

Abstract Submitted
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Comparative advantage between traditional and smart navigation systems¹ JEONGKYU SHIN, Dept. of Physics, Pohang University of Science and Technology, Pohang 790-784, Korea, PAN-JUN KIM, Asia-Pacific Center for Theoretical Physics, Pohang 790-784, Korea, SEUNGHWAN KIM, Dept. of Physics, Pohang University of Science and Technology, Pohang 790-784, Korea — The smart navigation system that refers to real-time traffic data is believed to be superior to traditional navigation systems. To verify this belief, we created an agent-based traffic model and examined the effect of changing market share of the traditional shortest-travel-time algorithm based navigation and the smart navigation system. We tested our model on the grid and actual metropolitan road network structures. The result reveals that the traditional navigation system have better performance than the smart one as the market share of the smart navigation system exceeds a critical value, which is contrary to conventional expectation. We suggest that the superiority inversion between agent groups is strongly related to the traffic weight function form, and is general. We also found that the relationship of market share, traffic flow density and travel time is determined by the combination of congestion avoidance behavior of the smartly navigated agents and the inefficiency of shortest-travel-time based navigated agents. Our results can be interpreted with the minority game and extended to the diverse topics of opinion dynamics.

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