JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

RECENT TRENDS IN APPLICATION OF ARTIFICIAL INTELLIGENCE (AI)

[1]Dr. Rajeev Jain, [2]Dr. Shikha Ujjainia
[1]Professor, [2]Assistant Professor
School of Management
Sanjeev Agrawal Global (SAGE) University, Bhopal, India

Abstract : Artificial Intelligence (AI) has become a transformative force across diverse sectors, revolutionizing traditional workflows, enhancing decision-making, and enabling unprecedented levels of automation. This paper explores the most recent trends in AI applications across key domains including healthcare, finance, education, manufacturing, and governance. It examines the evolution of generative AI, explainable AI (XAI), edge AI, AI ethics and governance, and human-AI collaboration. The study synthesizes findings from current literature, industry reports, and emerging case studies to present a comprehensive overview of how AI is shaping the present and future landscape. The paper also discusses challenges, risks, and future directions for research and policy.

Keywords **- Artificial Intelligence, Generative AI, Explainable AI, Edge Computing, AI Ethics, Human-AI Collaboration**

I. INTRODUCTION

Artificial Intelligence (AI) has evolved from a theoretical concept to a practical technology embedded in everyday life. From self-driving cars to AI-powered medical diagnostics, the reach of AI is expanding rapidly. With the convergence of big data, cloud computing, and machine learning, AI systems have become more capable, autonomous, and pervasive. Recent years have seen a shift from narrow, rule-based systems to more sophisticated models such as generative AI, deep learning networks, and reinforcement learning frameworks. This paper aims to highlight the recent trends in the application of AI and assess their implications for various industries and society.

II. GENERATIVE AI: TRANSFORMING CREATIVITY AND CONTENT

2.1 Applications

- **Content Creation:**

Tools like ChatGPT, Jasper, and Write sonic can generate blogs, reports, poems, and summaries based on user prompts. News agencies are experimenting with AI-generated reports for sports, finance, and weather updates, ensuring faster content generation with minimal human intervention.

- **Design and Art:**

Applications like DALL·E and Midjourney enable the creation of unique visual artworks based on textual descriptions. Designers use these tools for logo generation, virtual try-ons, and mock-ups, thereby accelerating creative processes.

- **Education:**

Personalized learning platforms are integrating generative AI to create study materials, quizzes, and even simulate virtual tutors. Tools like Khan Migo (by Khan Academy) use LLMs to tutor students interactively.

- **Coding Assistants:**

GitHub Copilot, powered by OpenAI Codex, assists developers by suggesting code snippets, automating boilerplate code, and even generating entire functions or modules, thereby increasing programming efficiency.

2.2 Impact

- **Democratization of Creativity:**

Individuals without formal training in writing, art, or design can now create high-quality content quickly.

- **Misinformation Risk:**

The ease of generating fake articles, images, or videos raises concerns around the proliferation of deepfakes and synthetic media.

- **Legal and Ethical Issues:**

Questions around content ownership, intellectual property, and attribution are intensifying, especially when AI replicates existing human-created work.

III. Explainable AI (XAI): Building Trust and Transparency

3.1 Trends

- **Regulatory Push:**

Governments in the EU and U.S. are enforcing laws that demand explanations for algorithmic decisions, especially in areas affecting civil rights like credit scoring, job hiring, and judicial rulings.

- **Toolkits:**

Tools like LIME (Local Interpretable Model-Agnostic Explanations) and SHAP (Shapley Additive explanations) help unpack black-box models, showing how different variables influence model outputs.

- **Integration:**

In healthcare, XAI helps explain why an AI suggested a particular diagnosis. In finance, it clarifies credit risk evaluations to comply with transparency standards.

IV. AI at the Edge: Edge Computing and Real-Time AI

4.1 Applications

- **Autonomous Vehicles:**

Cars equipped with on-board AI process sensor data in real time to make driving decisions. Edge AI helps minimize delays that could arise if data were sent to remote servers.

- **Smart Manufacturing:**

IoT devices with edge AI monitor machinery health, predict failures, and trigger maintenance automatically, reducing downtime and improving operational efficiency.

- **Healthcare Wearables:**

Devices like smartwatches use edge AI to analyze biometric data (e.g., heart rate, oxygen levels) and issue alerts without relying on the cloud, ensuring privacy and instant feedback.

4.2 Advantages

- **Faster Processing:**

Reduces latency by eliminating the need to transmit data to centralized servers.

- **Reduced Bandwidth Usage:**

Only essential data is transmitted, reducing network congestion and operational costs.

- **Improved Privacy and Security:**

By processing data locally, sensitive information is less likely to be intercepted or misused.

V. AI in Sectoral Applications

5.1 Healthcare

- **Diagnostics:**

AI models analyse medical images (X-rays, MRIs) with high accuracy. IBM Watson and Adios are examples of AI systems assisting radiologists.

- **Drug Discovery:**

AI expedites the identification of potential drug candidates by analysing vast datasets and simulating compound interactions.

- **Personalized Medicine:**

Machine learning tailors treatment plans based on an individual's genetic profile, lifestyle, and medical history.

5.2 Finance

- **Fraud Detection:**

Machine learning identifies anomalous transactions by learning from past fraud patterns. It adapts to evolving tactics used by cybercriminals.

- **Algorithmic Trading:**

AI executes high-speed trades based on real-time data, improving portfolio returns and reducing risk.

- **Customer Service:**

Virtual assistants like Erica (Bank of America) handle account inquiries, saving human resources and improving service delivery.

