

How active are your friends?
Activity Based Interfaces in Online Social Networks
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Jawad Laraqui
Thesis Supervisor: Prof. Judith Donath

There has been little done to consistently analyze social networking interfaces: the builders of commercial sites haphazardly put together features in order to increase their bottom line. The end results are usually systems where user and site incentives are not aligned. The goal of this project is to analyze current social networking interfaces, design new ones using a consistent framework, and implement and evaluate the resulting site. We will use the language of Feld¹ and Granovetter² to describe these networks and Signaling Theory (as framed by Prof. Donath) to provide the tools for a rigorous analysis. The analysis will not only take into account the users' interest, but also the site builders' who created the medium.

1. Background

a. Definition of Social Ties

Feld and Granovetter provide a good basic model for how general social networks are organized and grow. Granovetter establishes the semantics of talking about these networks, while Feld develops a more profound theory to explain how they evolve.

Granovetter posits that looking at the small-scale interactions between people can give you a lot more insight into the macroscopic behavior of the entire social network. He

particularly uses his small-scale definitions to derive rules on how information flows through a social network. There are three types of ties that relate people: strong, weak, and local bridges. This categorization is a direct mapping of how much work has been put into the given relationship: the strength of a tie is characterized by the “amount of time, emotional intensity, intimacy and reciprocal services”² that are invested in them. A local bridge is a weak tie which provides the only link between two sub-networks of friends. Granovetter also reiterates some basic dynamics of these ties which allow us to predict their evolution. Relationships tend to be transitive: if A is strongly tied to B and C, then B and C are likely to be very tied. As the frequency of positive interaction grows, so does the strength of the tie. The stronger the tie between people the more likely they are to be similar.

Granovetter also very briefly discusses the idea of an “absent” tie; this is a potential relationship. His paper, written in 1973, doesn’t deal with these much since their evolution contributes almost nothing to the changes in the social networks. In the offline world these are less important since the expected number of conversions of potential relationships into a real tie is very small. However, in the online world, the pool of available potential relationships as well as their conversion probability is much higher. Electronic communication bridges geographic and temporal boundaries so everyone in the world is within reach. New web applications allow a user to quickly search through millions of people’s profiles and contact them; converting the potential into a real relationship is greatly facilitated. In fact, many social networking sites deem these relationships so important that they compute and display an approximation of their total

for each user. The radius of a user's social horizon is a measure of his potential connectedness, and a barometer for the web site's popularity.

In the "Focused Organization of Social Ties", Feld moves the analysis of social networks a step further by providing a framework to explain the formation and evolution of the ties that Granovetter only described. For Feld, individuals tend to group themselves around foci of interest: these can be "social, psychological, logical, physical entities". Focus theory explains many of the behaviors and dynamics that Granovetter discusses. For example, if A and B as well as A and C are strongly tied it is because they are grouped around many foci. It is therefore not inconceivable that B and C would also share a subset of those foci. The transitive nature of ties comes out of Focus Theory. The evolution of a person's social ties is a main focus of Feld's paper. He discusses the mechanics of how ties get stronger, in particular how a local bridge can become a weak tie, which can in turn become a strong tie. Feld makes the assumption that all inputs into the ties are positive. Therefore, any effort put into a relationship will tend to make that relationship stronger. This is obviously not always true. The communication itself can be of low value: massively emailing a chain letter to 2000 people doesn't tie you more closely to them. If anything the sender might lose some credibility with his recipients. Or the content of the communication between the sender and receiver can be negative, in which case the input will tend to demote the status of the tie. As we will see in later sections, Signal Theory as applied to online systems provides a realistic model for how the economics of such communications influence the evolution of the ties between signaler and receiver.

