

Exploring Role of Women in Artificial Intelligence

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Abstract

Women's involvement in Artificial Intelligence (AI) technologies like Machine Learning (ML) and Deep Learning (DL) is crucial globally. The diverse consumer demographic of AI, coupled with a lack of diversity in the workforce and leadership, poses a crisis in the fast-paced and highly societally significant AI industry. Women often face prejudice in underrepresented professions, deterring them from pursuing certain careers. The workplace must address these challenges by providing tools for both genders and investing in women's support. AI, a new sector in this modern world, has the potential to bridge the gender gap, and women have a significant influence on AI development, community, and customer products. The article explores women's engagement in AI disciplines, discusses barriers such as gender stereotypes, educational discrepancies, labor market inequities, and a lack of support structures. It suggests strategies to increase women's participation in AI, such as ensuring gender equity in education, presenting mentorship programs, encouraging women-led research, and publicizing successful female role models. Therefore, the findings emphasize the need for a holistic approach to ensure inclusion in AI.

Keywords: Women empowerment, Gender equality, Leadership, Mentorship programs

1. Introduction

Gender relations are being shaped by women in the AI industry, who are also taking up new challenges and expanding chances for other women. Women must participate in the creation, implementation, assessment, and discussion of ethics and standards for fostering diversity in the AI and ML areas for the industry to fully include them. Engaging people in such activities fosters not only their professional and personal development but also the development of their team and, consequently, the advancement of technology [1]. Women's participation in all fields will result in laws and procedures that bring equality to the digital sphere. However, such a mission requires the males who make up the majority of the AI profession to work together as allies and aggressively alter the workplace from the inside out to make AI a more inclusive environment for everybody [2].

AI is a rapidly expanding area, with an economic effect projected to reach \$15.7 trillion by 2030 [3]. The future of mankind is still being shaped by advancements in AI in almost every area. Emerging technologies like big data, robots, and the Internet of Things (IoT) are already primarily driven by AI, and generative AI has increased the potential and appeal of AI even more. About 42% of enterprise-scale businesses will have actively implemented AI by 2024 [4]. Furthermore, from 2025 to 2028, 92%

of businesses want to raise their investments in AI technology [5]. As AI becomes more widespread, it raises ethical and social concerns. It raises questions about job displacement, privacy, and data security, as AI relies on vast amounts of personal data. It also raises concerns about bias and justice, and its impact on human autonomy raises questions about the distinction between human agency and technological influence. AI's advancements in healthcare and autonomous driving have led to a 5% increase in women working in the sector over the past decade [6]. However, this lack of diversity can lead to biased AI products, serving disadvantaged groups and intentionally harming them. AI has been shown to be intentionally biased, sexist, racist, and discriminatory, emphasizing the need for continued support for gender diversity in AI.

This study examines the pivotal role of women in influencing the AI industry by evaluating their current involvement, pinpointing obstacles to entry, and suggesting implementable strategies to improve gender diversity. It looks at global and regional numbers on how many women are working in AI, focusing on trailblazers and groups that are working to make gender equality a reality. It tackles problems like unequal access to education, discrimination at work, and societal and cultural expectations. It also provides a complete plan for getting more women involved through education, mentorship, and changes to policies. It brings attention to inclusive practices in AI development by focusing on the contributions of female AI pioneers and supportive initiatives, ultimately promoting fair and innovative technological progress.

2. Women's Engagement in AI Careers Worldwide

The proportion of women working in AI is now low but is rising globally.

- According to the World Economic Forum, women account for only 22% of the estimated 300,000 AI specialists globally [7]. It exposes that there is still a sizable gender imbalance in this industry despite tremendous advancements. This indicates that around 66,000 of the 300,000 AI experts thought to exist worldwide are female.
- According to the AI Index 2021 study, women account for 18% of all AI researchers globally [8]. This implies that out of around 80,000 AI researchers, just 14,400 are women, highlighting the gender disparity in high-level AI research jobs.
- According to Element AI, women account for 25% of AI roles in North America [8]. Of the projected 150,000 AI experts in this region, about 37,500 are women, demonstrating regional differences in gender representation.
- According to the European Commission, women account for 24% of all AI professionals in the EU [9]. With an estimated 200,000 AI experts in the EU, around 48,000 are women, indicating a comparable gender discrepancy to that found internationally.

