Lecture – 27

Strong and Weak Relationships

Introduction

Example of the importance of weak ties in job opportunities. A reference to a scene from Harry Potter where Hagrid comes to take Harry to Hogwarts, and highlights how a stranger can bring unexpected opportunities. The speaker then asks whether job opportunities come from friends or acquaintances, and concludes that most job opportunities come from weak ties, i.e., people who are not very familiar or close to us.

The concept of the strength of weak ties is introduced, which suggests that weak ties are important because they connect us to people and resources beyond our immediate social circles. This can lead to access to new information, opportunities, and ideas. The speaker emphasizes that weak ties are not only important for job opportunities, but also for personal growth, learning, and social mobility.

Lecture – 28

Strong and Weak Relationships

Granovetter's Strength of weak ties

The concept of the strength of weak ties refers to the idea that acquaintances or weak ties can be more beneficial in obtaining new job-related information than close friends or strong ties.Ex. people tend to hear about job opportunities from distant acquaintances rather than close friends or family members.

An example of five friends, A, B, C, D, and E, where A, B, C, and D work in the same place, while E is from a different world. E, who is a weak tie, can provide new information from their world that increases the sample space of information, which A, B, C, and D, who are strong ties, cannot provide.

Granovetter's experiment in the late 1960s, where he asked people how they found new jobs and concluded that the strength of weak ties is in play when it comes to obtaining new job-related information.The importance of keeping acquaintances happy and building a large friend circle. There is a fallacy in this statement as acquaintances may become close friends, which may not lead to obtaining new job-related information. New information comes from someone who is not too close to an individual and reiterates the importance of having weak ties or acquaintances to obtain new job-related information.

Lecture – 29

Strong and Weak Relationships

Triads, clustering coefficient and

Neighborhoods overlap

Neighborhood overlap is a measure of the similarity between the sets of neighbors of two nodes in a graph or network. In simpler terms, it refers to the extent to which two nodes share common neighbors. It is defined as the ratio of the number of common neighbors of the two nodes to the total number of distinct neighbors of the two nodes.

For example, consider two nodes A and B in a network. Let N(A) be the set of neighbors of node A and N(B) be the set of neighbors of node B. The neighborhood overlap between nodes A and B is given by the formula:

neighborhood overlap(A, B) = |N(A) ∩ N(B)| / |N(A) ∪ N(B)|

where |N(A) ∩ N(B)| is the number of common neighbors of nodes A and B, and |N(A) ∪ N(B)| is the total number of distinct neighbors of nodes A and B.

Neighborhood overlap is an important concept in social network analysis, as it helps to identify the similarity between nodes in terms of their connections to other nodes. It can be used to identify communities or groups of nodes that are densely connected to each other, as well as to measure the strength of ties between nodes.

Lecture – 30

Strong and Weak Relationships

Structure of weak ties, bridges, and local bridges

Local bridges are generally considered weak ties. This is because local bridges connect individuals from different clusters who do not have any common friends. The lack of common friends indicates that the relationship between the two individuals is not strong enough to generate a triadic closure, which is a characteristic of strong ties. Furthermore, Granovetter argued that weak ties, which are often local bridges, can provide individuals with access to novel information and opportunities outside of their social circles, which is not possible with strong ties. Therefore, local bridges are typically seen as weak ties that can have important implications for social network analysis.

Lecture – 31

Strong and Weak Relationships

Validation of Granovetter's experiment using cell phone data

The concept of Granovetter's strength of weak ties states that weak ties in a social network can be useful in getting information. The validation of this concept was done using data of cell phone usage between people, which showed that the local bridges in the network, which are proxies for weak ties, were actually weak ties. The neighborhood overlap of an edge was used as a better definition for local bridges, and it was observed that the duration of cell phone conversations between people was less for edges with smaller neighborhood overlap, which indicated that they were weak ties. The study was a significant breakthrough as it could only be conducted in the present era of sophisticated programming possibilities and big data analysis.

Lecture – 32

Strong and Weak Relationships

Embeddedness

- ➔ Embeddedness of a relationship is defined as the number of common friends that two people share.
- ➔ High embeddedness implies a stronger relationship and more trust between two individuals
- ➔ Trust is directly proportional to the number of common friends or embeddedness.

