A Game Theoretic Framework for Voting Behaviors and Candidate Strategies Using Monte Carlo Methods

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***Abstract*—This paper introduces a simulation framework to study voter-candidate dynamics and interactions in multi-issue elections. By combining voter decision-making models with candidate update strategies, we explore various interaction scenarios, including independent updates, tit-for-tat responses, and zero-determinant (ZD) strategies—a novel application in this context. Using Monte Carlo simulations, we evaluate the impact of these strategies on key metrics such as vote counts, positional stability, and extremism under varying hyper-parameter configurations. Our results reveal counterintuitive equilibrium states, demonstrating how certain strategies foster extremism or moderation, providing fresh insights into dynamic voting mechanisms using artificial intelligence.**

***Keyword*—Game Theory, Monte Carlo, Reinforcement Learning, Elections**

Matthew Fried is an Assistant Professor at SUNY Farmingdale. His main areas of research are in machine learning and mathematical applications thereof. He has authored several papers on applications of the Choquet Integral in optimizing information gain. He is currently finishing a Ph.D. in mathematics at Yeshiva University in New York, USA.