Social Network Analysis

INTRODUCTION

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Social Network Analysis

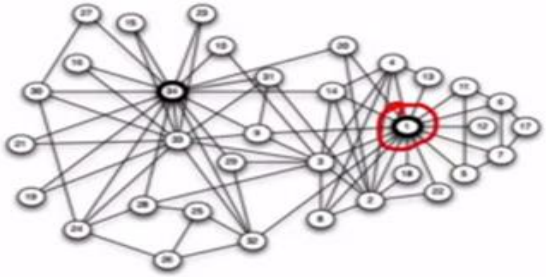
Networks are set of objects (nodes) with some relationship with each other called interconnections (edges)

Why study networks?

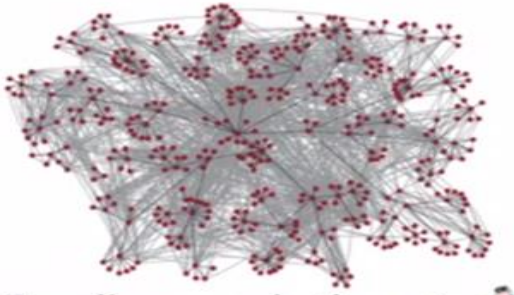
- Networks are everywhere
- How networks are in bunch of different settings

Social Network Analysis

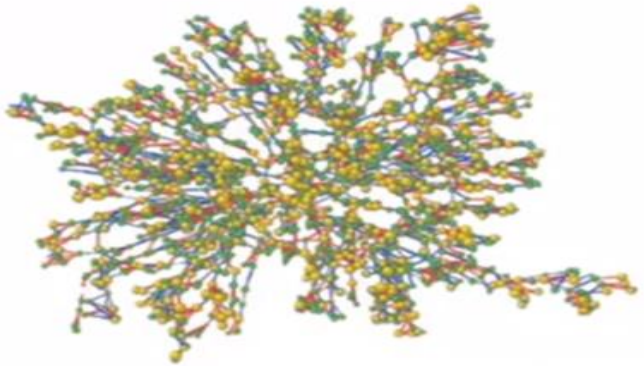
SOCIAL NETWORKS



Friendship network in a 34-person karate club
[Zachary 1977]



E-mail communication network
among 436 HP employees [Adamic & Adar 2005]



Network of friendship, marital tie, and
family tie among 2200 people
[Christakis & Fowler 2007]

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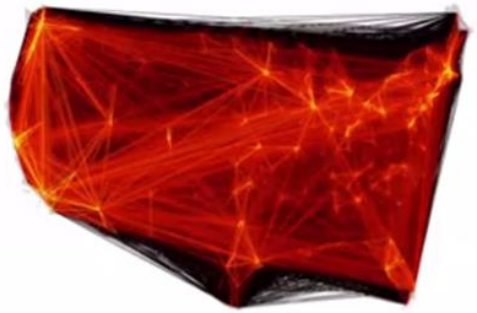
TRANSPORTATION AND MOBILITY NETWORKS

Network of direct flights around the world
[Bio.Diaspora]

Ann Arbor bus transportation network



Human mobility network based
on location of dollar bills (Where's George)
[Thiemann et al. 2010]

