the authors to focus on this topic. In the next three sections of the paper, we look deeper into the layers of identity in AI: the creators, the creations, and the consequences that emerge from the identity ecosystem. Figure 4 summarizes our exploration. By examining the intersection of AI with identity, we aim to shed light on the complex dimensions of AI identity and its implications for individuals and society as a whole.

The Creators of AI

The development of AI is influenced by its creators, whose diverse backgrounds and identities are crucial in shaping the technology's direction (Schiff et al. 2020). Despite significant advancements, AI suffers from a notable lack of diversity among its developers, echoing broader inclusivity challenges within the tech industry (Inaba and Togawa 2021). Diversity is not just about fairness but is essential for creating AI systems that are unbiased, ethical, and beneficial for society (Shams, Zowghi, and Bano 2023). Thus, enhancing the diversity of AI creators is imperative to ensure that the technology reflects a broad spectrum of human experiences and values, contributing positively to societal progress(Chubb, Reed, and Cowling 2022). It is important to note that this layer of the ecosystem is closely connected with the internal dimension of AI identity. In the list below, we highlight some of the key groups (individual and organizational) that influence who the creators are, illustrating the nature of AI's development landscape. The goals of AI are often defined by this layer of AI ecosystem and when we look at these key groups, this position paper acknowledges

the need to increase diversity across all of the groups across sectors and disciplines.

- Researchers, Scientists, and Academics: The development of AI is driven by a community of researchers, scientists, and academics from various disciplines (Hartmann and Henkel 2020). Experts in computer science, mathematics, biology, linguistics, cognitive science, and engineering collaborate to advance AI technologies. They conduct research, publish academic papers, and contribute to the theoretical foundations of AI(Stathoulopoulos and Mateos-Garcia 2019). Higher education institutions also play a big role in shaping the perception and standards (Mouta, Pinto-Llorente, and Torrecilla-Sánchez 2023)that these students carry into their professional careers. With HCI, interaction design, and UX communities contributing to AI work on addressing the gap in discourse about AI's relationship to design practice (Loi et al. 2019), higher education institutions and private research institutions are important actors in shaping the diversity in the field of AI (Ahmed and Wahed 2020) (Whittaker et al. 2018).
- Students and Higher Education Institutions: Students pursuing higher education, such as undergraduate and graduate programs, play a vital role in the creation and advancement of AI. They learn the fundamental concepts and skills necessary for AI development and contribute fresh perspectives and ideas (Touretzky et al. 2019). Many universities and educational institutions offer specialized AI programs and research opportunities (Luckin and Holmes 2016), nurturing the next generation of AI creators beginning from K-12 or high school (Adejoro et al. 2023). It is important to not here the disciplinary differences across AI perception and adoption across various disciplines (Zawacki-Richter et al. 2019)
- Corporate and Private Organizations: Numerous companies and organizations are actively involved in the development and deployment of AI technologies (Jacobides, Brusoni, and Candelon 2021). Major tech companies like Google, Microsoft, and IBM invest significant resources into AI research and development (de Laat 2021). Startups and research organizations focused on AI innovation also contribute to the creation of novel AI applications and technologies (Färber and Tampakis 2024). Many historically consumer or service-oriented organizations and companies are also building in-house AI solutions across sectors (Simon and Isaza-Ibarra 2023).
- Engineers and Developers: The creation of AI systems requires the expertise of engineers and developers who design and build the underlying software and hardware infrastructure. They develop algorithms, models, and frameworks that power AI applications. These professionals work on coding, testing, and optimizing AI systems to enhance their performance and capabilities (Griffin, Green, and Welie 2023).
- Collaborative Communities and Open-Source Projects: Collaboration and open-source initiatives play a crucial role in AI creation. Online communities, forums, and platforms facilitate knowledge sharing,

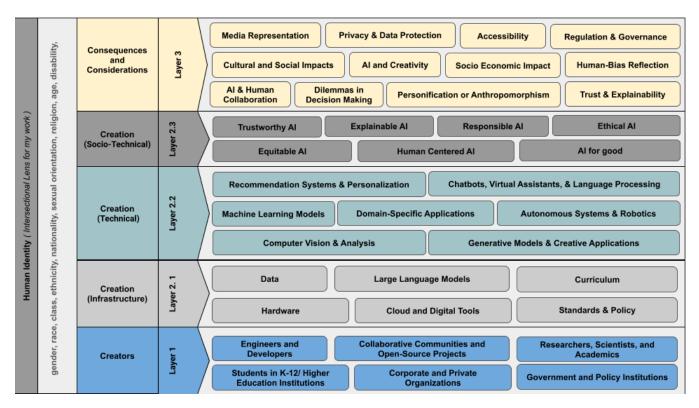


Figure 3: The AI Identity Ecosystem

collaboration, and the exchange of ideas among AI enthusiasts and professionals (Bostrom 2018) (Hibbard 2008). Open-source projects like TensorFlow and PyTorch provide accessible frameworks and tools that empower developers to create AI solutions (Paszke et al. 2019). Non-profits and professional societies are also getting involved with building standards and expectations around AI integration from the lenses of ethics and standards.

• Government and Policy Institutions: Governments and policy institutions contribute to the creation of AI by establishing frameworks, regulations, and policies that guide its development and deployment (Bareis and Katzenbach 2022) (Luo and Van Assche 2023). The government also invests in the development of AI through its military/defense wing to be up to date with private system developments. Mulitaleral Global organizations in the ICT space are trying to address ethical considerations, and privacy concerns, and ensure responsible and accountable AI practices (Vacarelu 2022) (Floridi et al. 2021). Governmentfunded National research initiatives and grants also support AI research and innovation (Donlon 2024).

The Creation of AI

To understand the definition of AI and its application in various scenarios it is important to understand the very building blocks of AI, and how they work and interact with the physical world (Raghavan 2021). This layer of the ecosystem acts as the mechanism or conduit that translate the goals reflected by the identity of the creators of AI into the conse-

quences and considerations layer of AI Identity ecosystem, and therefore is key to understanding both the external and internal aspects of AI Identity. this should be explained in the beginning of this section and then summarized at the end of this section. In this paper, we will adopt a comprehensive approach to understanding the workings of artificial intelligence (AI) by analyzing it from both technical and sociotechnical perspectives. It is simultaneously important to understand the intricate connection between the infrastructure layer and the growth of AI's impact on society through these two lenses.

The technical approach involves understanding AI Models and Applications, where we explore the technical foundations and applications of AI, including chatbots, virtual assistants, language processing, recommendation systems, domain-specific applications, autonomous systems, robotics, machine learning models, computer vision, and generative models. This layer represents the nuts and bolts of AI, where one learns what these technologies are, how they operate, and the specific tasks they are designed to perform. By understanding the mechanics and functionalities of these AI applications, one can appreciate the technical goals and innovations driving AI development. It is important to note here that the development of these goals have historically been oriented around efficiency and performance not about diversity and inclusion.

Conversely, the socio-technical approach centers on **AI Frameworks and Principles**, focusing on the overarching frameworks and principles guiding the ethical, responsible,

and equitable development and deployment of AI technologies. This layer encompasses Trustworthy AI, Responsible AI, Ethical AI, AI for Good, Human-Centered AI, and Equitable AI. Here, we assess how these guiding principles influence the design, purpose, and impact of AI technologies on society. This approach allows us to understand the broader implications of AI, including ethical considerations, societal impacts, and the role of AI in promoting social good and addressing global challenges.

