

3rd International Workshop on Machine Learning and Quantum Computing Applications in Medicine and Physics



Contribution ID : 80

Type : Talk

THE APPLICATION OF REINFORCED MACHINE LEARNING FOR CACHE MANAGEMENT IN HIGH-LOAD INFORMATION SYSTEMS

Thursday, 10 September 2026 09:40 (30)

The performance of modern, high-load information systems significantly depends on the efficiency of cache management. Meanwhile, the traditional Least Recently Used and Least Frequently Used policies are based on fixed heuristics, which limits their ability to adapt to changes in query structure and intensity.

To overcome these constraints, a decision-making approach for adding new objects to the cache is proposed, which is based on the tabular Q-Learning method with a deferred asynchronous update mechanism. It takes into account the key characteristics of objects, the context of their use and long-term consequences. The proposed approach involves training the agent through the accumulation of experience and the consideration of deferred rewards, which ensures an adaptive caching policy in real time and improves its efficiency, in particular by increasing the cache hit ratio.

The practical value of the results lies in the ability to improve the efficiency of Clinical Decision Support System users when working with current data. These systems process large, rapidly updated sets of medical data, and the developed approach will reduce data access latency and improve the information support provided to doctors when forming clinical recommendations. The proposed approach can also be applied to other electronic health systems for making decisions regarding the caching of frequently used data.

Primary author(s) : Dr VOLOKH, Bohdan (Kyiv National University of Construction and Architecture); Prof. TERENCECHUK, Svitlana (Kyiv National University of Construction and Architecture); Dr YEREMENKO, Bohdan (Taras Shevchenko National University of Kyiv)

Presenter(s) : Dr VOLOKH, Bohdan (Kyiv National University of Construction and Architecture)

Session Classification : Machine Learning in Medical Applications

Track Classification : Machine Learning in Medicine