Identifying At-Risk Students with Reinforcement Learning: A Basis for Improving Academic Performance in Algorithm Course Using Smart System

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Abstract:

The imperative to enhance student learning outcomes in higher education, particularly within computationally intensive fields like algorithm design and analysis, necessitates innovative approaches for identifying and supporting at-risk students. This dissertation explores the application of reinforcement learning methodologies within a smart system to proactively identify students who are likely to underperform in an algorithm course, enabling timely and targeted interventions to improve their academic trajectory. The research presented herein details the development of a novel reinforcement learning model integrated with a learning analytics framework, leveraging student engagement data, academic performance metrics, and demographic information to predict at-risk probabilities at various stages of the course. The efficacy of this approach is evaluated through rigorous experimentation, demonstrating its potential to enhance academic outcomes by providing instructors with actionable insights and facilitating personalized learning experiences.

Keywords:

Reinforcement Learning, Learning Analytics, At-Risk Students, Algorithm Courses, Smart Systems, Academic Performance, Early Intervention.