This infrastructure layer is not only a precursor to the technical layer's growth but also a fundamental aspect that interweaves with the socio-technical layer, affecting how AI integrates and resonates within human society. Through its capacity to support and scale AI development, It not only provides the technical means for AI's existence but also influences the objectives, ethics, and inclusivity of AI systems by virtue of access. By enabling or limiting the development of certain AI applications, the infrastructure layer shapes the AI identity, reflecting the priorities and values of its creators and users. Furthermore, by offering metrics for capacity building, the infrastructure layer facilitates the assessment of global AI development efforts, guiding policy, investment, and education towards a more equitable and inclusive AI future.

The Infrastructure Layer

The infrastructure underpinning artificial intelligence (AI) is the bedrock upon which the technical evolution and societal integration of AI is built. This infrastructure encompasses the essential tools, hardware, and frameworks necessary for the development, training, and deployment of AI systems, including data processing capabilities, computational power, and cloud services. These components are indispensable for the processing of vast datasets, supporting complex model training, and ensuring the scalable deployment of AI applications. As such, the infrastructure directly influences the pace and direction of AI innovation. The disparities in AI capabilities across different regions highlight the need for global cooperation and investment in AI infrastructure. Consequently, infrastructure availability becomes a crucial metric for gauging capacity-building efforts, underscoring the importance of democratizing AI benefits to mitigate regional disparities. As AI technologies become increasingly embedded in everyday life, the infrastructure that supports these technologies plays a vital role in determining how they are received, understood, and integrated into various cultural contexts. This interaction between AI and society influences the design, functionality, and adoption of AI systems, necessitating a thoughtful approach to infrastructure development that considers and reflects diverse human values and societal needs.

• Large Language Models (LLMs): Large Language Models, such as GPT (Generative Pretrained Transformer) and BERT (Bidirectional Encoder Representations from Transformers), represent significant advancements in natural language processing and understanding. These models, which learn from vast amounts of text data, have revolutionized how machines understand and generate human-

like text, enabling a wide range of applications from automated writing assistants to advanced chatbots. The development and refinement of LLMs require substantial computational resources and sophisticated algorithms, showcasing the importance of robust infrastructure in AI innovation (Devlin et al. 2018) (Brown et al. 2020).

- Data: Data serves as the cornerstone for training AI models, providing the raw material from which machines learn and make inferences. The quality, diversity, and volume of data directly impact the performance and bias in AI systems. Effective data management and processing infrastructure are crucial for handling the increasing scale of data, necessitating advanced storage solutions and data processing frameworks (Hartmann and Henkel 2020). The ethical considerations in data collection and use are also paramount, emphasizing the need for transparency and fairness in AI (Aragon et al. 2022).
- Curriculum: The AI curriculum encompasses the educational resources and programs designed to equip individuals with the knowledge and skills required to develop and manage AI technologies. This includes courses on machine learning, ethics in AI, data science, and specialized AI applications. The development of a comprehensive AI curriculum that is accessible and inclusive is essential for fostering a diverse and skilled workforce capable of advancing AI technology while considering its societal impacts (Maher and Tadimalla 2024) (Long and Magerko 2020) (Schiff 2022) (Song et al. 2024).
- Standards and Policy: Standards and policies play a critical role in guiding the ethical development, deployment, and governance of AI technologies. These frameworks help ensure that AI systems are developed responsibly, promoting transparency, accountability, and fairness. International organizations and regulatory bodies are increasingly focusing on developing AI standards and policies that balance innovation with ethical considerations and human rights (Jobin, Ienca, and Vayena 2019) (Long et al. 2023)
- Hardware: The hardware infrastructure, including GPUs (Graphics Processing Units) and TPUs (Tensor Processing Units), is fundamental for training and running AI models (Jouppi et al. 2017). These specialized processors can handle the parallel processing of large datasets and complex algorithms, making them indispensable for deep learning applications. The development of more efficient and powerful hardware is crucial for advancing AI capabilities and making AI more accessible and sustainable (Merritt 2024).
- Cloud and Digital Tools: Cloud computing and digital tools offer scalable and flexible resources for AI development and deployment. Cloud services provide access to computational power, storage, and AI development tools on-demand, facilitating the rapid prototyping and scaling of AI applications. This infrastructure supports the collaborative development of AI, enabling access to cuttingedge technology without significant upfront investment (Armbrust et al. 2010).

In essence, the infrastructure supporting AI is not just a foundation for its technical growth but also a mediator of its interaction with society, influencing both the capabilities of AI technologies and their alignment with human values.

The Technical Layer: AI Models and Applications

Understanding the foundation models of AI is essential to recognize how data influences AI's identity and its diverse applications, from enhancing daily life to revolutionizing industries. While AI moves beyond the imagery of futuristic robots to practical applications like chatbots, self-driving cars, and medical diagnosis, concerns about inclusivity and a human-centric focus persist. The distinction between Symbolic AI and Connectionist AI, such as deep learning, highlights different approaches to AI development, emphasizing the need for AI to be both transparent and grounded in human values.

As AI's applications extend from machine learning models in image recognition to personalized recommendation systems and beyond, the adaptability and potential of AI are evident. However, aligning AI with societal needs and ethical considerations remains a challenge. The exploration of AI's capabilities across various domains underscores the importance of developing AI technologies that are inclusive, ethical, and beneficial for all, ensuring a positive contribution to society's global challenges. Some of the concepts and applications that one needs to familiarize themselves with to get a comprehensive understanding of foundational AI blocks:

- Machine Learning Models: Often categorized into supervised learning, where models learn from labeled data; unsupervised learning, identifying patterns in unlabeled data; and reinforcement learning, where models optimize behavior through rewards from trial and error actions. AI employs machine learning models, including deep neural networks, for tasks like image recognition and natural language processing (Goodfellow, Bengio, and Courville 2016). However, while these models excel at pattern recognition and decision-making based on data, they sometimes lack a human-centered focus, which can result in outputs that might not always align with human values or societal nuances (Raghavan 2021).
- Chatbots, Virtual Assistants, and Language Processing: AI-powered chatbots, virtual assistants (e.g., Siri, Alexa), and language processing systems leverage natural language understanding and generation to interact with humans, provide information, and perform tasks (Khurana et al. 2023) (Kasneci et al. 2023).
- Autonomous Systems and Robotics: AI enables the development of autonomous systems, including self-driving cars (Grigorescu et al. 2020), drones, and robots, which can make decisions and perform tasks without direct human intervention (Thrun 2000).
- Generative Models and Creative Applications: AI generative models (Devlin et al. 2018), like GANs and VAEs, create realistic content such as images, music, and text, blurring the line between human and machinegenerated creations (Verdoliva 2020). AI is used in cre-

- ative fields(Du Sautoy 2020) such as art, music, and literature (Cao et al. 2024).
- Recommendation Systems and Personalization: AIpowered recommendation systems analyze user behavior
 and preferences to provide personalized recommendations
 for various products, services, and content, enhancing user
 experiences and engagement (Lü et al. 2012). Personalized Marketing and Targeted Advertising AI analyzes user
 data and behavior to deliver personalized marketing strategies, including targeted advertisements and recommendations tailored to individual customers.
- Computer Vision and Image Analysis: AI advancements in computer vision enable machines to understand and interpret visual information, performing tasks such as image recognition, object detection, facial recognition, and autonomous surveillance Iandola et al. (2016) (Voulodimos et al. 2018).
- Domain-Specific Applications: Medical Diagnosis, Healthcare, and Fraud Detection AI systems aid in medical diagnosis, analyzing patient data, medical images, and clinical records (Topol 2019). They also contribute to fraud detection and cybersecurity, identifying patterns and anomalies to protect against threats.

