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Artificial Intelligence and Cloud-Enabled Big Data Analytics for Genomic Research: Transforming Healthcare Management Through RealTime Decision Support Systems and Predictive Modeling

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The integration of Artificial Intelligence (AI) and cloud-enabled big data analytics is revolutionizing genomic research, enabling real-time decision support systems and predictive modeling for advanced healthcare management. This study explores how AI-driven algorithms analyze vast genomic datasets to identify disease markers, predict patient outcomes, and personalize treatment strategies. Cloud computing provides scalable and secure infrastructure for processing large-scale genomic data, facilitating collaboration among researchers, clinicians, and healthcare institutions. Machine learning models enhance precision medicine by uncovering complex genetic patterns, improving diagnostic accuracy, and optimizing therapeutic interventions. Additionally, AI-powered predictive analytics supports early disease detection and population health monitoring, enabling proactive healthcare strategies. Key challenges, including data privacy, ethical considerations, and regulatory compliance, are examined alongside emerging solutions. This research highlights the transformative potential of AI and big data in genomic medicine, driving innovation in personalized healthcare and accelerating advancements in medical research.