2.1 Empowering Women in AI Industries

Setting industry standards, certain businesses are responsible for encouraging gender diversity in their AI teams. The proportion of women in AI positions at these organizations is greater than average overall, which helps to gradually boost gender diversity in the IT industry. IBM distinguishes itself because women make up about 30% of its AI positions, which is much higher than the industry norm [10]. About 3,000 of IBM's 10,000 AI specialists are female, indicating the company's dedication to creating a welcoming and diverse workplace. At Microsoft, 28% of AI positions are held by women. Approximately 3,360 of the 12,000 AI jobs are held by women, demonstrating advancements in

diversity and inclusion initiatives [11]. According to Google, women make up 26% of their AI staff. Approximately 3,900 of Google's 15,000 AI workers are female, demonstrating the company's continuous efforts to increase gender diversity [8]. Women make up 23% of Meta's (previously Facebook) AI staff. There is potential for increased gender diversity within the organization, since 1,840 of the 8,000 AI team members are female [12]. Accenture is the industry leader in AI and technology, with women holding 35% of the positions. Approximately 7,000 of its 20,000 AI jobs are occupied by women, demonstrating its strong commitment to gender diversity in the IT industry [13].

2.2 Growth of Women in AI Roles

Due to several programs and initiatives that encourage women to pursue and remain in the profession, female participation in AI has steadily increased. The growing number of women seeking AI-related education and jobs, as well as the growing number of women in leadership positions, conferences, and research, are clear indicators of this development. Women still struggle to achieve parity in spite of these advancements, highlighting the need for continued support and engagement. The following facts show how many women work in the AI sector worldwide:

- The number of women in AI has increased by 5% in the past ten years, indicating encouraging but sluggish progress toward gender parity [14]. Ten years ago, there were 200,000 women working in AI; today, there are around 210,000, thanks to activism, mentorship, and educational initiatives.
- The AI Now Institute reports that during 2015, the number of women working in AI increased by 7% [15]. This growth indicates an increased trend in female engagement, with 7,000 more women joining the sector out of 100,000 professionals.
- According to a McKinsey analysis, there are now 12% more women in senior positions in AI than there were five years ago [16]. The fact that there are currently 11,200 women in leadership positions compared to 10,000 five years ago shows how far women have come in the field of AI.
- The number of women attending AI-related conferences has increased by 15% in recent years [17]. Approximately 23,000 women would have attended these conferences today if 20,000 had done so in the past, indicating increased interest and participation in the subject.

In academic contexts, 22% of faculty members in AI departments are women [18]. About 220 of the 1,000 AI faculty members are female, suggesting that gender diversity in higher education has been steadily improving.

2.3 Influential Female AI Pioneers Worldwide

Several women have become prominent figures in AI, making important contributions to the field and setting an example for next generations. These innovators have promoted diversity and inclusion in the IT sector while advancing AI research and applications. Their leadership and accomplishments encourage more women to seek jobs in AI, progressively altering the field's hitherto male-dominated environment [19].

- With more than 200,000 citations, Stanford University professor and co-director of the Stanford Human-Centered AI Institute, Fei-Fei Li, is among the most referenced AI researchers. She is a prominent figure in the world of computer vision because of her innovative work.
- Co-founder of Affectiva, Rana el Kaliouby, has secured more than \$50 million for her AI firm, which specializes in emotion identification technologies. This significant investment shows how valuable and influential her work can be.

- Half of the researchers on the team are women, according to Daniela Rus, head of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL). Considering the widespread gender gaps in computing, this is an impressive accomplishment.
- Expert in AI ethics, Joanna Bryson has written over 150 articles and made a substantial contribution to the conversation on ethically developing AI. Her vast corpus of work has an impact on AI ethical policies and procedures.

The 2021 Sidney Award went to Kate Crawford, a well-known expert on AI bias, for her significant contributions to the field's understanding and mitigation of bias in AI systems. Her work is essential to the creation of more equitable AI systems.

