


Chapter 7


AI in Critical Sectors: Healthcare, Education, Finance, and Security – Ethical Challenges in Generative AI

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ABSTRACT

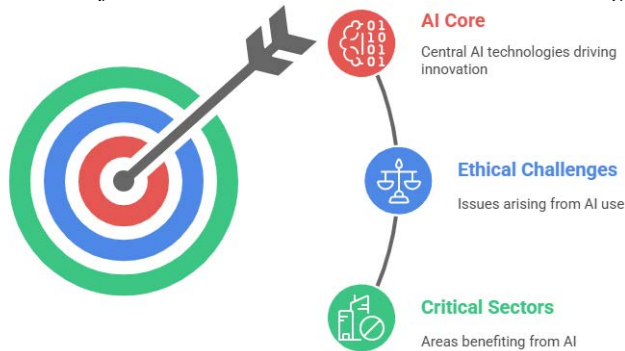
This chapter explores the transformative impact of Artificial Intelligence (AI) across four critical sectors healthcare, education, finance, and security while addressing the profound ethical challenges arising from the rise of generative AI. It examines how AI enhances diagnostic precision, personalized learning, financial efficiency, and cyber resilience, yet simultaneously introduces risks such as bias, privacy violations, algorithmic opacity, and misinformation. The chapter emphasizes the growing need for ethical governance frameworks, fairness auditing, and transparency to maintain public trust. Furthermore, it discusses how generative AI technologies, including large language models and deepfakes, complicate issues of authorship, authenticity, and accountability. By proposing governance and mitigation strategies, this chapter contributes to understanding how ethics, trust, and regulation can ensure that AI innovation aligns with human rights, fairness, and societal well-being.

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1. INTRODUCTION

Figure 1. Overview of AI in Critical Sectors and Ethical Challenges



The rapid evolution of Artificial Intelligence (AI) has revolutionized how societies organize and manage critical infrastructures and essential services. Once considered a futuristic concept, AI now underpins decision-making processes across sectors such as healthcare, education, finance, and security. These technologies enhance efficiency, accuracy, and personalization by integrating advanced data analytics, predictive modeling, and machine learning algorithms. From assisting doctors in diagnosing complex diseases to enabling adaptive learning experiences in classrooms, automating credit assessments, and detecting cyber threats in real time, AI has become the backbone of many essential operations. However, this transformation also brings profound ethical and social challenges that demand serious attention, as AI's influence expands into domains that affect fundamental aspects of human life. AI in critical sectors operates within environments that directly impact human welfare, dignity, and trust. Algorithmic decisions influence who receives life-saving treatment first, which students are labeled as at-risk, who qualifies for a loan, and how governments identify and respond to security threats. As a result, errors, biases, or inequities within AI systems are not just technical flaws but moral failures that can perpetuate discrimination, exclusion, and injustice. Machine learning models trained on biased data can replicate existing social inequalities, producing systemic unfairness in domains such as healthcare outcomes, financial accessibility, and educational opportunity. This underscores the need for AI systems to be not only technically sound but ethically accountable ensuring fairness, inclusivity, and respect for human rights. The emergence of generative AI has further intensified these ethical complexities. Unlike traditional rule-based algorithms, generative AI embodied in large language models, image generators, and deepfake systems can autonomously produce text, visuals, and sounds that closely mimic human creativity. While such

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