ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Lecture with Computer Exercises:
Modelling and Simulating Social Systems with MATLAB

Project Report

The Swiss Train System

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Agreement for free-download

We hereby agree to make our source code for this project freely available for download from the web pages of the SOMS chair. Furthermore, we assure that all source code is written by ourselves and is not violating any copyright restrictions.

Name 1

Name 2

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4.1   Gravity model

In social science -especially in international economics in trade simulations- it is a common and well established approach to simulate flows with a gravity model. The motivation behind it is the physical gravity force. This is defined by $F_G := G\frac{m_1 m_2}{r^2}$, where G is the gravity constant, m_i is the mass of the i-Th body for $i = 1, 2$ and r is the distance between body 1 and body 2.

This leads to the general ansatz:

$$F_{ij} = G\frac{M_i^{\beta_1} M_j^{\beta_2}}{D_{ij}^{\beta_3}}$$

($\leadsto$wikipedia)

We transferred this idea to our situation by identifying the mass of a city to its population and used different definitions of distance. We dropped the constant at the beginning since we normalized the resulting flow anyway. As exponents we have chosen $\beta_1 = \beta_2 = \beta_3 = 1$ since with no experience this was as suitable as anything else.

4.2   Investigation of the resulting network

5   Implementation

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