The Socio-technical Layer: AI Frameworks and Principles

The frameworks of Trustworthy AI, Responsible AI, Ethical AI, AI for Good, Human-Centered AI, and Equitable AI originated from the growing awareness of the profound impacts AI technologies have on society, coupled with a recognition of the potential risks and ethical dilemmas they present. As AI began to permeate every aspect of human life, from healthcare and education to governance and privacy, scholars, policymakers, and technologists acknowledged the need for guiding principles to ensure the development and deployment of AI technologies that are beneficial, fair, and aligned with human values (Floridi et al. 2021).

- **Trustworthy AI:** This framework focuses on creating AI systems that are safe, transparent, and reliable, emphasizing user privacy and data security (Li et al. 2023). It aims to build user trust through transparency, fairness, and accountability (AI 2019).
- **Responsible AI:** This framework stresses the ethical development and use of AI, ensuring societal benefit and minimal harm. It advocates for ethical standards and the consideration of AI's broader societal impacts, promoting integrity in AI deployment (Dignum 2019).
- Ethical AI: These AI principles align AI development with ethical principles, including human rights and fairness, to prevent bias and discrimination. It is supported by frameworks like those from the (Jobin, Ienca, and Vayena 2019), encouraging diverse perspectives in AI development.
- AI for Good: This framework applies AI to tackle global challenges (Rakova and Dobbe 2023) and achieve the United Nations Sustainable Development Goals (Coeckelbergh 2021), focusing on healthcare, education, and environmental protection (Floridi et al. 2021). It highlights

AI's potential for positive societal impact (Cowls et al. 2019).

- Human-Centered AI (HCAI): These AI principles prioritize human needs and values in AI development, integrating psychology, sociology, and ethics to enhance human capabilities without compromising dignity or autonomy. It advocates for participatory design, making AI accessible and meaningful (Shneiderman 2021).
- Explainable AI: As AI becomes more complex and powerful, there is a growing need for trust and explainability. Users and stakeholders want to understand how AI systems reach their conclusions or recommendations (Arrieta et al. 2020). Research on explainable AI aims to develop methods that can provide meaningful explanations for AI decisions (Arrieta et al. 2020).
- Equitable AI: These AI principles aim for the fair distribution of AI benefits and the mitigation of harms across society, addressing inequalities in AI's development and deployment. It focuses on diversity, inclusivity, and access, promoting inclusive design practices (Bennett, Rosner, and Taylor 2020).

The perception of AI and these frameworks dynamically influence each other(Shin 2021). These frameworks play a crucial role in shaping the development of AI by providing ethical, social, and technical guidelines that aim to maximize the benefits of AI while minimizing harm. They serve as a compass for creators, guiding the design of AI systems that respect human rights, promote inclusivity, and ensure accountability. They collectively emphasize ethical standards, societal welfare, and human values, advocating for transparency, fairness, and accountability (Floridi et al. 2021). However, their focuses vary slightly; Trustworthy AI prioritizes user trust through safety and reliability, Responsible and Ethical AI emphasizes adherence to ethical standards and societal impacts, AI for Good targets the application of AI for solving global challenges, Human-Centered AI stresses enhancing human capabilities and well-being, and Equitable AI seeks to ensure fairness and prevent exacerbation of inequalities.

Together, these frameworks form a comprehensive set of principles guiding the ethical, inclusive, and beneficial development of AI technologies, highlighting the multifaceted approach needed to address the complex implications of AI in society. Public perception impacts the emphasis and direction of these frameworks, as societal concerns about privacy, job displacement, and bias in AI systems have led to a greater focus on trustworthiness, responsibility, and ethics in AI development. Conversely, the adoption and promotion of these frameworks can positively influence public perception of AI, building trust and confidence in AI technologies.

AI consequences

This section explores the second dimension of the AI identity that is external and introduces a wide range of ethical, societal, and cultural considerations. Ethical issues, including algorithmic bias, privacy breaches, and the potential for surveillance, pose significant concerns. The integration of AI into everyday life highlights the potential for

synergy between humans and AI, facilitating collaborative problem-solving while also raising questions about anthropomorphism and its implications. The reflection of human biases in AI systems underscores the urgency for fairness and inclusivity in model development. As AI systems become more complex, the demand for transparency and clear explanations of AI decisions grows, alongside the need for stringent regulations and robust data protection measures. AI's foray into creative fields prompts discussions about originality and the nature of human creativity. Moreover, AI's impact extends to reshaping job markets and socioeconomic structures, necessitating strategies to protect workers and leverage AI for socioeconomic improvement. Media representations of AI significantly influence public perception, highlighting the need for a critical analysis of how AI is portrayed and perceived.

The concept of intersectional identity is pivotal when discussing perception, revealing how AI's interaction with culture, economics, and ethics intersects with various human identities, such as race, gender, socioeconomic status, and disability. Biased AI systems disproportionately affect marginalized communities, amplifying inequalities. The differential impact of AI on job markets, based on intersecting identities, calls for equitable AI deployment and strategies tailored to diverse societal needs. Media representations must also embrace intersectionality, offering nuanced portrayals that challenge stereotypes and shape diverse perceptions of AI technologies. Acknowledging these intersectional dimensions is essential for the development, regulation, and integration of AI technologies in a manner that ensures fairness, inclusivity, and equitable outcomes for everyone.

- Ethical Considerations: The development and deployment of AI raise important ethical considerations. Issues like bias in AI algorithms, privacy concerns, job displacement, and the impact of AI on society and human values require careful consideration and mitigation. Beyond its creators, AI's identity is shaped by a plethora of ethical dilemmas that have broader societal implications. The dichotomy of AI applications, as seen in authoritarian regimes using it for surveillance versus democratic societies grappling with its ethical deployment, illustrates the complexity of its societal implications (Jobin, Ienca, and Vayena 2019).
- Personification or Anthropomorphism: Humans often tend to anthropomorphize AI systems, attributing human-like qualities, intentions, and emotions to them (Cole 1991). This phenomenon raises important questions about the psychological and societal implications of interacting with AI. One of the most vivid examples of humans attributing lifelike qualities to AI systems can be seen in the applications of voice-activated virtual assistants like Siri, Alexa, or Google Assistant (Blut et al. 2021). As benign as this may seem, it brings forth significant questions. How does this humanization of machines affect our social behaviors, especially among the younger generation? Do these interactions blur the lines between genuine human relationships and interactions with coded algorithms? Ad-

ditionally, as AI systems get more sophisticated in their responses, the risk of over-trusting or becoming emotionally reliant on them grows. This phenomenon necessitates a broader discussion on the implications of AI-human interactions, not just from a technological standpoint, but from psychological and societal perspectives as well.