5.3 Education

- **Adaptive Learning:**

AI customizes content based on student performance and learning pace. Platforms like Dream Box and Squirrel AI are examples.

- **Assessment Automation:**

Grading of multiple-choice and even subjective answers is being automated using AI, saving educator time and providing instant feedback.

- **Learning Analytics:**

AI tracks student behaviour and performance to identify at-risk students and suggest interventions.

5.4 Governance

- **Smart Cities:**

AI optimizes utilities, traffic flows, and emergency response times through real-time data processing.

- **Predictive Policing:**

Algorithms forecast crime hotspots, allowing better resource allocation. However, ethical concerns around bias remain.

- **Citizen Engagement:**

Chatbots and AI-driven platforms streamline access to public services, complaint resolution, and policy feedback.

5.5 Manufacturing

- **Predictive Maintenance:**

AI models predict equipment failures before they occur, reducing downtime and maintenance costs.

- **Robotics:**

Intelligent robots perform tasks like assembly, inspection, and packaging in highly automated factories.

- **Supply Chain Optimization:**

AI forecasts demand, manages inventory levels, and identifies bottlenecks, thereby enhancing responsiveness.

VI. ETHICAL AI AND POLICY FRAMEWORKS

6.1 Challenges

- **Bias in Algorithms:**

AI trained on biased data can perpetuate discrimination, particularly in hiring, lending, or law enforcement.

- **Job Displacement:**

Automation threatens low- and mid-skilled jobs, necessitating retraining and social safety nets.

- **Privacy Breaches:**

AI-driven surveillance and data analysis can infringe on individual privacy without adequate safeguards.

- **Lack of Accountability:**

The opaque nature of AI decisions raises questions about who is liable when errors occur—developers, users, or companies?

6.2 Global Efforts

- **EU AI Act:**

Categorizes AI applications into risk tiers and mandates transparency, data governance, and human oversight.

- **OECD AI Principles:**

Advocates for inclusive, sustainable, and human-centric AI development.

- **India's NITI Aayog Strategy:**

Focuses on using AI for social inclusion in agriculture, education, healthcare, and governance.

VII. HUMAN-AI COLLABORATION

7.1 Examples

- **AI + Doctor:**

AI supports diagnosis by flagging potential issues in scans, but final decisions remain with medical professionals.

- **AI + Teacher:**

AI tools grade papers and suggest improvements, while teachers focus on mentorship and personalized guidance.

- **AI + Customer Support:**

AI answers FAQs and handles routine queries; human agents intervene in complex or sensitive issues.

VIII. CHALLENGES AND FUTURE DIRECTIONS

8.1 Key Challenges

- **Fairness and Inclusivity:**

Ensuring AI serves all demographics and regions equally, not just affluent, data-rich communities.

- **Sustainability:**

Training large AI models consumes significant energy. Solutions include using green energy and optimizing algorithms.

- **SME Integration:**

Many small and medium enterprises lack the resources to adopt AI, leading to a digital divide.

- **Misinformation Management:**

Generative AI can create convincing fake news and content, requiring robust verification tools.

8.2 Future Research Directions

- **Neuromorphic Computing:**

AI chips mimicking the human brain offer efficiency gains and better real-time learning.

- **Quantum-AI Integration:**

Combining quantum computing with AI could dramatically speed up data analysis and optimization.

- **Artificial General Intelligence (AGI):**

Efforts continue to develop AI with human-level reasoning and adaptability.

- **Climate Modelling:**

AI is being used to simulate environmental scenarios and optimize resource usage in combating climate change.

REFERENCES

[1] Brockman, G., et al. (2023). ChatGPT and the Future of Generative AI. OpenAI Technical Report. https://openai.com/research

[2] Brynjolfsson, E., & McAfee, A. (2017). The business of artificial intelligence: What it can — and cannot — do for your organization. Harvard Business Review. https://hbr.org

[3] Doshi-Velez, F., & Kim, B. (2017). Towards a rigorous science of interpretable machine learning. ar Xiv preprint arXiv:1702.08608. https://arxiv.org/abs/1702.08608

[4] Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press.

[5] Gartner, Inc. (2024). Top strategic technology trends 2024. https://www.gartner.com

[6] Harari, Y. N. (2020). The age of AI: Implications for the future of humanity. Foreign Affairs, 99(4), 21–29. https://www.foreignaffairs.com

[7] IEEE Standards Association. (2023). Ethically aligned design: A vision for prioritizing human wellbeing with autonomous and intelligent systems. IEEE. https://standards.ieee.org

[8] Kumar, R., & Bansal, A. (2022). Edge AI: Applications and challenges. IEEE Access, 10, 15019–15035. https://doi.org/10.1109/ACCESS.2022.3149386

[9] McKinsey & Company. (2023). The state of AI in 2023. https://www.mckinsey.com

[10] MIT Technology Review. (2024). 50 smartest companies: AI edition. https://www.technologyreview.com

[11] NVIDIA. (2023). AI at the edge: Real-time solutions for smart devices. https://www.nvidia.com

[12] Oxford Internet Institute. (2022). AI and society: Opportunities and risks. University of Oxford. https://www.oii.ox.ac.uk

[13] PwC. (2023). AI predictions 2023: 5 trends to watch. PricewaterhouseCoopers. https://www.pwc.com

[14] Stanford University. (2024). AI index report 2024. Stanford HAI. https://aiindex.stanford.edu

[15] World Economic Forum. (2024). Global AI adoption index. https://www.weforum.org