Short Paper

How long can Facebook survive? Complex Physics Model for Predicting the Life Cycle of Social Network

Yingqiong GU
14518 NE 30th PL
Bellevue WA 98007
USA
guyingqiong@hotmail.com

ABSTRACT: *A social network means a social structure made up of a group of actors (such as individuals or organizations) and the dyadic communication ties between these actors. The social network perspective provides a clear way of analyzing the structure of whole social entities. The study of these structures uses social network analysis to identify local and global patterns, locate influential entities, and examine network dynamics.*

Currently, social network activity owns the hottest topic in people's social life. The real social network system belongs to the complex physics model and data-mining area. Social networks, like facebook.com, myspace.com and twitter.com, are real-time complex systems. Author tries to introduce a complex model [1] to predict the life cycle of the social network.

Keywords: Social Network [2], Complex Physics Model [3], Life cycle [4]

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1. Introduction

Social network is like a self–balanced thermal equilibrium system (Figure 1). Each actor has his/her own thermal temperature. Information which just likes thermal temperature will be transferred between each other and finally reach the equilibrium.

Author introduces this self-heating model to reproduce the life-cycle of social network activity, growing – expanding – equilibrium - fading. Each actor (people) will be considered as a single node in this social network (Figure 2).

In the model construction, author assumes there is (are) original point or a few points to initialize a constant heat source, which corresponds to the producer/owner of a social network.

Author introduces a scale from 1 to 5 to measure each node's temperature in this social network.

5 - able to heat- up the neighbor nodes.

2 to 4 - able to be heated up by neighbor nodes.

1 - unable to be heated up.

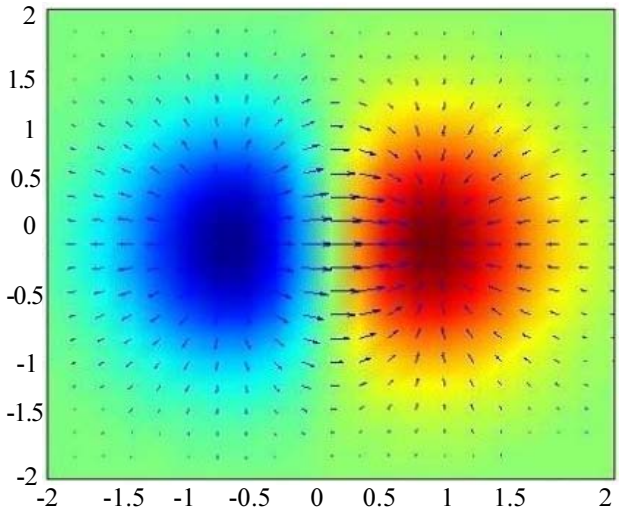

Figure 1. Social Networks as Thermal Equilibrium

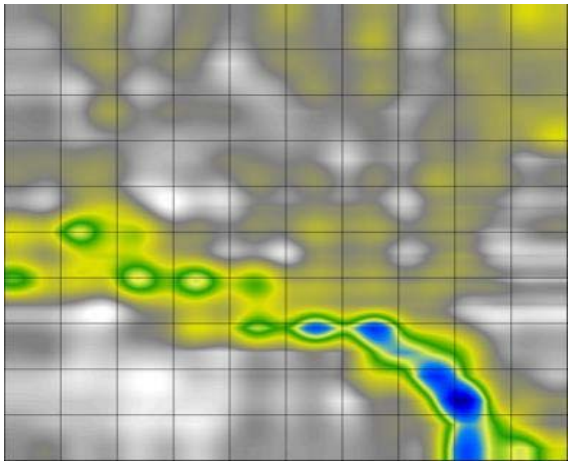
Figure 2. Actors as nodes in the Social Networks

Rules in expanding the heat in system (Figure 2):

1) we will have initial sources whose scale are 5

2) Nodes other than sources will have scale level between 1 to 4.

3) If one node with temperature scale below has two neighbor nodes whose temperature scale greater than 3, it will be heated up by 1 within next timeframe.

4) If one node has more than two neighbor nodes with scale 5, it will be 5 within next timeframe.

5) One node with scale 5 will continue to drop 1 to 2- 4 scale by each time frame after certain time frame even with more than two scale 5 neighbor nodes. This node will not be able to go back to scale 3 to 5 within a certain time frame.

Next chapter, we will discuss this model in a two-dimensional scenario.

2. Interaction in a limited two-dimensional space

Author initialized an 100x100 array matrix, each array elements has the scale of 5. Then author put a source at (50, 50), (51, 51), (51, 50), (50, 51) with scale 5. Each node can interact with at most eight neighbor nodes.

Author defines that one node with scale 5 can only keep this scale for 30 time steps and it has to keep in scale 5 for 30 steps then it is able to be heated up again.

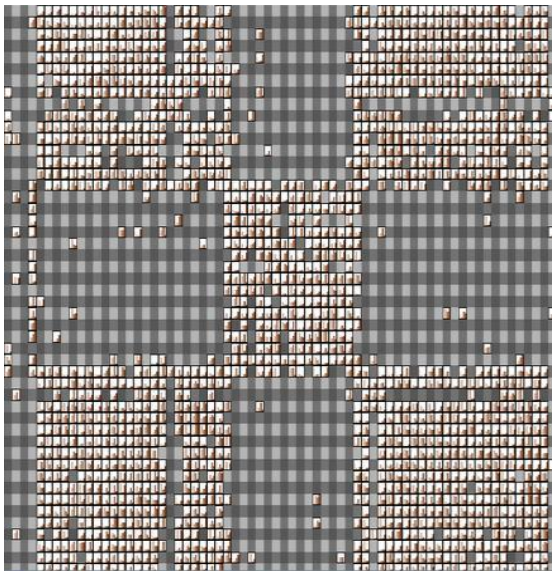

Figure 3. Scaling of nodes

Following the rules in first part, author's C++ code draws the distribution of the array element's scale level at different time step. The details will be revealed in another writing paper.

3. Interesting discovery

The matrix is covered by scale 5 nodes quickly, then after 50 steps, the numbers of scale 5 nodes in matrix starts to drop to the equilibrium. Author noticed that the numbers of scale 5 nodes start to fade away after 200 steps. Matrix is full of nodes with scale 2-3 again.

4. Conclusion

It is interesting to see if multi social networks will follow the same track, author's model indicates that a social network without new heat source will finally fade away after certain time frame.

Algorithm in the model could be adjusted according to the reality.

5. Acknowledgment

As a senior member of IEEE and reviewer of IEEE A & A panel, author would like to express special gratitude is extended to the reviewers from IEEE society for their valuable comments and suggestions.

References

[1] Author's model is constructed on his multi-years social-network working history, mathematical background and data modeling.
[2] http://en.wikipedia.org/wiki/Social_network
[3] Modeling Complex Systems
[4] http://en.wikipedia.org/wiki/Life_cycle