Chapter 8
Industry-Specific Applications of AI and ML

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ABSTRACT

Artificial intelligence in healthcare has the potential to enhance diagnostics, patient care, and medical research. However, trust in AI-driven decision-making processes is crucial as AI systems become more complex. Explainable artificial intelligence (XAI) is a strategy to ensure AI-driven healthcare solutions are efficient and understandable to healthcare professionals and patients. XAI can improve medical practitioners' decision-making processes, increase trust in AI recommendations, and boost patient-doctor communication. Applications include medical imaging, predictive analytics, drug development, and tailored treatment plans. The chapter discusses the ethical and regulatory implications of AI in healthcare, focusing on patient data privacy and security. Future XAI trends will focus on improving patient outcomes and healthcare service quality by making AI systems accessible and consistent with ethical norms.

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1. INTRODUCTION

AI is revolutionizing healthcare by improving diagnoses, personalizing treatments, and advancing medical research (Harry, 2023). However, concerns about transparency and interpretability arise due to AI algorithms making judgments without explanations. Explainable Artificial Intelligence (XAI) is crucial in addressing this issue. Despite advancements in predictive analytics, image recognition, and data analysis, XAI provides human-understandable explanations for AI-driven judgments, providing a foundation for regulating AI-driven healthcare applications (Das and Rad. 2020). Artificial Intelligence (AI) has significantly transformed healthcare by providing insights into the "why" and "how" of AI suggestions. This is crucial for physicians and patients to understand the reasoning behind AI decisions. XAI has the potential to revolutionize AI use in healthcare, enabling better-informed decisions, promoting trust in AI recommendations, and improving patient-doctor communication (Patil and Patil, 2023). However, challenges such as data protection, algorithmic complexity, and interaction with existing systems exist. The transformative potential of XAI in healthcare goes beyond increasing results; it also ensures AI adheres to medical ethics.

Artificial intelligence (AI) is revolutionizing healthcare by providing innovative solutions and creating new opportunities (Lee and Yoon, 2021). Its impact extends to patient care, medical research, therapy, and diagnostics. AI has significantly improved diagnostics and medical imaging, assisting medical personnel in identifying diseases in X-rays, CT scans, and MRIs. AI algorithms can evaluate medical images with exceptional accuracy, expediting diagnostic procedures and enhancing findings' precision, leading to earlier action and improved patient outcomes.

AI's predictive analytics enable medical professionals to detect at-risk patients and customize treatment strategies based on the patient's medical background, genetic information, and previous medication reactions. This helps control chronic conditions and avoid complications. AI also accelerates drug research and development by identifying potential drug candidates by processing large datasets (Paul et al., 2021). This expedites the process by reducing negative effects and increasing the efficiency of medication. Overall, AI's predictive analytics play a crucial role in managing chronic conditions and preventing complications.

AI, particularly Natural Language Processing (NLP), is a powerful tool that aids in data management, information extraction, and decision assistance (Singh, 2018). It is used in robotic surgery to improve precision and reduce recovery times. AI-powered chatbots and virtual health assistants provide 24/7 patient support, organize appointments, and answer medical questions. These platforms also aid in clinical decision-making by providing advice based on the available data. AI also plays a crucial role in telehealth and remote monitoring, enabling physicians to track patient health and intervene promptly, particularly in chronic disease management. AI is revolutionizing administrative operations like medical billing and insurance claim processing, reducing errors and increasing operational efficiency. As technology advances, AI is expected to significantly impact healthcare delivery, patient care, and medical research advancements.

AI has advanced significantly in various industries, including healthcare, finance, autonomous driving, and natural language processing. Machine learning models can process large amounts of data and identify patterns. However, the issue in AI decision-making poses a challenge. Explainable Artificial Intelligence (XAI) was created to address this issue. XAI aims to bridge the gap between AI's ability to generate accurate forecasts and recommendations and our understanding of them (Saeed and Omlin,