- AI and Human Collaboration: The relationship between AI and humans is evolving. AI can augment human capabilities, automate repetitive tasks, and provide valuable insights. Human-AI collaboration is essential for leveraging the strengths of both to tackle complex problems (Dellermann et al. 2019)but introducing AI may negatively impact employees if not done intentionally (Mirbabaie et al. 2022) (Rezwana and Maher 2023).
- Human-Bias Reflection: AI systems can inherit human biases present in the data they are trained on, leading to biased outcomes and discriminatory behavior (Schellmann 2024). Recognizing and mitigating these biases is essential to ensure fairness and inclusivity in AI applications (Buolamwini and Gebru 2018). We have seen the need to scrutinize and rectify any biases in the data of AI systems become critical especially in areas like criminal justice, to ensure fairness and prevent perpetuation of historic injustices.
- Regulation and Governance: The rapid advancement of AI has prompted discussions around the need for regulations and governance frameworks (Hinton et al. 2023) (Pause Giant 2023). Governments and organizations are exploring ways to ensure the responsible and ethical use of AI, protect privacy, and address potential risks associated with its deployment (Madiega 2021).
- Privacy and Data Protection: AI systems rely on vast amounts of data, raising concerns about privacy and data protection. Experts in computer science and law collaborate to develop frameworks and regulations that safeguard individuals' privacy while allowing for AI innovation (Aragon et al. 2022) (Arora et al. 2023).
- AI and Creativity: AI is making its mark in creative domains such as art, music, and literature. This blurs the line between human creativity and machine-generated output (Karimi et al. 2020), raising questions about authorship, originality, and the nature of art. Can an AI, devoid of lived experiences and emotions, genuinely craft a narrative that resonates with human emotions? And if the AI art/creation wins a competition, who would take the accolades the AI, its developers, or the myriad of authors whose works trained the system? (Franceschelli and Musolesi 2022)
- Cultural and Social Impacts: AI technologies are not developed in a vacuum but are shaped by cultural and social contexts. Experts in sociology and anthropology examine how AI systems reflect and reproduce societal norms, values, and power dynamics (Karizat et al. 2021).
- Socioeconomic Impact: The implications of AI-driven automation have the potential to reshape job markets and socioeconomic structures through job displacement and disrupting the human resources landscape (Schellmann

- 2024). Thus, exploring strategies to ensure a just transition for workers and leveraging AI for socioeconomic development becomes crucial across various sectors like health-care, education, and governance (Chui et al. 2023). Countries that rapidly adapt to AI stand to gain significant socioeconomic advantages, while those lagging behind face an exacerbated digital divide. This widening gap between AI-ready nations and those without adequate access or infrastructure could lead to significant disparities in social and economic growth in the coming decades escpecially for marginalised groups (Chetty et al. 2014).
- Media Representations: Media plays a crucial role in shaping public perceptions and understandings of AI. Experts critically analyze how AI is portrayed in popular culture, news media, and entertainment, especially the genres of science fiction and speculative fiction, which have a long history of shaping the public's perception of AI. These diverse media representations significantly influence public sentiment and understanding of AI, thus shaping the discourse surrounding its development and deployment in real-world contexts.
- AI Dilemmas: Various combinations of Consequences and considerations in AI raise numerous dilemmas, such as determining responsibility and accountability for AI actions, ensuring fairness and transparency in decision-making, and considering the ethical impact of AI on social dynamics, safety, and privacy (Caldwell et al. 2022). Highlighting that we must ensure that while AI is a valuable resource and tool, the final decision must rests with the human expert, capitalizing on the strengths of both entities to address intricate challenges while promoting the principles of HCAI.

When AI is seen as being developed and deployed in a manner that is aligned with ethical principles and societal well-being, it garners broader acceptance and support (Lucivero et al. 2020). This interplay highlights the importance of transparent communication and engagement with the public in the ongoing development and refinement of AI technologies and their guiding frameworks.

AI Identity Framework

The perception of AI is not monolithic, It is influenced by numerous factors, including societal structures, personal experiences, media representations, etc. The lens of identity in the field adds a layer of complexity, which leads to discussions about whether AI application design and creation processes are informed by a myriad of backgrounds, experiences, and worldviews. Thus by understanding the context of who creates AI technologies, as well as examining the frameworks and societal considerations that guide AI's development and the way they impact society, we can advocate for diversity and inclusion as essential to an AI Identity that serves all people fairly. The research and conceptual frameworks of AI identity ecosystem capture this complexity by examining the relationship between individual identity factors—such as race, ethnicity, gender, class, sexual orientation, religion, and disability—and their impact in technological contexts, specifically through the lens of creators and

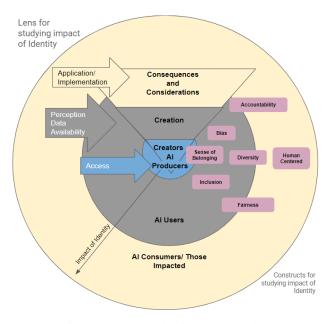


Figure 4: The AI Identity Framework

consumers roles in the development, access to, data management, perception, and implementation of AI in applications/solutions(Kivunja 2018). In the technology development landscape, the creator's work is influenced by their experiences, perceptions and identity, which manifests in the data they select and collect, ultimately shaping the technology they create. Thus representation and inclusion in the creation process has far-reaching consequences and considerations, which the framework suggests must be critically assessed through the lens of identity. Key sociological constructs such as diversity, fairness, inclusion, and bias are interwoven with a fundamental sense of belonging, and accountability underscoring the importance of these concepts in evaluating diversity and inclusion work in the field of AI. The upward arrow alongside 'Impact of Identity' suggests that the presence or lack of diversity and inclusion across the mentioned sociological constructs get amplified as we move up through the layers. for example, the impact of bias in the creator's layers (Mehrabi et al. 2021) snowballs exponentially into the consequences and considerations layer much akin to the bio accumulation/magnification process in nature (Bommasani et al. 2022). Greater emphasis on these aspects can potentially elevate the role and positive influence of identity in the technological sphere. This sociological framework serves as a guide for a comprehensive analysis of how identity shapes technology and, conversely, how technology can reflect and affect societal values and individual sense of self.

In essence, this position paper underscores the importance of an interdisciplinary, identity-centered approach when educating future designers and developers of AI systems. It reinforces the belief that for AI to be truly beneficial for all of society, the designers of tomorrow must be equipped not just with technical expertise, but with a profound understanding of their own identity and understand the ethical, social, and personal ramifications of AI's role in our world.

Importantly, this approach combined with Human-Centered principles can also catalyze broadening participation. When AI technologies are built to prioritize inclusivity and fairness, they can naturally spark interest and engagement from a broader cross-section of society. A commitment to center AI creation and development in identity and the human experience can lead to more people, including those from underrepresented backgrounds, feeling motivated to participate in the field. In return, their participation ensures a broader scope of insights, improving AI's responsiveness to societal needs.

Conclusion

In conclusion, the world of AI is ever-changing, with new creators, creations, and ideas constantly emerging as technology advances. Highlighting the interplay between the technology itself and its broader interaction with society, We define AI Identity in two dimensions to form a comprehensive view of AI identity. AI Identity that includes the collective characteristics, values, and ethical considerations embodied in the creation of AI technologies internally, and AI identity that is shaped by individual perception, societal impact, and cultural norms externally. The discussions within this paper shed light on the significant impact of diversity and inclusion in shaping public perceptions and understanding of AI, demonstrating how these narratives influence the discourse surrounding AI technologies in various societal contexts. Moreover, by proposing the AI identity framework, which captures the impact of various social constructs such as diversity, fairness, inclusion, bias, sense of belonging, and accountability across the creators, creations, and consequences of AI, we advocate for a more inclusive and responsible AI ecosystem. This AI identity ecosystem lens highlights the need for the development of AI technologies that are equitable, accessible, and beneficial for all segments of society. This paper serves as a call to action, urging the AI community to ground the development of AI in the human experience. An approach that creates technology to addresses the needs of diverse populations, which, in turn, fosters greater inclusivity and engagement in AI development.