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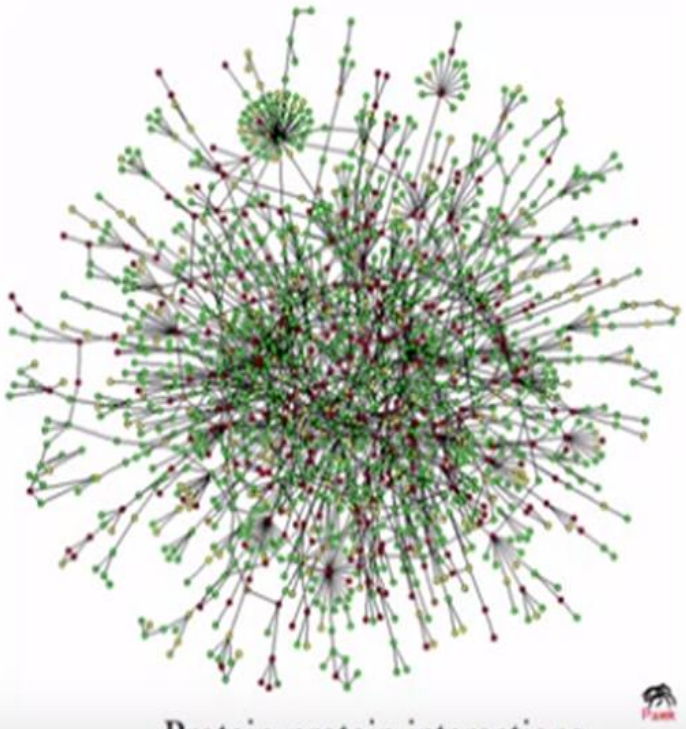
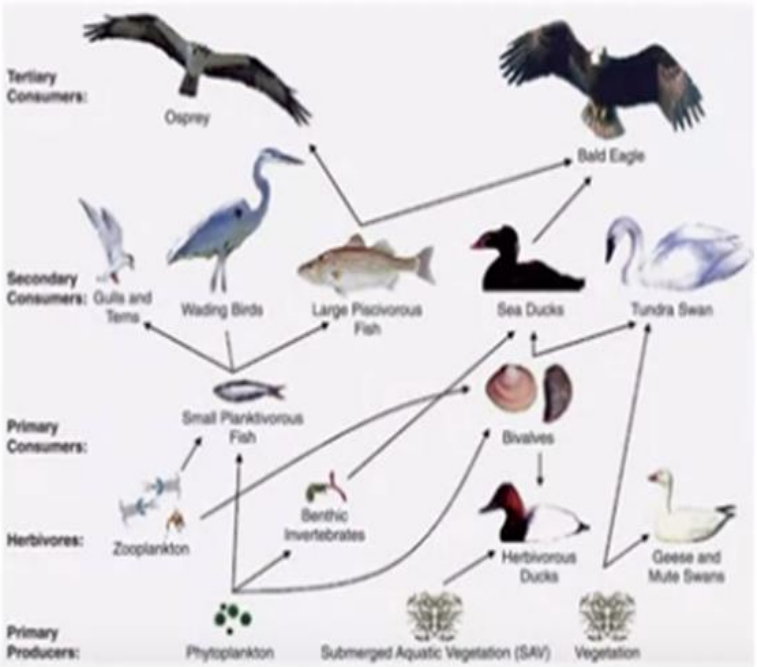


Protein-protein interactions
[Jeong et al. 2001]



Chesapeake Bay Waterbird Food Web
[Perry et al. 2005]

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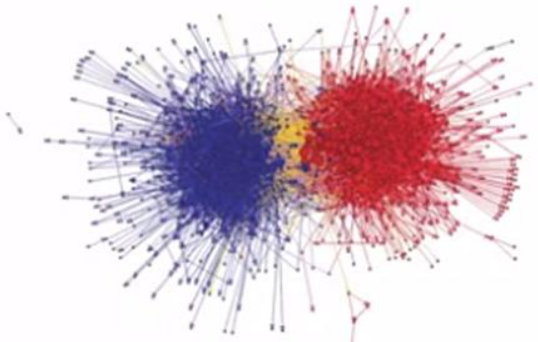
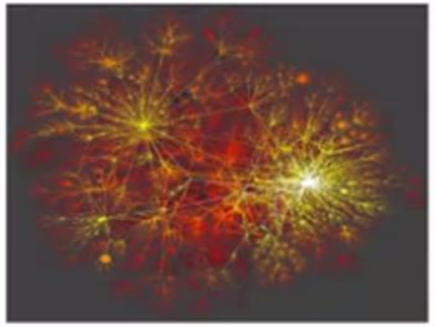
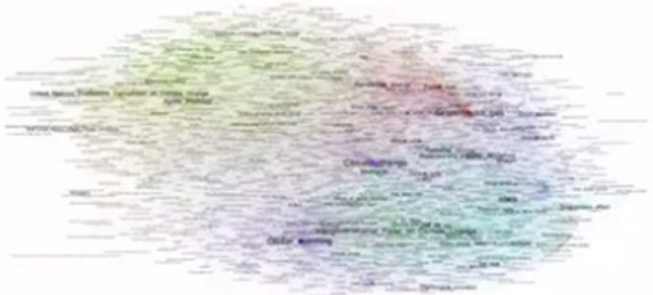
INFORMATION NETWORKS