2.4 Next Era for Women in AI

With a number of predictions indicating more involvement and leadership positions for women in AI in the years to come, the future appears bright for these ladies. The following predictions pertain to the role of women in the AI sector [20, 21]:

- This growth will be fueled by ongoing lobbying, educational initiatives, and legislative modifications. Women will hold 400,000 of the 1 million AI jobs.
- A Forbes analysis predicts that by 2025, financing for female-led AI firms will increase by 25% above present levels. They may earn \$125 million if they now receive \$100 million, demonstrating the increased trust of investors in female AI entrepreneurs.
- By 2030, women are expected to file 30% more patents in AI, according to the World Intellectual Property Organization (WIPO). By 2030, there may be 13,000 patent applications, up from 10,000 today, suggesting that more creative contributions from female AI specialists are being made.
- By 2028, educational efforts will increase the proportion of female graduates in AI-related disciplines by 50%. About 30,000 women might graduate by 2028 if 20,000 do so now, training more women for jobs in AI.

According to projections, women will be the primary authors of 35% of AI research publications by 2026. The growing significance of women in AI research is demonstrated by the possibility that 350 out of 1,000 research publications might be led by women.

2.5 Gender Diversity in AI: India Statistics

Due to business mentoring, proactive government initiatives, and growing awareness, India is progressively closing the gender inequality. Table 1 provides the fraction of women AI careers in India.

Table 1: Proportion of Women AI Professionals in India

Metric	% of women in Tech India (2025)	Global average
AI roles	28	26
Cybersecurity	17	25
Tech founders	14	19
Increase since 2020	+9	+5

India has a rising number of women who are leading from the front:

1. Dr. Neeta Verma, a former director general of NIC and an authority on AI governance;
2. Sneha Revanur, a youth leader and champion for AI ethics;
3. Rinki Sethi, CISO of Bill.com (formerly vice president of security at IBM and Twitter);
4. Dr. Megha Bhatt, entrepreneur and STEM educator, is developing AI education for girls.

These trailblazers are guiding the upcoming generation of women in technology in addition to developing safe digital frameworks [22]. The following public and private programs encourage women in AI technology:

- WE-Hub (Women Entrepreneurs Hub): It provides support to tech-based enterprises run by women;
- Digital Shakti Campaign: It educates young girls about cybersecurity;
- The AI Centre of Excellence: It provides training programs targeted at women in rural regions;
- NOSSCOM's FutureSkills Prime: It provides free AI and cybersecurity courses for women.

Additionally, these programs are generating a pool of highly qualified female professionals in Tier-2 and Tier-3 cities.

3. Challenges Faced by Women in AI

The underrepresentation of women in AI and technology is undeniable. According to estimates, women make up 13.5% of AI experts. This raises the question of why this underrepresentation exists. Although women made up a large portion of the leaders and inventors in the early days of computers and the internet, males now predominate in this profession. The ratio of women employed by even the biggest software businesses is startlingly low: only 10% of Google AI and 12% of Element AI are female [23]. Two-thirds of businesses think women would prioritize their families above their careers, and many do not think women boost financial returns.

Table 2 lists some of the obstacles women encounter in the field of AI as well as potential remedies to alleviate gender disparity. Only by taking significant action, particularly by male-identifying leaders in government and business, will the gender gap be closed and an equitable culture established [24]. These actions could include establishing clear, visible leadership and advocating for change; educating people to reduce unconscious bias; providing blind recruitment and compensation; providing sponsors rather than mentors; approving flexible work schedules for everyone; and acknowledging that men can, do, and ought to be permitted to prioritize their families.

Table 2: Barriers for Women in AI

Barrier Category	Description	Remedies
Lack of Education	Compared to males, women are less likely to enrol in AI-related massive open online courses, which are frequently available for free and cover a variety of subjects. Women graduate at a lower rate in AI. Additionally, women typically have lesser numeracy abilities than	Tackling current gender inequalities in curriculum and parental choices, as well as promoting increased female-identifying enrolment in AI-related programs and apprenticeships. Establishing and supporting grant programs to increase women's participation in AI education

	male graduates when they enter the workforce after graduating from these disciplines.	
Lack of Diversity	The lack of diversity in the makeup of AI teams worldwide is a reflection of the pervasive gender gap and, as a result, of societal prejudice and gender bias.	Participation in AI activities that identify as female should rise more quickly. However, if these individuals encounter persistent prejudices in the workplace, efforts to increase the number of females and women studying AI would not significantly close disparities.
Misconceptions about Socio-Cultural Expectations and Structure	Gender-Specific Expectations: Architects, scientists, and engineers are the career choices of twice as many guys as girls. Entrepreneurial gender disparity: Men are three times more likely than women to operate a company with workers, and they are almost twice as likely to work for themselves.	Fostering female-identifying role models in AI is one important way to change gender-specific preconceptions about careers. Addressing the systemic underlying causes of the inequality is necessary to close the gender gap. Putting into practice awareness initiatives that address prejudices, stereotypes, and sociocultural norms.

