Self-sustainability Challenges of Plants Colonization Strategies in Virtual 3D Environments

Abstract: The Biosphere is a bountiful source of inspiration for the biologically inclined scientist, though one may be seized by the twists and turns of its complexity. Artificial Life emerged from the conundrum of condensing this overwhelming intricacy into a tractable volume of data.
To tackle the distant challenge of studying the long-term dynamics of artificial ecosystems, we focused in this work our efforts on plant-plant interactions in a simplified 3D setting.
Through an extension of K. Sims' directed graphs, we devised a polyvalent genotype for artificial plants development.
These individuals compete and collaborate with one another in a shared plot of earth subjected to dynamically changing environmental conditions.
We illustrate and analyze how the use of multi-objective fitnesses generated a panel of diverse morphologies and strategies.
Furthermore, we identify two driving forces of the emerge of self-reproduction and investigate their effect on self-sustainability.