CS4408 Learning Journal 8

Over the past week, I delved into understanding and applying the Mini-Max algorithm and alpha-beta pruning in decision-making contexts, specifically within economics and game theory. My primary task involved writing an academic-style essay that explained the concepts, provided a diagram of the associated game tree, and used credible sources such as *Artificial Intelligence: Foundations of Computational Agents* (Poole & Mackworth, 2017). In preparing the essay, I approached the problem by first reviewing the relevant literature, making notes on the core principles of Mini-Max, and examining how alpha-beta pruning optimizes the decision-making process.

In terms of methodology, I started by sketching a simple game tree to visualize MAX and MIN nodes. Drawing out a small example helped me internalize how each node selects either the maximum or minimum utility value, depending on whether it represents the maximizing or minimizing player. After verifying this logic, I integrated alpha-beta pruning concepts by marking branches that would be pruned if they could not influence the final outcome. Seeing this diagram reinforced my grasp of the pruning technique’s efficiency gains. I then wrote the essay’s sections in a logical order—introduction, discussion, and conclusion—ensuring that I cited the textbook (Poole & Mackworth, 2017) appropriately in APA format.

My initial reaction to this process was a mixture of curiosity and slight trepidation. Although I had read about Mini-Max previously, putting it into my own words with proper citations and creating a coherent diagram felt both challenging and rewarding. Nevertheless, once I got into the flow of organizing ideas, I found the writing process instructive and fulfilling. One aspect that stood out was seeing how theories from game theory and artificial intelligence intersect with economics, illustrating the algorithm’s broader applicability in strategic decision-making.

During the discussion forum, I received feedback from a peer who suggested that I clarify the distinction between alpha (α) and beta (β) values early in the explanation. They pointed out that the definitions of α (the best already explored option along the path to the root for the maximizer) and β (the best already explored option along the path to the root for the minimizer) could be confusing to newcomers. This comment was particularly helpful because it allowed me to refine my essay by adding a concise sentence on α and β in the introduction. This clarification not only strengthened the essay’s overall clarity but also demonstrated how peer-review can highlight areas that may be unclear to the target audience.

My feelings and attitudes throughout the assignment remained positive. Although I faced some difficulties in ensuring my references matched APA guidelines, the process taught me how critical it is to maintain academic integrity and clarity. Moreover, I learned the importance of double-checking each source for accuracy. The biggest challenge I encountered was distilling the complexity of alpha-beta pruning without oversimplifying. However, by iteratively revising and reflecting on the algorithm’s steps, I was able to refine my explanation into an accessible form.

Ultimately, this exercise deepened my understanding of how Mini-Max and alpha-beta pruning function as crucial tools in adversarial settings. Through reflective writing, active engagement with reading materials, and constructive peer feedback, I emerged with a stronger conceptual grasp of computational decision-making strategies. I believe these skills will continue to serve me not only in this course, but also in future applications where strategic thinking and efficient search algorithms are essential.

**Reference**  
Poole, D. L., & Mackworth, A. K. (2017). *Artificial intelligence: Foundations of computational agents* (2nd ed.). Cambridge University Press. <https://artint.info/3e/html/ArtInt3e.Ch14.html>