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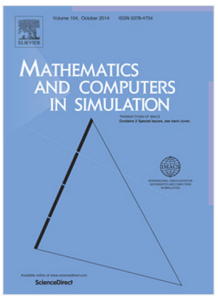

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A physical model for screen space distribution of 3D marks on geographical information systems

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Abstract

In this paper, a novel approach to the on-screen reordering of geolocated marks for geographical information system is proposed. This self-organizing set of marks, called *Non-Overlapping Marks*, relies on a real-time simulation of a physical model of point masses. This work presents the challenges of displaying a high number of such georeferenced features on 2D and 3D maps, and the goals that the final mark distribution should achieve. It is described how the proposed model uses electrostatic and elastic forces, among others, to improve the marks readability. Moreover, the proposed system has been fully implemented on a virtual globe framework. The final part of this work addresses experimentally the margins of usability of the proposed system.

Keywords:
Symbology, GIS, Visualization, Spring/Mass Model, Stability, Marks, Numerical Simulation, 3D Maps

1. Introduction

Nowadays, the digital media perceives an extraordinary growth of georeferenced data. This growth is, in no small part, due to the rise of the mobile computing that enables the acquisition and consumption of all kinds of geographical information continuously. Most of these data is processed and displayed on maps and 3D virtual globe applications.

Many geographical information systems (GIS) rely on large data sets of points that reference geolocations on their map clients. Such data volumes