Focus theory lends itself very well to online social networks since they are laid out in a very interest driven interface. When looking at a person's profile, you get a comprehensive view of his foci: what organizations he belongs to, what people he knows, what his interests are, etc... In fact, even if you don't have an explicit connection with the person, you are sometimes told how you overlap: how many friends are in common, through whom you do you know them, which organizations do you share? There are two forces that work together to drive the strengthening of old ties, and the creation of new ties in these networks. The first is the pressure individuals feel to associate themselves in stronger relationships: Feld notes that given a weak link, people will try to find more foci that they have in common. The second force is the engineering of the social space done by the builders of the site: keeping users active is a central goal for the builders. It is not by accident that profile pages invite you to find common interests and connections with people in the network. The stronger and more numerous the connections a given user has, the more content and communication he will be subjected to which will keep him active on the site. Any new piece of content or message now has the potential to reach anyone in a user's dense network of friends. This is an example of how information flows better in dense networks with strong links which Granovetter describes in his paper.

b. Signaling Theory

Signaling theory is a framework usually used for analyzing communication and behaviors in the animal world. It proposes that agents have qualities which they wish to signal to others. Prof. Donath has proposed the application of this framework to the

online world. We will present the basics of Signaling Theory³ as defined by Prof. Donath and show that it lends itself very well in the analysis of online social networking sites.

At the base of the theory is the idea that each agent has qualities that they wish to communicate. If the message is sent to the intended receiver we call the message a signal, while if it is overheard than it is called evidence. The goal of this transmission is to somehow alter the receiver's beliefs or behaviors. However, determining whether a signal is reliable can be problematic: we live in a world where deception can have many benefits. Signals have costs and are reliable when "they are beneficial to produce truthfully, and prohibitively costly to produce falsely." An agent can advertise a quality that exists in which case we have an honest signal, or he can be falsely promoting a quality he doesn't possess; this is a deceptive signal. An agent receiving the signal has to use his aggregate experience to determine whether the sender was being or honest or deceptive. The receiver will classify the signal as reliable if he can deduce that the signal was always honest. The signal will be unreliable if there is too much noise (other agents falsely promoting the same quality) or too many false positives (our sender is being deceptive). In fact, the abuse of deceptive signalers destroys the reliability of honest ones: if a signal is too easy to produce deceptively than it can't be very reliable.

The application of signaling theory as an analysis framework will allow us to find flaws in current social networking interfaces and design better ones. Signaling theory is very well suited to online social networks because each action can be broken down into measurable costs and benefits. Solving this economics problem will result in a service that meets the need of all of the actors. We will not only analyze these interfaces from the user's point of view, but also from the builder's. In fact, the medium is deliberately

controlled and fine-tuned to meet the needs of the builders and brings user manipulation to an unprecedented level. However, the balance of power is not one-sided because, in the end, the users have the right to choose which service they want to belong to. The medium must thus be perfectly tuned to correspond directly to the needs of the user that it supports. Signaling theory will allow us to rigorously take into account all of these factors in the design of new interfaces.

2. Preliminary Analysis of Current Interfaces

a. User's signal

There are many qualities that a user may want to signal in a typical social networking site. For example, his popularity can be gauged from the number of links to other people in the network, the number of people who have left comments on their profile, the number of groups they belong to, etc... Wit, humor and creativity are also important as most sites allow you to personalize your name, pick wacky interests, and join groups merely to have a badge of honor on your page. Finally, technical expertise is commonly a signaled quality: their page contains some elements which demonstrate the user gaming the system (i.e. adding video to the page when you're not allowed to).

b. Builder's Signal

The medium that the builders put together is also a signaling entity. Person and content reachability are important qualities. The builders want to show that the network is

large and so the set of potential connections for a user is limitless. Also, the content is important and valuable because it is relevant: this content is easily accessible and filtered up to aggregate pages so that it is digestible by the users. Therefore activity and popularity are important qualities as well: the users should come back very often to the site because it is a dynamic and vibrant environment. Finally, the medium needs to signal fairness and transparency: the user must have all their needs meet within a system that seems passive and non obtrusive.

c. Problems with friend relationship interfaces

The representation of how people are connected is the basis of a social network. Most sites allow an individual to link to other profiles in an explicit relationship; the name of this relationship depends on the implementation of the site but can be “friend”, “co-worker”, “pet” (www.dogster.com), etc... In almost all of these social networking sites, there is a structural problem in the incentive schemes for cataloguing and accumulating these links.

