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CS 491: Social Networks: Lab 2

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**Social Networks**

1.6.6: I think it’s clear that individuals exhibit different behavior on different social media platforms. In some sense this is an obvious conclusion, since these platforms are built for different purposes and provide different means for interaction and behavior. Twitter, with its relatively small character limit for posting, provides a different way to interact from a platform like Reddit, where posts can be entire essays. And a platform designed for listening to streaming music like Pandora is going to see radically different user behavior from either Twitter or Reddit, simply as a consequence of its intended use and the types of interaction that are supported. These platforms can also have their own unique cultures, promoting varying types of behavior from platform to platform.

At the same time, these are all platforms made for and used by humans, and should be connected in terms of usage by common norms of human behavior. To name one simple precept, it seems likely that no matter the platform, users will be more likely to peruse content and form friend relationships that have some prior basis in their pre-existing interests, friendships, and physical location. Also, there are behavioral, societal, and legal norms and rules that guide and place limits on the way these platforms are used. Certain types of interaction and content are frowned upon in a normative way (say, racist screeds), and certain types of interaction and content can be legally prohibited from appearing (say, distributed pirated media).

In summary, sites are used differently mainly because they are built differently, supporting different types of interactions, with different objectives in mind, and different cultures of use can arise on different sites. While there is some commonality in human behavior due to the common society and background in which humans participate, it’s not surprising to see different behavior between very different social media platforms.

1.6.9: The vast scale of information sharing on current social media platforms has had several major side effects that are already clear to see, and possibly consequences that have yet to become clear or well understood.

One major side effect has been the creation of threats to and violations of individual privacy on a massive scale. Even when social media platforms implement the ability for users to hide personal information from the public, the threat of compromised security still means that a vast amount of sensitive information about individual users can be at risk. Indeed, the sheer scale on which information sharing takes place on social media can be a challenge to pre-digital notions of privacy; so much information is available that one suspects the real dangers may have yet to even come into view. The current realities of compromised privacy include increased threats of identity theft, governmental and corporate spying and espionage, and blackmail, to name just a few.

Another major side effect has been a change in the way people receive and perceive information about the world. As was mentioned in class, “fake news” is a hot research topic in light of recent cultural and political developments. The fake news phenomenon appears to reflect a reality in which patterns of information sharing behavior on social media have led people to become less trusting of traditional, established sources of news and more trusting of material shared within friend and peer groups on social media, even when that information might be false or highly misleading. This changing perception of what is trustworthy and what is true is one emerging consequence of the environment of massive information sharing enabled by digital social networks.

**Graph Essentials**

2.9.2: It is not possible to create such a graph; the sequence provided is not a valid graphic sequence. A degree sequence can be realized in a graph if and only if the sum of the degrees is even. For this graph the sum of the degrees is 29, which is not even. Therefore there is no graph matching this degree sequence.

2.9.3:

Adjacency list:

Node Connected To

v1 v2, v3

v2 v1, v3

v3 v1, v2, v4, v5

v4 v3, v5, v6, v7

v5 v3, v4, v6, v7

v6 v4, v5, v7, v8

v7 v4, v5, v6, v8

v8 v6, v7, v9

v9 v8

Edge list:

(v1, v2) (v5, v7)

(v1, v3) (v6, v4)

(v2, v1) (v6, v5)

(v2, v3) (v6, v7)

(v3, v1) (v6, v8)

(v3, v2) (v7, v4)

(v3, v4) (v7, v5)

(v3, v5) (v7, v6)

(v4, v3) (v7, v8)

(v4, v5) (v8, v6)

(v4, v6) (v8, v7)

(v4, v7) (v8, v9)

(v5, v3) (v9, v8)

(v5, v4)

(v5, v6)

**Bonferroni's Principle**

1.2.2: There are 108 individuals, and so there are 108 choose 2, or approximately 5 x 1015 possible pairs of people.

Each individual selects 10 items from the 1000 available when they visit the store, so there are 1000 choose 10, or approximately 2.6 x 1023 possible item combinations.

The probability of the same set of objects being bought by two individuals is thus

( 1 / 2.6 x 1023 )2.

There are 5 x 1015 pairs and individuals shop 100 times a year, so the final probability of a pair buying the same combination of items in a year is

100 x ( 5 x 1015 ) x ( 1 / 2.6 x 1023 )2, or approximately 7.4 x 10-30.

Bonferroni’s Principle says that we should be skeptical when trying to draw conclusions from a property that will appear frequently in random data out of proportion with the number of individuals that have the property in the real population. In other words, don’t look in more places for meaningful patterns than the actual data supports. This could be seen in the hotel example treated in class, where 250,000 matching pairs were found- a number far exceeding the number of actual terrorists, meaning there were a huge number of false positives.

In this case, though, the event in question is exceedingly unlikely to happen, on a scale that is more in proportion to the extremely rare incidence of terrorists in the real population. Since a pair buying the exact same 10 items is so unlikely, we can be somewhat more confident that pairs of individuals who do are genuinely suspicious and not false positives.