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The Sociophysical Spectrum: Navigating Behavioral Influences in Simulated Social Environments

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Abstract

This research article explores the dynamic interplay between social self-perception and behavioral influence in digital simulations, shedding light on the complexities that define our online interactions. In an era where virtual spaces play an increasingly significant role in shaping human behavior, understanding the mechanisms through which individuals perceive themselves in simulated social environments is paramount. Drawing on interdisciplinary insights from psychology, computer science, and sociology, this study employs a variety of methodologies, including virtual reality experiments, agent-based modeling, and data analytics, to comprehensively examine the intricate relationship between self-perception and behavior in digital contexts. Aiming for this goal requires the decision whether to communicate information truthfully or if deceptive lies might improve the reputation even more. The basis of this decision involves not only an individual's belief about others, but also their understanding of others' beliefs, described by the concept of Theory of Mind, and the mental processes from which these beliefs emerge. In the present work, we used the Reputation Game Simulation as an approach for modeling the evolution of reputation in agent-based social communication networks, in which agents treat information approximately according to Bayesian logic. We implemented a second-order Theory of Mind based message decision strategy that allows the agents to mentally simulate the impact of different communication options on the knowledge of their counterparts' minds in order to identify the message that is expected to maximize their reputation.

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Introduction

The advent of digital technologies has transformed the way individuals construct and present their identities in virtual spaces. This research seeks to unravel the role of social self-perception as a catalyst for behavioral influence within digital simulations. The significance of this exploration lies in its potential to inform the design of virtual environments, shape online interactions, and influence various sectors, including marketing, social media, and collaborative digital platforms. Although lying may be considered antisocial behavior, this does not necessarily hold when telling white lies or flattering to create a more pleasant social atmosphere. Nonetheless, we frequently resort to deceitful lies to gain an advantage for ourselves, for example in the form of social advancement by attempting to move the own reputation in a desired direction. The agents are modeled not to retain every step of communication, but to let them store their information at hand in a compressed way with a fixed number of parameters that are updated according to Bayesian probabilistic reasoning and information theoretical principles.

Methods

To capture the nuances of social self-perception and its impact on behavior, a multi-methodological approach is employed. Virtual reality experiments immerse participants in simulated social scenarios, allowing for the observation of real-time behavioral responses. Agent-based modeling facilitates the creation of digital societies where self-perception dynamics can be systematically manipulated and studied. Data analytics techniques are applied to large-scale datasets to uncover patterns and trends in online behavior, providing a holistic view of the digital reflections individuals project.

Results

The findings of this research underscore the reciprocal relationship between social self-perception and behavioral outcomes in digital simulations. Participants exhibit nuanced and context-dependent behaviors influenced by their constructed digital identities. The study reveals the existence of self-perception feedback loops, where online behaviors further shape and reinforce individuals' perceptions of themselves within virtual environments.



Discussion and Summary

We have set up a working model of a second-order Theory of Mind agent that uses this mental ability to deliberately deceive others with the goal of maximizing his own reputation, by choosing the communication option that promises the highest expected reputation after simulating different possibilities in the other agents' minds. As it turned out, such ToM-agents showed a strong tendency to tell lies and significantly increased their mean reputation performance compared to the conventional ordinary strategy. It must be noted the success in the individual scenario mostly depends on the quality of the ToM information used for the decision making.

Applications and Implications

The practical applications of these findings extend across various domains. From refining targeted marketing strategies to enhancing virtual team dynamics, understanding and leveraging the behavioral influence of social self-perception opens avenues for innovation. The implications also extend to ethical considerations, urging responsible development and use of technologies that influence digital behavior.

Conclusion

This research contributes valuable insights into the intricate dynamics of social self-perception and its role in shaping behavior within digital simulations. As technology continues to advance, the knowledge generated from this study informs the responsible design of virtual environments and prompts a reconsideration of ethical frameworks governing digital influence. The digital reflections individuals project online are not mere representations but dynamic forces that shape the evolving landscape of our interconnected digital society.

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