References

Abboud, R.; Arya, A.; and Pandi, M. 2020. Redefining The Digital Divide In The Age Of AI. In *INTED2020 Proceedings*, 4483–4492. IATED.

Adejoro, C. O.; Arn, L.; Schwartz, L.; and Yeh, T. 2023. Empower Children in Nigeria to Design the Future of Artificial Intelligence (AI) through Writing. In *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference*, 677–680.

Ahmed, N.; and Wahed, M. 2020. The De-democratization of AI: Deep learning and the compute divide in artificial intelligence research. *arXiv* preprint arXiv:2010.15581.

AI, H. 2019. High-level expert group on artificial intelligence.

- Alahmad, R.; and Robert, L. 2020. Artificial intelligence (AI) and IT identity: antecedents identifying with AI applications. *arXiv* preprint arXiv:2005.12196.
- Albert, S. 1998. *Metadefinition of Identity*. Thousand Oaks, CA: SAGE Publications.
- Amershi, B. 2020. Culture, the process of knowledge, perception of the world and emergence of AI. *AI & SOCIETY*, 35(2): 417–430.
- Amershi, S.; Weld, D.; Vorvoreanu, M.; Fourney, A.; Nushi, B.; Collisson, P.; Suh, J.; Iqbal, S.; Bennett, P. N.; Inkpen, K.; et al. 2019. Guidelines for human-AI interaction. In *Proceedings of the 2019 chi conference on human factors in computing systems*, 1–13.
- Aragon, C.; Guha, S.; Kogan, M.; Muller, M.; and Neff, G. 2022. *Human-centered data science: an introduction*. MIT Press.
- Aragon, C.; Hutto, C.; Echenique, A.; Fiore-Gartland, B.; Huang, Y.; Kim, J.; Neff, G.; Xing, W.; and Bayer, J. 2016. Developing a research agenda for human-centered data science. In *Proceedings of the 19th ACM conference on computer supported cooperative work and social computing companion*, 529–535.
- Armbrust, M.; Fox, A.; Griffith, R.; Joseph, A. D.; Katz, R.; Konwinski, A.; Lee, G.; Patterson, D.; Rabkin, A.; Stoica, I.; et al. 2010. A view of cloud computing. *Communications of the ACM*, 53(4): 50–58.
- Arora, A.; Barrett, M.; Lee, E.; Oborn, E.; and Prince, K. 2023. Risk and the future of AI: Algorithmic bias, data colonialism, and marginalization.
- Arrieta, A. B.; Díaz-Rodríguez, N.; Del Ser, J.; Bennetot, A.; Tabik, S.; Barbado, A.; García, S.; Gil-López, S.; Molina, D.; Benjamins, R.; et al. 2020. Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI. *Information fusion*, 58: 82–115.
- Ashktorab, Z.; Liao, Q. V.; Dugan, C.; Johnson, J.; Pan, Q.; Zhang, W.; Kumaravel, S.; and Campbell, M. 2020. Humanai collaboration in a cooperative game setting: Measuring social perception and outcomes. *Proceedings of the ACM on Human-Computer Interaction*, 4(CSCW2): 1–20.
- Bareis, J.; and Katzenbach, C. 2022. Talking AI into being: The narratives and imaginaries of national AI strategies and their performative politics. *Science, Technology, & Human Values*, 47(5): 855–881.
- Basole, R. C.; and Accenture, A. 2021. Visualizing the Evolution of the AI Ecosystem. In *HICSS*, 1–10.
- Batra, G.; Jacobson, Z.; Madhav, S.; Queirolo, A.; and Santhanam, N. 2019. Artificial-intelligence hardware: New opportunities for semiconductor companies. *McKinsey and Company*, 2.
- Benjamin, R. 2019. Race After Technology: Abolitionist Tools for the New Jim Code. Polity Press. ISBN 9781509526437.
- Bennett, C. L.; Rosner, D. K.; and Taylor, A. S. 2020. The care work of access. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–15.

- Bessen, J. E.; Impink, S. M.; Reichensperger, L.; and Seamans, R. 2023. The business of AI startups. *Boston Univ. School of Law, Law and Economics Research Paper*, (18-28).
- Bingley, W. J.; Haslam, S. A.; Steffens, N. K.; Gillespie, N.; Worthy, P.; Curtis, C.; Lockey, S.; Bialkowski, A.; Ko, R. K.; and Wiles, J. 2023. Enlarging the model of the human at the heart of human-centered AI: A social self-determination model of AI system impact. *New Ideas in Psychology*, 70: 101025.
- Birhane, A.; Ruane, E.; Laurent, T.; S. Brown, M.; Flowers, J.; Ventresque, A.; and L. Dancy, C. 2022. The forgotten margins of AI ethics. In *Proceedings of the 2022 ACM Conference on Fairness, Accountability, and Transparency*, 948–958.
- Blut, M.; Wang, C.; Wünderlich, N. V.; and Brock, C. 2021. Understanding anthropomorphism in service provision: a meta-analysis of physical robots, chatbots, and other AI. *Journal of the Academy of Marketing Science*, 49(4): 632–658.
- Bommasani, R.; Hudson, D. A.; Adeli, E.; Altman, R.; Arora, S.; von Arx, S.; Bernstein, M. S.; Bohg, J.; Bosselut, A.; Brunskill, E.; Brynjolfsson, E.; Buch, S.; Card, D.; Castellon, R.; Chatterji, N.; Chen, A.; Creel, K.; Davis, J. Q.; Demszky, D.; Donahue, C.; Doumbouya, M.; Durmus, E.; Ermon, S.; Etchemendy, J.; Ethayarajh, K.; Fei-Fei, L.; Finn, C.; Gale, T.; Gillespie, L.; Goel, K.; Goodman, N.; Grossman, S.; Guha, N.; Hashimoto, T.; Henderson, P.; Hewitt, J.; Ho, D. E.; Hong, J.; Hsu, K.; Huang, J.; Icard, T.; Jain, S.; Jurafsky, D.; Kalluri, P.; Karamcheti, S.; Keeling, G.; Khani, F.; Khattab, O.; Koh, P. W.; Krass, M.; Krishna, R.; Kuditipudi, R.: Kumar, A.: Ladhak, F.: Lee, M.: Lee, T.: Leskovec, J.; Levent, I.; Li, X. L.; Li, X.; Ma, T.; Malik, A.; Manning, C. D.; Mirchandani, S.; Mitchell, E.; Munyikwa, Z.; Nair, S.; Narayan, A.; Narayanan, D.; Newman, B.; Nie, A.; Niebles, J. C.; Nilforoshan, H.; Nyarko, J.; Ogut, G.; Orr, L.; Papadimitriou, I.; Park, J. S.; Piech, C.; Portelance, E.; Potts, C.; Raghunathan, A.; Reich, R.; Ren, H.; Rong, F.; Roohani, Y.; Ruiz, C.; Ryan, J.; Ré, C.; Sadigh, D.; Sagawa, S.; Santhanam, K.; Shih, A.; Srinivasan, K.; Tamkin, A.; Taori, R.; Thomas, A. W.; Tramèr, F.; Wang, R. E.; Wang, W.; Wu, B.; Wu, J.; Wu, Y.; Xie, S. M.; Yasunaga, M.; You, J.; Zaharia, M.; Zhang, M.; Zhang, T.; Zhang, X.; Zhang, Y.; Zheng, L.; Zhou, K.; and Liang, P. 2022. On the Opportunities and Risks of Foundation Models. arXiv:2108.07258.
- Bostrom, N. 2018. Strategic implications of openness in AI development. In *Artificial Intelligence Safety and Security*, 145–164. Chapman and Hall/CRC.
- Brown, T.; Mann, B.; Ryder, N.; Subbiah, M.; Kaplan, J. D.; Dhariwal, P.; Neelakantan, A.; Shyam, P.; Sastry, G.; Askell, A.; et al. 2020. Language models are few-shot learners. *Advances in neural information processing systems*, 33: 1877–1901.
- Buolamwini, J.; and Gebru, T. 2018. Gender shades: Intersectional accuracy disparities in commercial gender classification. In *Conference on fairness, accountability and transparency*, 77–91. PMLR.

