FIT5190 Introduction to IT Research Methods
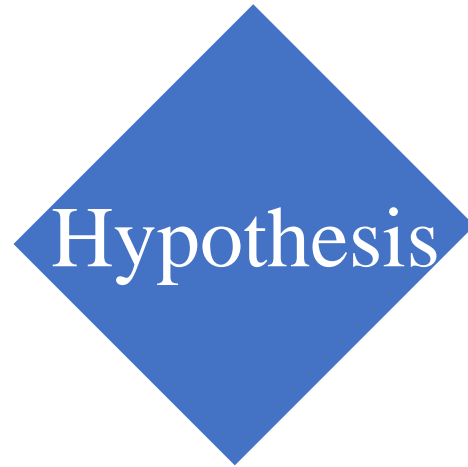
Maximizing the Spread of Influence through a Social Network

Yang Sun   2634****
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Southeast University--Monash University Joint Graduate School

Content

Background   Hypothesis   Methodology   Conclusion

Background

- People now live in the digital age, social networks are full of humans' life, sending message, email, searching information through social networks are happening every day.

- In order to make people more convenient and efficient, maximizing the spread of influence through social networks is very important.

Background

- What is a social network?
  A social network - the graph of relationships and interactions within a group of individuals - plays a fundamental role as a medium for the spread of information, idea, and influence among its members.

Figure 1. Social Networks

Hypothesis

- Which set of individuals should we target?

- How to measure the influence?

- What are the methods to solve this problem?

Method

◆ Which set of individuals should we target?

◇

Different social networks have different sets of individuals. For example:

- Renren Network's target is mainly college students, they can upload pictures, share news from their life.

- Google Gmail's target is mainly business men all over the world, they can communicate, schedule one another.

- Baihe Network's target is mainly someone who is eager to marry, they input their own information to find the match.

Targeting set of individuals is important according to different social networks.
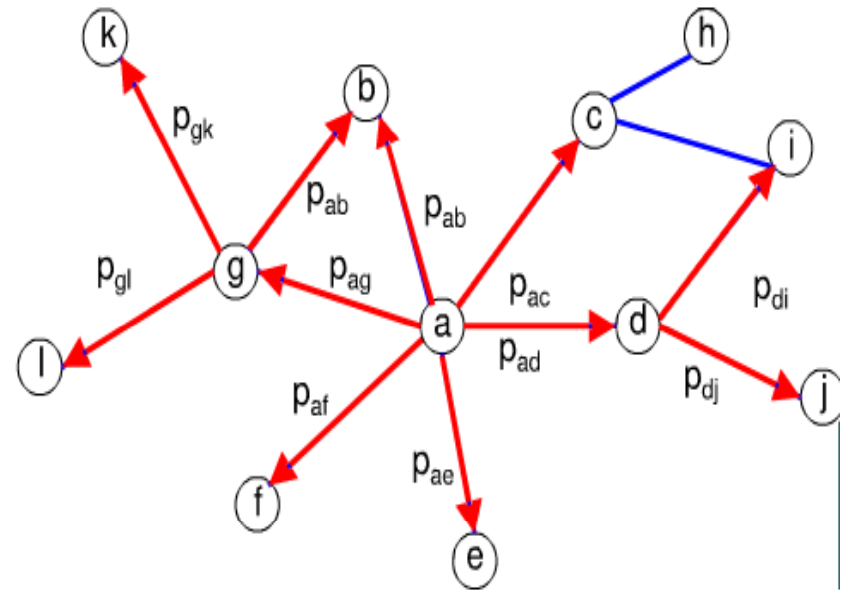
Method

Figure 2. Influence Model

◆ How to measure the influence?

◇

- A social network is represented as a directed graph. Each user is considered as a node.

- Each node can be either active or inactive.

- Each node's tendency to become active increases monotonically as more of its neighbors become active.

Method

What are the methods to solve this problem?
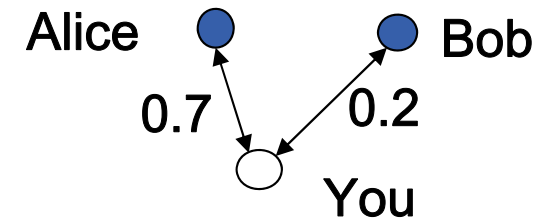
Alice ● ● Bob

0.7 0.2

○ You

Figure 3. LTM

- Linear Threshold Model

➤ A node is influenced by each neighbor according to a weight.

➤ Each node has a threshold which is chosen uniformly at random from the interval [0,1].

➤ A node becomes active if weight is more than threshold.
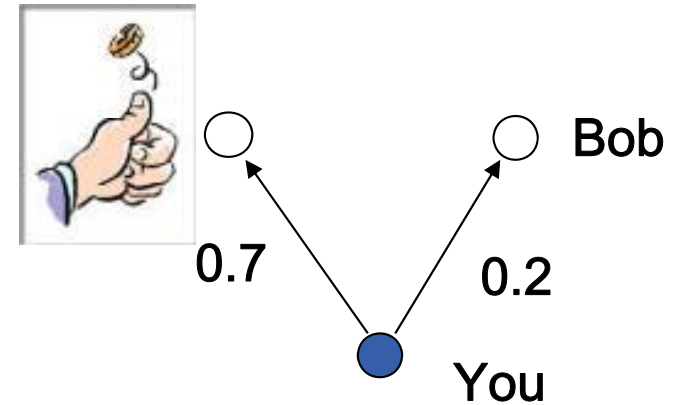
Method

What are the methods to solve this problem?

0.7   0.2   Bob

You

Figure 4. ICM

- Independent Cascade Model

➢ If You succeed in step t, then *Bob* becomes active in step *t*+1

➢ Whether or not *You* succeeds, *You* cannot make any further attempts to activate *Bob* in subsequent rounds.

➢ The process runs until no more activations are possible.

Conclusion

Different social networks
different sets of individuals

Social networks ⟹ **directed graphs**
Users ⟹ **nodes**

Linear Threshold Model
Independent Cascade Model

25%

50%

75%

Thank you!