Zebra: Threat and Response in a Dynamical Artwork

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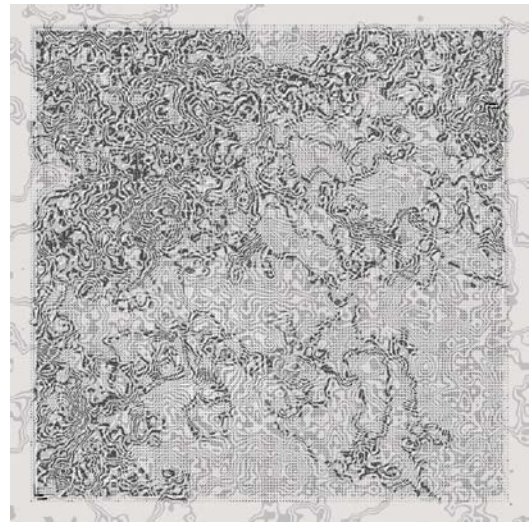
Abstract

This paper describes the artwork 'Zebra', an agent based system designed and implemented by the author. In this artwork, agents, or 'zebras', move over a noisy terrain where they perceive and respond to threat in the form of encounters. Depending on their reaction state, agents can respond to these encounters reflexively or freeze and deliberate their next action according to a history state which describes the outcome of their last encounter. Encounter outcomes are then fed back into the system where they contribute to the overall resilience of the world. 'Zebra' models how history might affect agent responses to threat and how the ongoing behavior of agents under stress might affect their environment. The artwork explores whether agents who recall the past while responding to encounters are more or less likely to become negatively correlated with stress and what effects that correlation might have on their environment.



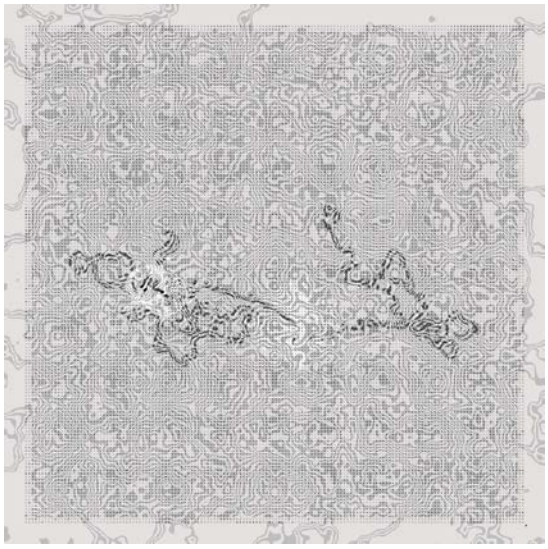
Zebra (2022), screenshot, computational media.

Description

'Zebra' is an agent based system that explores the relationship between memory, environment, and agent response to encounters. The system is

designed around two main causal loops. One loop positively correlates with erratic agent behaviors such as seeking, fighting, and avoidance. A balancing loop negatively correlates with the effects of stress on agents by reinforcing stability in the environment. Stress is measured as the global noise level in the system. Stability is measured as how sensitive the world is to its collective damage.

‘Zebra’ initializes with its environment in a neutral state. Agents start off with random encounter histories and random behaviors. A roaming state determines each agents pattern of motion and its radius of perception. Agents set to wander move through the world in a wander state with no agenda. Agents set to avoid will maintain a maximum distance between themselves and all other world elements. Agents set to seek will ‘target’ another agent within their roaming radius and attempt to leave their wandering phase to enter an encounter.



Zebra (2022), screenshot, computational media.

The outcomes of these 'encounters', or agent-to-agent collisions, are the main determinant of agent behavior. Some agents respond to encounters reflexively, choosing their next behavior at random. But other agents 'freeze' or stop activity on encounter. These agents consult a history state describing the outcome of their last encounter in order to decide a response to a current encounter.

Both reflexive and deliberative agents respond to encounters with flight, flght, or play. Agents who choose flight will take on a slight amount of damage and a slight increase in stability. Agents who fight and win are more likely to enter a seek behavior pattern. Agents who fight and lose are more likely to behave with avoidance. Over time, their movement in the world can become increasing avoidant and erratic. Agents who respond to an encounter with play will erase their history state and replace it with a wander state.

On time step, the damage and stability of the environment is calculated, along with the outcomes of agent encounters. Agent states and behaviors are updated.

References

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