- ➔ If two individuals have no common friends, the trust between them is low.
- ➔ In the case of a loan or a surety, involving a third person reduces the chances of default and increases trust.
- ➔ In friendships, involving a common friend resolves issues and increases trust.
- ➔ High embeddedness is not always necessary as it may have negative consequences as well.

Lecture – 33

Strong and Weak Relationships

Structural Holes

Common friends increase trust in personal friendships, as there is less room for mistrust or cheating.

Low embeddedness in a personal friendship (i.e., no common friends) can be dangerous for business transactions, as there is a higher risk of cheating.

However, low embeddedness can also have advantages in certain situations. For example, if one person (e.g., Ramya) monopolizes a certain market (e.g., real estate), and the other person (e.g., Sudarshan) needs to access that market, they will have to go through Ramya, who acts as a structural hole.

The concept of structural holes refers to situations where certain individuals or groups hold a strong position in a network because they are the only connections between different parts of the network.

In such situations, the person who holds the structural hole (e.g., Ramya) benefits from any transactions between the different parts of the network (e.g., Sudarshan and the other side community).

High embeddedness adds trust to personal friendships, even in business transactions, but can limit access to certain markets or connections.

Low embeddedness can be advantageous in certain situations where one person monopolizes a market or holds a structural hole.

Lecture – 34

Strong and Weak Relationships

Social Capital

What is a recommendation system, and how does it work?

A recommendation system is a type of information filtering system that is used to suggest items or services to users based on their past behavior, preferences, and similarities with other users. It is a technique used by companies like Amazon, Netflix, and YouTube to recommend products, movies, and videos to their users.

There are mainly two types of recommendation systems, namely, collaborative filtering and content-based filtering. Collaborative filtering works by finding similarities between users and recommending products based on the preferences of similar users. Content-based filtering, on the other hand, recommends products based on the characteristics of the product itself.

Collaborative filtering can be further divided into two sub-types, namely, user-based collaborative filtering and item-based collaborative filtering. User-based collaborative filtering works by finding

users who have similar preferences to the target user and recommending products that these similar users have liked in the past. Item-based collaborative filtering works by finding products that are similar to the products that the target user has liked in the past and recommending these similar products to the user.

In content-based filtering, the system recommends products that are similar in characteristics to the products that the user has liked in the past. For example, if a user likes a romantic comedy movie, the system may recommend other romantic comedy movies to the user based on the genre, actors, directors, and other characteristics of the movie.

Recommendation systems use machine learning algorithms to learn from the data and improve the accuracy of recommendations over time. These systems are widely used in e-commerce, social media, and online entertainment industries to improve the user experience and increase engagement.

Lecture - 38

Strong and Weak Relationships (Continued) and Homophily

Tie Strength, Social Media and Passive Engagement

The three types of relationships observed on Facebook communication are: one-way communication, mutual communication, and maintained relationships.One-way communication occurs when a user sends a message to another user, but the other user does not respond back. This type of communication is often initiated by users who have lost touch with someone, and it is usually a one-time thing. Mutual communication, on the other hand, happens when there is a back-and-forth exchange between two users. This type of communication is characterized by reciprocity, and it is often seen among friends who are in regular contact with each other.

Maintained relationships are those where users keep in touch with each other by following each other's updates and reacting to them, such as liking or commenting. These relationships are more passive, as there is no direct communication between the two users, but they still provide a sense of connection.These types of relationships are classified based on their level of engagement. One-way communication is the least engaged type of relationship, while mutual communication is the most engaged type. Maintained relationships fall somewhere in between, as they provide a sense of connection but do not involve direct communication.

Lecture - 39

Strong and Weak Relationships (Continued) and Homophily

Betweenness Measures and Graph Partitioning

The Louvain algorithm is a hierarchical clustering algorithm that optimizes the modularity of the network, which is a measure of the density of edges within a community compared to the expected density if the edges were distributed randomly.

The algorithm works by initially assigning each node to its own community, and then iteratively optimizing the modularity by merging communities that have the highest increase in modularity when merged. This process continues until no further increase in modularity can be achieved. The Louvain algorithm is computationally efficient and can handle very large networks. It is widely used in various applications, such as social network analysis, recommendation systems, and bioinformatics.