- Caldwell, S.; Sweetser, P.; O'Donnell, N.; Knight, M. J.; Aitchison, M.; Gedeon, T.; Johnson, D.; Brereton, M.; Gallagher, M.; and Conroy, D. 2022. An agile new research framework for hybrid human-AI teaming: Trust, transparency, and transferability. *ACM Transactions on Interactive Intelligent Systems (TiiS)*, 12(3): 1–36.
- Calo, R. 2017. Artificial intelligence policy: a primer and roadmap. *UCDL Rev.*, 51: 399.
- Cao, H.; Tan, C.; Gao, Z.; Xu, Y.; Chen, G.; Heng, P.-A.; and Li, S. Z. 2024. A Survey on Generative Diffusion Models. *IEEE Transactions on Knowledge and Data Engineering*, 1–20.
- Cao, L.; Chen, C.; Dong, X.; Wang, M.; and Qin, X. 2023. The dark side of AI identity: Investigating when and why AI identity entitles unethical behavior. *Computers in Human Behavior*, 143: 107669.
- Capel, T.; and Brereton, M. 2023. What is Human-Centered about Human-Centered AI? A Map of the Research Landscape. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–23.
- Carter, L.; Liu, D.; and Cantrell, C. 2020. Exploring the intersection of the digital divide and artificial intelligence: A hermeneutic literature review. *AIS Transactions on Human-Computer Interaction*, 12(4): 253–275.
- Cave, S.; and Dihal, K. 2020. The whiteness of AI. *Philosophy & Technology*, 33(4): 685–703.
- Chetty, R.; Hendren, N.; Kline, P.; and Saez, E. 2014. Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, 129(4): 1553–1623.
- Christian, B. 2020. *The alignment problem: Machine learning and human values*. WW Norton & Company.
- Chubb, J.; Reed, D.; and Cowling, P. 2022. Expert views about missing AI narratives: is there an AI story crisis? *AI & society*, 1–20.
- Chui, M.; Hazan, E.; Roberts, R.; Singla, A.; and Smaje, K. 2023. The economic potential of generative AI.
- Coeckelbergh, M. 2021. AI for climate: freedom, justice, and other ethical and political challenges. *AI and Ethics*, 1(1): 67–72.
- Coeckelbergh, M. 2022. *The political philosophy of AI: an introduction*. John Wiley & Sons.
- Cole, D. 1991. Artificial intelligence and personal identity. *Synthese*, 88: 399–417.
- Collins, P. H.; and Bilge, S. 2020. *Intersectionality*. John Wiley & Sons.
- Coulter, M. 2023. AI experts disown Musk-backed campaign citing their research. *Reuters*.
- Cowls, J.; King, T.; Taddeo, M.; and Floridi, L. 2019. Designing AI for social good: Seven essential factors. *Available at SSRN 3388669*.
- Crawford, K. 2021. The atlas of AI: Power, politics, and the planetary costs of artificial intelligence. Yale University Press.

- Crenshaw, K. 2013. Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. In *Feminist legal theories*, 23–51. Routledge.
- de Laat, P. B. 2021. Companies committed to responsible AI: From principles towards implementation and regulation? *Philosophy & technology*, 34: 1135–1193.
- De Spiegeleire, S.; Maas, M.; and Sweijs, T. 2017. Artificial intelligence and the future of defense: strategic implications for small-and medium-sized force providers. The Hague Centre for Strategic Studies.
- Dellermann, D.; Ebel, P.; Söllner, M.; and Leimeister, J. M. 2019. Hybrid intelligence. *Business & Information Systems Engineering*, 61: 637–643.
- Devedzic, V. 2022. Identity of AI. *Discover Artificial Intelligence*, 2(1): 23.
- Devlin, J.; Chang, M.-W.; Lee, K.; and Toutanova, K. 2018. Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv preprint arXiv:1810.04805*.
- Dignum, V. 2019. Responsible artificial intelligence: how to develop and use AI in a responsible way, volume 2156. Springer.
- Donlon, J. J. 2024. The National Artificial Intelligence Research Institutes program and its significance to a prosperous future. *AI Magazine*.
- Du Sautoy, M. 2020. *The Creativity Code: Art and Innovation in the Age of AI*. Harvard University Press. ISBN 9780674244719.
- Dwivedi, Y. K.; Hughes, L.; Ismagilova, E.; Aarts, G.; Coombs, C.; Crick, T.; Duan, Y.; Dwivedi, R.; Edwards, J.; Eirug, A.; et al. 2021. Artificial Intelligence (AI): Multi-disciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57: 101994.
- Dyvik, E. H. 2023. Global employment figures 2023.
- Färber, M.; and Tampakis, L. 2024. Analyzing the impact of companies on AI research based on publications. *Scientometrics*, 129(1): 31–63.
- Floridi, L.; Cowls, J.; Beltrametti, M.; Chatila, R.; Chazerand, P.; Dignum, V.; Luetge, C.; Madelin, R.; Pagallo, U.; Rossi, F.; et al. 2021. An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Ethics, governance, and policies in artificial intelligence*, 19–39.
- Franceschelli, G.; and Musolesi, M. 2022. Copyright in generative deep learning. *Data & Policy*, 4: e17.
- Goodfellow, I.; Bengio, Y.; and Courville, A. 2016. *Deep learning*. MIT press.
- Griffin, T. A.; Green, B. P.; and Welie, J. V. 2023. The ethical agency of AI developers. *AI and Ethics*, 1–10.
- Grigorescu, S.; Trasnea, B.; Cocias, T.; and Macesanu, G. 2020. A survey of deep learning techniques for autonomous driving. *Journal of Field Robotics*, 37(3): 362–386.
- Gutoreva, A. 2024. Sharing Identity with AI Systems: A Comprehensive Review. *Procedia Computer Science*, 231: 759–764.