Communication between left-wing and right-wing political blogs [Adamic & Glance 2005]



Internet Connectivity [K. C. Claffy]



Network of Wikipedia articles about climate change [EMAPS]

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AND MORE …

- Financial Networks
- Trade Networks
- Co-authorship Networks
- Citations Networks

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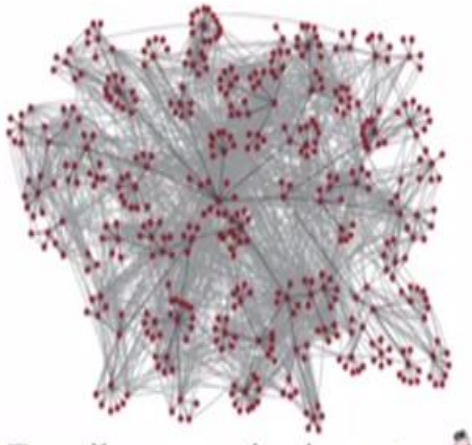
NETWORK APPLICATIONS

Networks are everywhere, but what can we do with them?

Is rumor likely spread in this network?

Who are the most influential people in this organization?



E-mail communication network among 436 HP employees [Adamic & Adar 2005]

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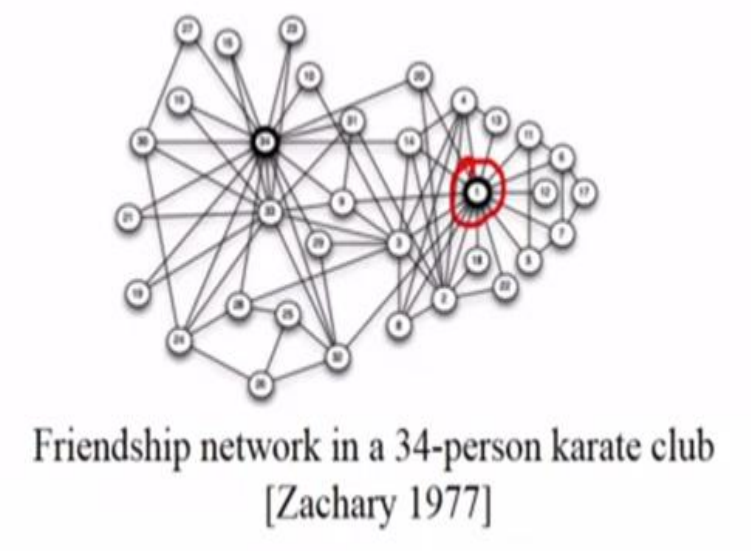
NETWORK APPLICATIONS

Networks are everywhere, but what can we do with them?

Is this club likely to split into two groups?

If so, which node will go to which group?



Friendship network in a 34-person karate club
[Zachary 1977]

NETWORK APPLICATIONS

Networks are everywhere, but what can we do with them?

Which airports are at highest risk for virus spreading ?

Are some parts of the world more difficult to reach?

Network of direct flights around the world [Bio.Diaspora]

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SUMMARY

More complex structures can be modeled by networks

Studying the structure of a network can allow us to answer questions about complex phenomena