In general the user wants to accumulate as many friends as possible: having a large group of friends is a signal that the user is popular. He would like to display his number of friends to other people, and will work hard to create new connections. However, the cost to making each new connection is very small: the builders purposely design the system in this manner to create dense networks which increases the perception of activity. The link between profiles soon loses its meaning as it becomes an unreliable signal for friendship.

The builders also use the social network for information flow. They want there to be as much relevant information displayed to the user as possible. However, with current interfaces, information is flowing equally through sets of links which are losing their meaning. In the offline world, there is a limit in time and energy to maintaining friendships. I can call up my 10 best friends and learn about what they have been up to. In the online world, I can easily accumulate a high number of relationships at no maintenance cost: how can I sift through updates for 5000 friends?

A naïve solution is to make adding friends a cumbersome process. It's possible to design interfaces with costs, but a sufficiently patient user will almost always be able to circumvent them. If we keep raising the cost of performing an action in terms of the time and effort it takes, the feature will eventually not get used. The builder will never build an interface that is so cumbersome as to be unusable: his main purpose is to keep his users happy, not frustrated and clicking. Therefore, the builder wants every feature to be as clean, fast, and intuitive as possible to reduce friction for the users. Creating costs at the site level is not done by making each action costly, but by assembling the right feature set and produce the right interfaces so that there is no incentive to abuse the features.

Current websites are poorly mapping the offline notions of social networks to the online world because they have no concept of costs, and what the users and builders are competing to signal. Often times, we see the more advanced web sites searching for a means to express the inadequacies stated above. Since the reasoning doesn't come from a comprehensive analysis of their problems, they attempt to solve their problem using "one-off" features which result in ineffective temporary fixes. For example,

Facebook.com relies on geographic portioning and status updates, while MySpace.com uses an “n favorite friend” subset.

3. Design Procedure

Our primary design goal will be to restructure a typical social networking site so that users and builder’s needs are still met. In this new site, the service will measure the activity between users. The explicit link between users will be a variable among many others in calculating link activity. This new implementation will be fair because it will minimally rely on the user’s input: the builder can monitor the usage pattern of the user base and infer how the activity between users has evolved. The purpose of this new interface is to allow the builder and the user to coexist naturally: they can each signal the qualities that they wish. The user can still accumulate his friend list and use it as a measure of popularity.

Activity will be measured through communication and focus sharing as defined by Feld. The activity between two people will be kept as a score that is tracked over time, and modified through usage on the site. For example, private communications between users will be more highly weighted than a general announcement in a group. Also, the higher frequency and reciprocity of communications will result in higher scores. Focus sharing can be measured as how many interests or groups two users will have in common. There will be a decay model associated with these measurements as well: if two users don’t maintain their relationship it will slowly decay. This preserves the idea that

we don't have an infinite amount of energy to devote to building and maintaining relationships. The usage from a user presents a natural limit analogous to the one in the offline world.

4. Evaluation and Testing

The project will involve building a web site that will implement the above design goals. In order to evaluate and test the project, the implementation will be a system for managing relationships and projects at the Media Lab. The hope is that providing a useful social networking tool around lab collaboration and sponsor needs will motivate people to actually populate and use the system. Also, there is an existing database of medial lab professors, students, projects, groups, and sponsors that will be used to pre-populate the site. The users of the system will be administrators, professors, students (graduate and UROP), and sponsors. The site will be developed during IAP, allowing a couple months of measurements and historical data to determine the effectiveness of the new interfaces.

5. References

1 - Feld S L: 'The focused organization of social ties', *American Journal of Sociology*, 86, No 5, pp 1015—1035 (March 1981).

2 - Granovetter M S: 'The strength of weak ties', *American Journal of Sociology*, 78, pp 1360—1380 (1973).

3 - Donath Judith: "Signals, cues and meaning",

<http://smg.media.mit.edu/classes/IdentitySignals06/SignalingDraft.pdf>

4 - Donath J, Boyd D: "Public displays of connection", BT Technology Journal Vol

22 No 4 October 2004, pp 71-82.