

Interaction between users of social networks: multi-agent model with exogenous parameters of competition

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With the development of information technologies, Internet creates new virtual environment. Self-organization of Internet users and venture businesses, built on this effect (e.g. social networks) are the brightest phenomenon of the Information Economy.

The most important monetization factor of social network is the total number of its participants. Nonlinear dynamics model are widely used to evaluate and predict the number of social network's users.

We propose a multi-agent model of users' interaction, which is developed based on Maurer-Huberman model:

$$dx_i / dt = a_i x_i (b_i - x_i) - \sum_{j \neq i, j=1}^{n-1} c_{ij} x_i x_j,$$

where x_i is the proportion of unique users of the i -th ($i = \overline{1, n}$) social network, a_i ($a_i \geq 0$) is the growth rate of the i -th network, b_i ($0 \leq b_i \leq 1$) is the network power, c_{ij} ($0 \leq c_{ij} \leq 1$) is the competition between networks.

A series of experiments with the model can be divided into 3 blocks according to

three market types: competitive, cooperative and mixed.

Analysis of the results of experimentation has allowed expanding the range of situations depending on the market types, their characteristics and strategies of the major players. It shown that:

1. Strong competition causes monopolization, confirming Maurer and Huberman assumptions. At the same time, the quality of services plays a crucial role in highly competitive markets.

2. Strong competition between market leaders blocks their growth, which allow developing small projects focused on specialized audience.

3. At the cooperative market, network's success depends on its technical capabilities and content quality.

4. Cooperation of small local networks at the mixed market will be effective only if they are able to provide highly competitive content.