National University of Computer and Emerging Sciences

Lab Manual 07
CL461-Artificial Intelligence Lab

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Background

Anato's pockets are as empty as a politician's promises, yet he somehow managed to scrounge up a few rupees by moonlighting as a professional rock-paper-scissors referee!

Now, Anato is dumb but he saw a “Become a millionaire overnight through Forex” scheme on a poster ad at backside of a Riskha. With nonsense Dreams of becoming the next Harshad Mehta, he downloaded an app, deposited his Rs 10,000 and started his journey to 1-click millionaire. [hopefully, he won’t lose all his money otherwise Anato will be very sad (ToT)]

Lab Task:

Design an algorithm to help Anato optimize his investment portfolio allocations using the minimax algorithm with alpha-beta pruning. The goal is to maximize returns while minimizing risk, considering various investment options and their associated risks and returns.

You must consider the following parameters:

- The algorithm should take as input the available investment options, along with their expected returns and associated risks.
- The algorithm should consider constraints such as the investor's risk tolerance and the desired investment horizon.
- The algorithm should use the minimax algorithm with alpha-beta pruning to search for the optimal portfolio allocation strategy.
- The output should be the recommended allocation of funds to each investment option, maximizing expected returns while staying within the risk tolerance limits.

Hints:

1. Represent the investment options and their characteristics (returns, risks) in a data structure.
2. Define an evaluation function that assesses the quality of a given portfolio allocation based on expected returns and risks.
3. Use recursion to implement the minimax algorithm with alpha-beta pruning to search through the space of possible portfolio allocations.
4. Consider factors such as diversification and correlation among investment options when evaluating portfolio allocations.
5. Test your algorithm with different sets of investment options and risk tolerance levels to ensure robustness and effectiveness.