- Hagerty, A.; and Rubinov, I. 2019. Global AI ethics: a review of the social impacts and ethical implications of artificial intelligence. *arXiv preprint arXiv:1907.07892*.
- Hartmann, P.; and Henkel, J. 2020. The rise of corporate science in AI: Data as a strategic resource. *Academy of Management Discoveries*, 6(3): 359–381.
- Hibbard, B. 2008. Open source AI. Frontiers in Artificial Intelligence and Applications, 171: 473.
- Hinton, G.; Bengio, Y.; Hassabis, D.; Altman, S.; Amodei, D.; Song, D.; et al. 2023. Statement on AI Risk. AI experts and public figures express their concern about AI risk. Center for AI Risk (May 30, 2023), available online at; https://www. safe. ai/statement-on-ai-risk# openletter¿("Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war.").
- Hirsch, E. 1992. *The concept of identity*. Oxford University Press.
- Howarth, J. 2024. 57 new AI statistics (Apr 2024).
- Huang, M.-H.; and Rust, R. T. 2021. A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, 49: 30–50.
- Iandola, F. N.; Han, S.; Moskewicz, M. W.; Ashraf, K.; Dally, W. J.; and Keutzer, K. 2016. SqueezeNet: AlexNet-level accuracy with 50x fewer parameters and; 0.5 MB model size. *arXiv preprint arXiv:1602.07360*.
- Inaba, Y.; and Togawa, K. 2021. Social capital in the creation of AI perception. *Behaviormetrika*, 48(1): 79–102.
- Jacobides, M. G.; Brusoni, S.; and Candelon, F. 2021. The evolutionary dynamics of the artificial intelligence ecosystem. *Strategy Science*, 6(4): 412–435.
- Jenkins, R. 2014. Social identity. Routledge.
- Jobin, A.; Ienca, M.; and Vayena, E. 2019. The global land-scape of AI ethics guidelines. *Nature machine intelligence*, 1(9): 389–399.
- Jouppi, N. P.; Young, C.; Patil, N.; Patterson, D.; Agrawal, G.; Bajwa, R.; Bates, S.; Bhatia, S.; Boden, N.; Borchers, A.; et al. 2017. In-datacenter performance analysis of a tensor processing unit. In *Proceedings of the 44th annual international symposium on computer architecture*, 1–12.
- Karimi, P.; Rezwana, J.; Siddiqui, S.; Maher, M. L.; and Dehbozorgi, N. 2020. Creative sketching partner: an analysis of human-AI co-creativity. In *Proceedings of the 25th International Conference on Intelligent User Interfaces*, 221–230.
- Karizat, N.; Delmonaco, D.; Eslami, M.; and Andalibi, N. 2021. Algorithmic folk theories and identity: How TikTok users co-produce Knowledge of identity and engage in algorithmic resistance. *Proceedings of the ACM on Human-Computer Interaction*, 5(CSCW2): 1–44.
- Kasneci, E.; Seßler, K.; Küchemann, S.; Bannert, M.; Dementieva, D.; Fischer, F.; Gasser, U.; Groh, G.; Günnemann, S.; Hüllermeier, E.; et al. 2023. ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and individual differences*, 103: 102274.

- Keyes, O.; Hitzig, Z.; and Blell, M. 2021. Truth from the machine: artificial intelligence and the materialization of identity. *Interdisciplinary Science Reviews*, 46(1-2): 158–175.
- Khanna, R. 2023. *Progressive Capitalism: How to Make Tech Work for All of Us.* Simon and Schuster.
- Khurana, D.; Koli, A.; Khatter, K.; and Singh, S. 2023. Natural language processing: State of the art, current trends and challenges. *Multimedia tools and applications*, 82(3): 3713–3744.
- Kim, T.; Molina, M. D.; Rheu, M.; Zhan, E. S.; and Peng, W. 2023. One AI Does Not Fit All: A Cluster Analysis of the Laypeople's Perception of AI Roles. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–20.
- Kivunja, C. 2018. Distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field. *International journal of higher education*, 7(6): 44–53.
- Kovačević, A.; Putnik, N.; and Tošković, O. 2020. Factors related to cyber security behavior. *IEEE Access*, 8: 125140–125148.
- Lee, K.; and Qiufan, C. 2021. *AI 2041: Ten Visions for Our Future*. Crown. ISBN 9780593238295.
- Li, B.; Qi, P.; Liu, B.; Di, S.; Liu, J.; Pei, J.; Yi, J.; and Zhou, B. 2023. Trustworthy AI: From principles to practices. *ACM Computing Surveys*, 55(9): 1–46.
- Lima, G.; Kim, C.; Ryu, S.; Jeon, C.; and Cha, M. 2020. Collecting the public perception of AI and robot rights. *Proceedings of the ACM on Human-Computer Interaction*, 4(CSCW2): 1–24.
- Liu, F.; Makady, H.; Nah, S.; and McNealy, J. 2023. When citizens support AI policies: the moderating roles of AI efficacy on AI news, discussion, and literacy. *Journal of Information Technology & Politics*, 1–17.
- Loi, D.; Wolf, C. T.; Blomberg, J. L.; Arar, R.; and Brereton, M. 2019. Co-designing AI futures: Integrating AI ethics, social computing, and design. In *Companion publication of the 2019 on designing interactive systems conference 2019 companion*, 381–384.
- Long, D.; and Magerko, B. 2020. What is AI literacy? Competencies and design considerations. In *Proceedings of the 2020 CHI conference on human factors in computing systems*, 1–16.
- Long, D.; Roberts, J.; Magerko, B.; Holstein, K.; DiPaola, D.; and Martin, F. 2023. AI Literacy: Finding Common Threads between Education, Design, Policy, and Explainability. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–6.
- Lucivero, F.; Samuel, G.; Blair, G.; Darby, S. J.; Fawcett, T.; Hazas, M.; Ten Holter, C.; Jirotka, M.; Parker, M.; Webb, H.; et al. 2020. Data-driven unsustainability? An interdisciplinary perspective on governing the environmental impacts of a data-driven society. An Interdisciplinary Perspective on Governing the Environmental Impacts of a Data-Driven Society (June 19, 2020).

- Luckin, R.; and Holmes, W. 2016. Intelligence unleashed: An argument for AI in education.
- Luo, Y.; and Van Assche, A. 2023. The rise of technogeopolitical uncertainty: Implications of the United States CHIPS and Science Act. *Journal of international business studies*, 54(8): 1423–1440.
- Lü, L.; Medo, M.; Yeung, C. H.; Zhang, Y.-C.; Zhang, Z.-K.; and Zhou, T. 2012. Recommender systems. *Physics Reports*, 519(1): 1–49. Recommender Systems.
- Madiega, T. 2021. Artificial intelligence act. European Parliament: European Parliamentary Research Service.
- Maher, M. L.; and Tadimalla, S. Y. 2024. Expanding Capacity and Diversity in Lifelong AI Education. *Proceedings of AAAI Spring Symposium Series*.
- Maher, M. L.; Tadimalla, S. Y.; and Dhamani, D. 2023. An Exploratory Study on the Impact of AI tools on the Student Experience in Programming Courses: an Intersectional Analysis Approach. In 2023 IEEE Frontiers in Education Conference (FIE), 1–5. IEEE.
- Mehrabi, N.; Morstatter, F.; Saxena, N.; Lerman, K.; and Galstyan, A. 2021. A Survey on Bias and Fairness in Machine Learning. *ACM Comput. Surv.*, 54(6).
- Merritt, R. 2024. Why gpus are great for ai.
- Minkkinen, M.; Zimmer, M. P.; and Mäntymäki, M. 2021. Towards ecosystems for responsible AI: expectations on sociotechnical systems, agendas, and networks in EU documents. In *Conference on e-Business, e-Services and e-Society*, 220–232. Springer.
- Mir, U.; Kar, A. K.; and Gupta, M. P. 2022. AI-enabled digital identity—inputs for stakeholders and policymakers. *Journal of Science and Technology Policy Management*, 13(3): 514–541.
- Mirbabaie, M.; Brünker, F.; Möllmann, N. R.; and Stieglitz, S. 2022. The rise of artificial intelligence–understanding the AI identity threat at the workplace. *Electronic Markets*, 1–27
- Mitchell, M. 2020. *Artificial intelligence a guide for thinking humans*. Pelican, an imprint of Penguin Books.
- Mouta, A.; Pinto-Llorente, A. M.; and Torrecilla-Sánchez, E. M. 2023. Uncovering blind spots in education ethics: Insights from a systematic literature review on artificial intelligence in education. *International Journal of Artificial Intelligence in Education*, 1–40.
- Noble, S. U. 2018. Algorithms of oppression. In *Algorithms of oppression*. New York university press.
- Pasquale, F. 2015. The black box society: The secret algorithms that control money and information. Harvard University Press.
- Paszke, A.; Gross, S.; Massa, F.; Lerer, A.; Bradbury, J.; Chanan, G.; Killeen, T.; Lin, Z.; Gimelshein, N.; Antiga, L.; et al. 2019. Pytorch: An imperative style, high-performance deep learning library. *Advances in neural information processing systems*, 32.
- Pause Giant, A. 2023. Experiments: an open letter. *Future of Life Institute*.

