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THE IMPORTANCE OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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Abstract: The Fourth Industrial Revolution is marked by the integration of emerging technologies across physical, digital, and biological domains. One of the most transformative innovations in this era is artificial intelligence (AI), which is expected to play a crucial role in revolutionizing healthcare. AI has the potential to enhance disease tracking, treatment planning, and decision-making by providing medical professionals with comprehensive data analysis. Additionally, AI-driven data management is a foundational step in improving healthcare systems, particularly in genetics, where projects like Deep Genomics leverage large datasets to identify disease-related mutations and predict DNA modifications.

Keywords: Artificial Intelligence, Healthcare, Big Data, Disease Tracking, Pharmaceutical Development, Personalized Medicine, Deep Genomics, Ethical AI Usage.

There are many thought leaders who believe we are experiencing the Fourth Industrial Revolution, characterized by emerging technologies that integrate our physical, digital, and biological worlds. These technologies influence various disciplines, economies, and industries while addressing numerous challenges. Healthcare is expected to be one of the primary sectors of this revolution, with artificial intelligence (AI) serving as a key catalyst for change.

In reality, we perceive the world around us through systems of rules and processes. The world of Big Data is so vast that we need AI to monitor and analyze it effectively. In the healthcare and medical fields, AI can improve disease tracking, treatment planning, and decision-making by providing physicians with comprehensive data. AI has the potential to revolutionize healthcare—from treatment planning for various diseases to automating repetitive tasks, such as drug management and pharmaceutical development.

One of the most significant applications of AI in healthcare is data management. Collecting, storing, and tracking medical data is considered a foundational step in transforming the current healthcare system. AI can also significantly impact genetics, as seen in the Deep Genomics project, which analyzes vast genetic and medical datasets to

identify mutations associated with diseases. This new-generation computational technology helps predict how DNA modifications-natural or therapeutic- will affect cells.

At the same time, researchers from the Human Genome Project, led by Craig Venter, have been developing an algorithm that can predict a patient's physical characteristics based on their DNA.

AI in Pharmaceutical Development: Developing pharmaceutical drugs through clinical trials can take over a decade and cost billions of dollars. Accelerating these processes and reducing costs could greatly impact the healthcare industry and enhance the integration of innovative treatments into daily medicine. AI-powered supercomputers can analyze molecular structures to develop new therapies. For example, the company Atomwise launched a virtual drug screening project for the Ebola virus. Using AI-based predictive technology, they identified two existing drugs that could significantly reduce Ebola infections. This AI-driven analysis, which traditionally would take months or even years, was completed in less than a day.

AI and Personalized Medicine: Another remarkable example of AI-driven healthcare innovation is Biopharma, a Boston-based company. They collect data to understand how some individuals survive illnesses and how existing treatments can be improved or new treatments developed. AI is used to compare healthy and disease-resistant environments to identify new drugs, improve diagnostics, and enhance healthcare applications.

At the same time, public awareness of AI's capabilities and potential risks is essential. One common fear is that AI may surpass human intelligence and eventually control aspects of our lives. However, this scenario is unlikely if we prioritize proper AI implementation and ethical usage.

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