

Review Form 3

Journal Name:	Asian Research Journal of Mathematics
Manuscript Number:	Ms_ARJOM_125981
Title of the Manuscript:	THE USE OF MACHINE LEARNING, ARTIFICIAL INTELLIGENT AND GAME THEORY IN MATHEMATICS
Type of the Article	

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PART 1: Review Comments

Compulsory REVISION comments	Reviewer's comment	Author's Feedback (Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	This manuscript highlights the intersection of machine learning (ML), artificial intelligence (AI), and game theory (GT), presenting a valuable contribution to the scientific community by exploring how these fields synergize to solve complex decision-making problems. The work has relevance in applications ranging from economics to autonomous systems, emphasizing the transformative potential of this interdisciplinary approach. I appreciate the comprehensive synthesis of ML and GT, which sets a foundation for future research in both theoretical and applied contexts.	
Is the title of the article suitable? (If not please suggest an alternative title)	The current title, "The Use of Machine Learning, Artificial Intelligence, and Game Theory in Mathematics," is broadly suitable. However, a more precise title, such as "Synergies between Machine Learning, Artificial Intelligence, and Game Theory for Complex Decision-Making," could better convey the focus on interdisciplinary integration. But the choice is the author's to consider this suggestion.	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	The abstract effectively introduces the importance of integrating ML, AI, and GT. However, it could benefit from mentioning specific applications or potential research directions (e.g., autonomous systems, economic equilibrium). This addition would make the abstract more comprehensive by providing a clearer overview of the real-world implications discussed in the manuscript.	
Are subsections and structure of the manuscript appropriate?	The manuscript is well-organized, with clear sections on key concepts and applications. Each section logically flows into the next, making it accessible to readers. However, a concluding section summarizing the paper's main insights and future research areas would enhance the manuscript's structure and readability.	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.	The manuscript is scientifically sound and technically robust, addressing foundational and advanced concepts in ML, AI, and GT. It accurately describes how ML and GT can complement each other to improve decision-making in dynamic environments. The mathematical notations and models are relevant and well-explained, which strengthens the manuscript's technical merit. However, certain concepts, such as reinforcement learning dynamics and multi-agent optimization, could benefit from deeper explanations to improve accessibility for a broader audience.	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. :	<p>The references are insufficient and lack recent advancements. I recommend adding seminal and recent works in AI and GT applications, including:</p> <ol style="list-style-type: none">Yekkehkhany, A., & Nagi, R. (2022). Risk-averse equilibria for vehicle navigation in stochastic congestion games. <i>IEEE Transactions on Intelligent Transportation Systems</i>, 23(10), 18719-18735.Yekkehkhany, A., Murray, T., & Nagi, R. (2021). Stochastic superiority equilibrium in game theory. <i>Decision Analysis</i>, 18(2), 153-168.Aghassi, M., & Bertsimas, D. (2006). Robust game theory. <i>Mathematical Programming</i>, 107(1), 231-273.Nikolova, E., & Stier-Moses, N. (2012). Stochastic selfish routing. <i>ACM SIGecom Exchanges</i>, 11(1), 21-25. <p>These references could strengthen the manuscript's grounding in game theory and demonstrate its practical relevance in autonomous systems. To strengthen the discussion on reinforcement learning (RL) within game-theoretic frameworks, I recommend including recent and foundational references on RL applications. Notably:</p> <ol style="list-style-type: none">Yekkehkhany, A., Feng, H., Ying, D., & Lavaei, J. (2023). <i>A hitting time analysis for stochastic time-varying functions with applications to adversarial attacks on computation of Markov decision processes</i>. <i>IEEE Transactions on Automatic Control</i>.<ul style="list-style-type: none">This work delves into stochastic time-varying functions and their relevance to	

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	<p>RL, particularly in handling adversarial environments within Markov decision processes.</p> <p>2. Busoniu, L., Babuska, R., De Schutter, B., & Ernst, D. (2017). <i>Reinforcement learning and dynamic programming using function approximators</i>. CRC Press.</p> <ul style="list-style-type: none">This book provides a comprehensive overview of RL methods, emphasizing function approximation techniques and their applications, which could enrich the manuscript's RL-related content. <p>Including these references will bolster the manuscript’s foundation on RL techniques and their integration with game theory, demonstrating the breadth of current advancements in multi-agent decision-making and adversarial settings.</p>	
Minor REVISION comments		
Is the language/English quality of the article suitable for scholarly communications?	The language is largely clear, though some grammatical improvements could enhance readability. For instance, replacing "intelligent systems smarter" with "intelligent systems more capable" and "bring in reinforcements" with "incorporate reinforcement learning" would improve clarity.	
Optional/General comments	The manuscript presents a promising synthesis of disciplines, though integrating case studies or practical applications would enhance its appeal and relevance for applied research. Overall, this manuscript is a solid contribution that could be further improved with the above revisions and additional references.	

PART 2:

	Reviewer’s comment	Author’s comment (if agreed with the reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Are there ethical issues in this manuscript?	(If yes, Kindly please write down the ethical issues here in detail) No	

Reviewer Details:

Name:	Ali Yekkehkhany
Department, University & Country	University of Texas at Dallas, United States of America