- Pollack, M. E. 2005. Intelligent technology for an aging population: The use of AI to assist elders with cognitive impairment. *AI magazine*, 26(2): 9–9.
- Prahl, A.; and Goh, W. W. P. 2021. "Rogue machines" and crisis communication: When AI fails, how do companies publicly respond? *Public Relations Review*, 47(4): 102077.
- Quan, X. I.; and Sanderson, J. 2018. Understanding the artificial intelligence business ecosystem. *IEEE Engineering Management Review*, 46(4): 22–25.
- Raghavan, M. 2021. *The Societal Impacts of Algorithmic Decision-Making*. Ph.D. thesis, Cornell University.
- Ragot, M.; Martin, N.; and Cojean, S. 2020. Ai-generated vs. human artworks. a perception bias towards artificial intelligence? In *Extended abstracts of the 2020 CHI conference on human factors in computing systems*, 1–10.
- Rakova, B.; and Dobbe, R. 2023. Algorithms as social-ecological-technological systems: an environmental justice lens on algorithmic audits. *arXiv preprint arXiv:2305.05733*.
- Rezwana, J.; and Maher, M. L. 2023. Designing creative AI partners with COFI: A framework for modeling interaction in human-AI co-creative systems. *ACM Transactions on Computer-Human Interaction*, 30(5): 1–28.
- Salas-Pilco, S. Z.; Xiao, K.; and Oshima, J. 2022. Artificial Intelligence and New Technologies in Inclusive Education for Minority Students: A Systematic Review. *Sustainability*, 14(20).
- Schellmann, H. 2024. *The Algorithm: How AI Can Hijack Your Career and Steal Your Future*. Hurst Publishers. ISBN 9781805261339.
- Scheuerman, M. K.; Wade, K.; Lustig, C.; and Brubaker, J. R. 2020. How we've taught algorithms to see identity: Constructing race and gender in image databases for facial analysis. *Proceedings of the ACM on Human-computer Interaction*, 4(CSCW1): 1–35.
- Schiff, D. 2022. Education for AI, not AI for education: The role of education and ethics in national AI policy strategies. *International Journal of Artificial Intelligence in Education*, 32(3): 527–563.
- Schiff, D.; Biddle, J.; Borenstein, J.; and Laas, K. 2020. What's next for ai ethics, policy, and governance? a global overview. In *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society*, 153–158.
- Schlesinger, A.; O'Hara, K. P.; and Taylor, A. S. 2018. Let's talk about race: Identity, chatbots, and AI. In *Proceedings* of the 2018 chi conference on human factors in computing systems, 1–14.
- Shams, R. A.; Zowghi, D.; and Bano, M. 2023. AI and the quest for diversity and inclusion: a systematic literature review. *AI and Ethics*, 1–28.
- Sherif, A. 2023. Number of ICT professionals worldwide 2019-2023.
- Shin, D. 2021. The effects of explainability and causability on perception, trust, and acceptance: Implications for explainable AI. *International Journal of Human-Computer Studies*, 146: 102551.

Shinners, L.; Grace, S.; Smith, S.; Stephens, A.; and Aggar, C. 2022. Exploring healthcare professionals' perceptions of artificial intelligence: Piloting the Shinners Artificial Intelligence Perception tool. *Digital Health*, 8: 20552076221078110.

Shneiderman, B. 2021. Human-centered AI. *Issues in Science and Technology*, 37(2): 56–61.

Simon, F. M.; and Isaza-Ibarra, L. F. 2023. AI in the news: reshaping the information ecosystem?

Song, Y.; Weisberg, L. R.; Zhang, S.; Tian, X.; Boyer, K. E.; and Israel, M. 2024. A Framework for Inclusive AI Learning Design for Diverse Learners. *Computers and Education: Artificial Intelligence*, 100212.

Stathoulopoulos, K.; and Mateos-Garcia, J. C. 2019. Gender diversity in AI research. *Available at SSRN 3428240*.

Stets, J. E.; and Burke, P. J. 2000. Identity theory and social identity theory. *Social psychology quarterly*, 224–237.

Thrun, S. 2000. Probabilistic algorithms in robotics. *Ai Magazine*, 21(4): 93–93.

Tian, Y.-h.; Chen, X.-l.; Xiong, H.-k.; Li, H.-l.; Dai, L.-r.; Chen, J.; Xing, J.-l.; Chen, J.; Wu, X.-h.; Hu, W.-m.; et al. 2017. Towards human-like and transhuman perception in AI 2.0: a review. *Frontiers of Information Technology & Electronic Engineering*, 18: 58–67.

Topol, E. 2019. *Deep medicine: how artificial intelligence can make healthcare human again.* Hachette UK.

Touretzky, D.; Gardner-McCune, C.; Martin, F.; and Seehorn, D. 2019. Envisioning AI for K-12: What should every child know about AI? In *Proceedings of the AAAI conference on artificial intelligence*, volume 33, 9795–9799.

Touretzky, D.; Gardner-McCune, C.; and Seehorn, D. 2023. Machine learning and the five big ideas in AI. *International Journal of Artificial Intelligence in Education*, 33(2): 233–266.

Trewin, S.; Basson, S.; Muller, M.; Branham, S.; Treviranus, J.; Gruen, D.; Hebert, D.; Lyckowski, N.; and Manser, E. 2019. Considerations for AI fairness for people with disabilities. *AI Matters*, 5(3): 40–63.

Vacarelu, M. 2022. Politicians and Artificial Intelligence Refusal: Brief Considerations. In *European Conference on the Impact of Artificial Intelligence and Robotics*, volume 4, 100–107.

Verdoliva, L. 2020. Media Forensics and DeepFakes: An Overview. *IEEE Journal of Selected Topics in Signal Processing*, 14(5): 910–932.

Voulodimos, A.; Doulamis, N.; Doulamis, A.; Protopapadakis, E.; et al. 2018. Deep learning for computer vision: A brief review. *Computational intelligence and neuroscience*, 2018.

Wang, P. 2019. On defining artificial intelligence. *Journal of Artificial General Intelligence*, 10(2): 1–37.

Whittaker, M.; Crawford, K.; Dobbe, R.; Fried, G.; Kaziunas, E.; Mathur, V.; West, S. M.; Richardson, R.; Schultz, J.; Schwartz, O.; et al. 2018. *AI now report 2018*. AI Now Institute at New York University New York.

Wood, A. F.; and Smith, M. J. 2004. *Online communication: Linking technology, identity, & culture.* Routledge.

Yoo, S. 2020. A Study on AI Business Ecosystem. *The Journal of the Institute of Internet, Broadcasting and Communication*, 20(2): 21–27.

Zawacki-Richter, O.; Marín, V. I.; Bond, M.; and Gouverneur, F. 2019. Systematic review of research on artificial intelligence applications in higher education—where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1): 1–27.