3.1 Overcoming Challenges for Women in AI

Girls might be inspired and motivated to accomplish their own objectives by influential women. When there aren't enough female leaders in AI, ambitious female leaders may not think they can succeed since they don't see other women in such positions. According to a study conducted by the Peterson Institute for International Economics, which surveyed 21,980 businesses across more than 90 countries, the profitability of these businesses increases when there are more female-identifying executives in senior corporate management roles [25].

Table 3 lists a few instances of women in technology who have overcome obstacles and held senior positions.

Table 3: Overcoming Challenges for Women in AI

Name	Title	Company	Addressing Key challenges
Heather Bowerman	Founder and CEO	DotLab	The first non-invasive endometriosis test
Ahna Girshick	Senior Computational Research Scientist	AncestryDNA	Enhanced the architecture of data presentation and created computational methods to help individuals connect with their past
Rana el Kaliouby	CEO and Co-Founder	Affectiva	25% of the Fortune 500 already utilize ML technologies that can recognize emotions
Daniela Rus	Professor and Director of CSAIL	MIT	The MIT CSAIL's first female-identifying head
Rachel Thomas	Founder	Fast.ai	Offers free online courses in AI to everyone

These ladies are now prospering after overcoming prejudice and gender bias. They are trailblazers for women in AI and leaders in their respective fields. AI, as we know it, is being revolutionized by women like Daniela Rus, one of the world's top roboticists. She is carrying out groundbreaking research on developing soft robotics, self-reconfiguration, and network partnerships. To promote equality for everybody, Heather Bowerman is utilizing her position to assist in the eradication of institutionalized bias in the medical sector. In 2016, the MIT Technology Review called her one of the leading innovators under 35, and in 2017, Goldman Sachs named her one of the most fascinating entrepreneurs [26]. These are only a handful of the women who are improving AI and attempting to increase the gender inclusivity of the industry. Everyone in the AI sector has to be more committed to supporting, nurturing, and mentoring women to help improve gender equality in the field. Examples of organizations whose primary objective is to assist in bridging the gender gap in technology are shown in Table 4.

Table 4: Supportive Organization for Women in AI

Organization	Vision for AI	Program Objective
AI4ALL	Workforce that is inclusive and diverse: AI offers a potent set of tools that everyone ought to have to access our rapidly evolving reality. AI's ability to help mankind will be unlocked by a diversity of perspectives and life experiences.	Make connections between all minorities and female mentors and role models. At the moment, 86% of graduates have role models in the AI industry that identify as female.
Girls Who Code	Stop the fall: Girls Who Code aims to close the gender gap and halt the decrease in the proportion of women in computing.	Reduce the gender gap in technology-related occupations and alter the way the public perceives programmers.
Women in Technology	Give learning chances: Give all women working in technology, including AI, mentorship opportunities, leadership training, and technological education.	It aims to support the advancement of women in technology across all spheres of life.
Women in AI	Empowering women in AI: the stigma associated with fear and threat in the area must be eradicated, and women must be better represented in AI. Support is required for women to assume leadership positions and strive for increased influence.	The primary objective of the Women in AI initiative is to reduce the gender disparity in participation and representation of women in AI.

4. Strategic Measures to Improve Women Engagement in AI Development

Significant adjustments must be made if gender equality is to exist in technology, and AI in particular. The difference must be felt and seen by women. A recommended occupational life cycle for women in AI is shown in Table 5. This life cycle is divided into stages according to the age and professional stage of the woman. The life cycle centers on resources, mentors, and education that are made available and, in some situations, necessary for everyone. Supporting females in K–12 schools is centered on modifying the curriculum to make it more inclusive [27]. Women are frequently in a discovery period throughout their undergraduate studies, and the current solutions emphasize inclusivity and motivating

women through activities and instruction. To make sure she feels included, a woman will receive training and be exposed to diversity efforts in the early phases of her professional career.

