

# Simulation of the commercial market evolution in a city

Carlos Soriano; Patow, Gustavo A.



Simulating the evolution of urban landscapes is a challenging objective with a large impact not only for Computer Graphics (for its applications in the filming and gaming industries), but also for urban planning, economical and historical studies, urban physics, and many other. However, this target has remained elusive because of the large complexity implied by urban structures and their evolutions. We present a system that aims at simulating the evolution of the commercial structure in a modern city. In particular, given an initial distribution of shops, it studies the evolution when larger commercial areas, like malls, are introduced.

This is computed using the Huff model as a measure of the attraction each commerce has on potential consumers, and an agent-based simulation to determine how these aspects affect their choices. Then, after a given simulation time, the system decides whether the shop has retained an income such that it can continue operating, or has gone bankrupt. Our system is used to study the evolution of the commercial structure of Barcelona city over the last century. 1. Introduction Procedural urban modeling has presented us with astonishing results over the last decade, starting with the seminal work by Parish and Muller [PM01] and Muller et al. [MWH 06], and continuing with the recent advances in acquisition [MWA 12], non-regular modeling [LCOZ 11], user interfaces [Pat12], among others. However, in spite of all those improvements, several problems remain open [PBP14], one of the most important ones is simulating the evolution of urban landscapes over time. With only a few exceptions [WMWG09,BWK14], this topic has barely been touched, in spite of its crucial importance for history and archeology, urban planning, socio-economical studies, and many other social-related disciplines. Among these unexplored aspects, the problem of simulating the evolution of the commerce structure in a city is a prominent one, as it is attractive for being computationally tractable and crucial for socio-economic studies. But this study has applications that are broader than a pure social analysis, as the resulting distributions can be used to also model its appearance over time, which is interesting for computer graphics because of its applications to film and videogames, two of the leading industries in the field

<http://dx.doi.org/10.2312/ceig.20151206>