

Wilderness Exploration and Pathway Formation

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Abstract—In this project, we will explore the emergent behaviors of destructive agents moving through randomly generated wilderness terrain. Specifically, we will investigate how pathway networks develop in the landscape, and the extent to which a network of paths eases the difficulties of traversing terrain.

I. INTRODUCTION

Wilderness terrain is rarely uniformly wild. Most often, it is found carved up with many pre-formed paths and animal trails. How did these paths form? Clearly, they were not engineered, but were the product of some sort of emergence. In this project, we attempt to explore this process by simulating the movement of entities across procedurally generated terrain.

Our simulation models a section of wilderness terrain, through which many different agents move. These agents can represent hikers, all-terrain vehicles, animals, or anything else. Each of these agents has nothing more than a general direction they are traveling, and knowledge of their immediate surroundings. Their goal is to reach their destination through the easiest path they can find. Agents do not have any organization amongst themselves, nor do they communicate directly with one another. Ultimately, the purpose is to see if coherent and complex networks of pathways can emerge from the actions of agents that are not cooperating with one another.

Another topic of investigation is how easy traversing the terrain becomes as the path network reaches maturity. A wild wilderness should presumably be a difficult area to move through. Just how much of an effect does an established network of paths have on minimizing this difficulty?

Also, just what is the effect on the terrain itself when these agents come tearing through, trampling everything in their path? Is the destruction they cause enough to destroy ecosystems, or can a wild wilderness be made traversable without compromising its various ecological balances?

We have created a complex system crafted out of relatively simple rules, so there is a lot of potential for completely unforeseen properties to emerge. We hope to find unexpected behaviors in the simulation. As with many experiments, the secondary goal of this simulation is to be happily surprised by it.

II. SIMULATION OVERVIEW

The simulation was written in NetLogo 5.1. It consists of two major parts: the terrain, and the agents. The terrain is a procedurally generated, grid-based map, and agents are small objects that traverse this map.

A. Terrain Generation

Subsection text here.[1]

B. Agent Behavior

Subsection text here.

C. Extension: Terrain Regrowth

Subsection text here.

III. RESULTS

Results goes here.

IV. DISCUSSION

Discuss stuff here.

V. CONCLUSION

The conclusion goes here.

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REFERENCES

- [1] Weisstein, Eric W. "Voronoi Diagram." From MathWorld—A Wolfram Web Resource. <http://mathworld.wolfram.com/VoronoiDiagram.html>