Making a job work for a woman and providing her with the opportunity she needs to grow in her role are the main goals of a woman's middle-stage professional career. Lastly, to keep women current and supported in their professions, they must have access to programs and courses. This life cycle offers a fresh approach to providing women with opportunities and the assistance they require to thrive.

Table 5: Empowering Women with AI-Mindset

Age	Stage	Suggestion
> 18	Growth	AI instruction in the core curriculum Training on unconscious bias for educators and counselors Role models for girls in AI (in the media)
18-24	Discovery	AI activities and initiatives More female academics Increase knowledge on AI industry employment
25-34	Exploration	Women role models in the public eye Diversity in recruiting, training, and allying with men
35-54	Establishment	Development of professional skills Workplace diversity policies Workplace childcare program Technical instruction
55-64	Influencer	Industry gatherings and activities tailored to women Expanding educational access through the internet Management's encouragement

5. Discussion

The increasing impact of automation on women's employment is a significant concern, with AI and ML predicted to replace over half of all American jobs by 2026. Women, who make up just 50% of workers, are at the most risk of being replaced by technology, with up to 58% of them at risk. To ensure their livelihoods are not disrupted by technological advancements, it is crucial for women to acquire new skills that will prepare them for the future technological market. The gender disparity in the technology sector indicates an opportunity for women looking to start careers in technology or shift occupations in established technology fields. To meet the growing demand for AI specialists, talent pools in AI must be targeted to include applicants from all genders, ages, and backgrounds. A recent analysis by Gilchrist suggests that the market for AI employment might grow by as much as 16% in 2021 [28].

Relevant stakeholders must focus on young female-identifying students in STEM fields to prepare for the future expansion of the AI sector. Education in STEM professions is crucial for both men and women as AI increasingly dominates the workforce. Girls must be inspired and encouraged to pursue STEM fields from an early age, as this early admission will create prospects for pursuing careers in AI [29]. Emerging AI markets will also be significantly impacted by women, as recruiting and retaining top people in developing regions is a difficult task due to high turnover rates in many developing nations.

To address this issue, multinational corporations have turned to a talent pool that competitors typically ignore: women in developing nations, who make up at least half of the workforce and university

graduates. AI is expected to drastically alter employment trends in the upcoming years, and businesses and other stakeholders need to be ready to invest in reskilling for AI-related positions. Employers can reduce gender bias in recruiting, retention, and career advancement by using these developing AI marketplaces with consideration, potentially advancing women into leadership positions in these industries.

In an AI-dominated future, companies must diversify their senior executives' skill sets to remain competitive. Women's needs may be difficult to accommodate in a white male-dominated executive board. Promoting diversity can help more women advance into leadership positions and encourage more women to pursue careers in AI [30]. Companies can inspire new entrants and prospective applicants by promoting female-identifying employees to high management positions. One effective strategy to get women into the technology industry is to provide them with opportunities to grow in their professions and guide them to success in senior leadership positions. Promoting female-identifying employees to high management positions can positively impact top female talent retention and employee participation. However, there is a low degree of female-identifying engagement in AI development. The issues and methods of women might influence how AI is developed, leading to AI lacking the feminine blending necessary for daily living. Women's contributions to AI development cannot be overlooked, as their contributions could lead to the widespread use of AI being perceived unfavorably. Closing the gender gap in the technology sector is crucial for establishing and maintaining true equality and access to opportunity, regardless of gender. AI has the potential to either narrow or exacerbate the gender gap as it develops and permeates daily life. Promoting women to senior positions in the AI sector, encouraging young girls to pursue STEM careers, and considering women's needs while creating new technologies all need concerted effort. AI has the potential to be a potent equalizing tool if these efforts are successful.

6. Conclusion

This study emphasizes how critical it is to close the gender gap in the AI sector to promote fair and creative technological development. It emphasizes the transformative potential of inclusive practices by highlighting the current underrepresentation of women, identifying important barriers like workplace biases and educational disparities, and showcasing the contributions of female pioneers. Increasing women's involvement and leadership in AI requires strategic actions, like improved STEM education for girls, strong mentorship programs, and workplace diversity policies. In addition to empowering women, these initiatives guarantee that AI systems are created with various viewpoints, reducing prejudices and boosting the advantages for society. To maintain this momentum and build an AI ecosystem that is truly inclusive, leaders in the industry, legislators, and educators must continue to be committed.

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