Adaptive Cardiovascular Care: Leveraging Deep Reinforcement Learning for Personalized Treatment Optimization

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Abstract:

The rise of cardiovascular diseases (CVDs) has highlighted the need for personalized treatment strategies that adapt to individual patient characteristics. Traditional treatment methods often fail to consider the evolving nature of a patient's health. This paper presents a framework that employs Deep Reinforcement Learning (DRL) for personalized cardiovascular treatment. DRL allows for adaptive treatment plans by continuously learning from real-time patient data and medical history. The proposed model integrates patient characteristics such as age, gender, medical history, and treatment response to dynamically optimize interventions like medication dosages and lifestyle recommendations. Our results demonstrate that DRL outperforms traditional treatment approaches in terms of effectiveness and adaptability. The framework shows promise in improving patient outcomes by tailoring treatments based on long-term health objectives. Furthermore, the model offers potential for real-time decision-making in digital health applications and clinical decision support systems.

Keywords:

Deep Reinforcement Learning, Cardiovascular Treatment, Personalization, Machine Learning, Healthcare, Decision Support Systems.