

# ONLINE SOCIAL NETWORK ANALYSIS: A SURVEY OF RESEARCH APPLICATIONS IN COMPUTER SCIENCE

SOCIAL NETWORK ANALYSIS MID-TERM PRESENTATION

Presented by  
Sitdhibong Laokok  
63199130350

2021

INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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### INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS



## A network diagram consisting of approximately 20 stylized human icons arranged in a circular pattern. Each icon is enclosed in a colored circle (blue, green, yellow, red, or grey). The icons are connected by a web of dashed lines in various colors (red, blue, green, yellow, and grey), representing relationships or connections between the individuals. The central part of the diagram is more densely connected, with many overlapping lines, while the outer edges have fewer connections.

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# ONLINE SOCIAL NETWORKS

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

*The Internet is used for development for online social networks (OSNs) – an adaptation of social organization to the "virtual world"*



# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

## WHY SHOULD ANYONE RESEARCH OSNs?

### Data availability:



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## WHY SHOULD ANYONE RESEARCH OSNs?

**Data availability:**

**Multiple authorship:**



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## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY









# WHICH NETWORKS ARE EXPLORED?

## Twitter: Text Analysis



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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

# WHICH NETWORKS ARE EXPLORED?

**Twitter:** Text Analysis

**Facebook:** Relationship, Networking



ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

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**Twitter:** Text Analysis

**Facebook:** Relationship, Networking

**YouTube:** Recommendation



ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS



# WHICH NETWORKS ARE EXPLORED?

**Twitter:** Text Analysis

**Facebook:** Relationship, Networking

**YouTube:** Recommendation

**Flickr:** Image Processing



**flickr**

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

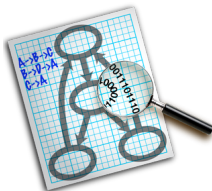


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- ▶ Graph-based: AllegroGraph, Neo4j
- ▶ Graph drawing software: Graphviz, Tulip
- ▶ Visualization: Cytoscape
- ▶ Analysis: igraph, NetworkX, NetworkKit

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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# GEPHI - THE OPEN GRAPH VIZ PLATFORM

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

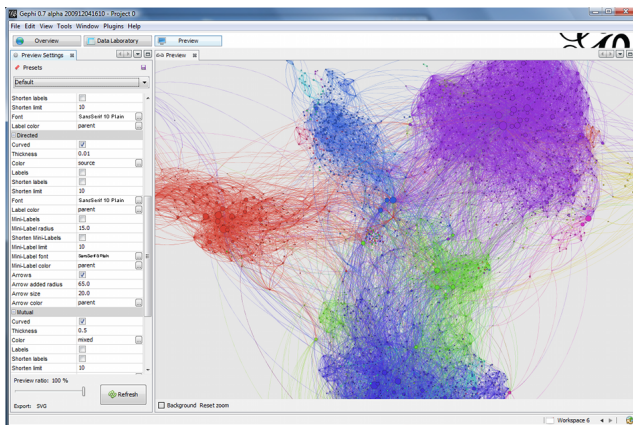


FIGURE: Gephi

# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

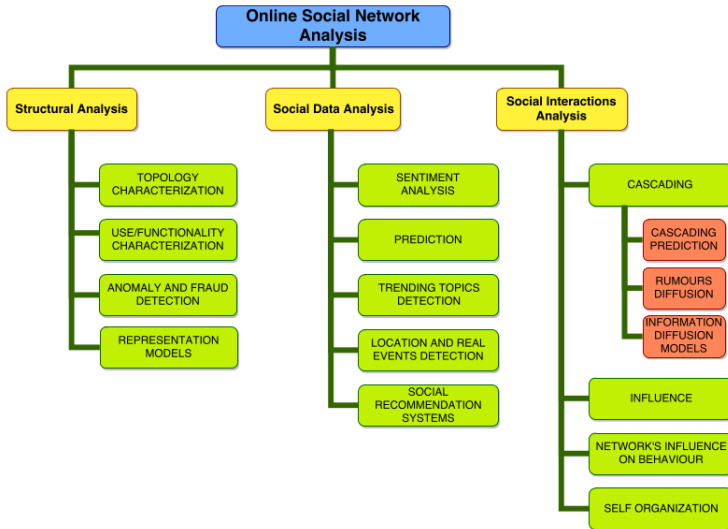
SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

# CATEGORIES OF STUDY ON ONLINE SOCIAL NETWORKS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS



- ▶ **Structural analysis:** Simply knowing what are those services and why so many people were being attracted to them.
- ▶ **Social data analysis:** What OSNs produce.
- ▶ **Social interaction analysis:** How users interact on the network and have insights on aspects of human behavior. This category discovers relations to other fields of research, such as Psychology, Sociology and even Biology.

# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

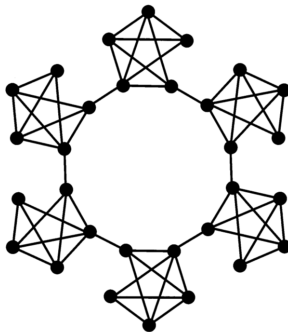
**STRUCTURAL  
ANALYSIS**

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

## TOPOLOGY CHARACTERIZATION

- ▶ **What the network structure reveals?:** How similar OSNs with real studied networks. This topics verified the presence of power-law degree distribution and small-world property.
- ▶ **Many network in one network:** OSN may embed more than one network structure.



From Watts (1999)

# TOPOLOGY CHARACTERIZATION

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

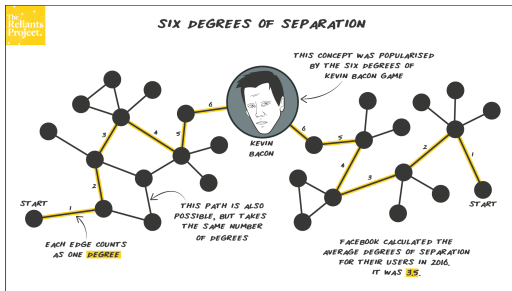
ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

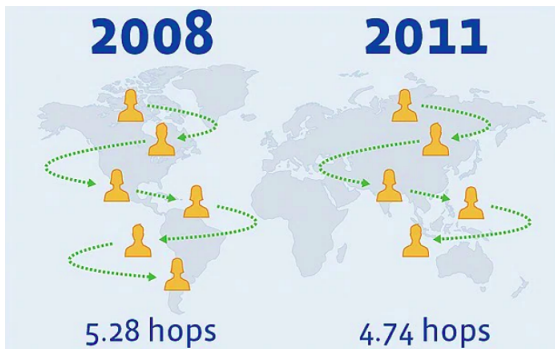
SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS



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# USE AND FUNCTIONALITY CHARACTERIZATION

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

- ▶ **Network formation:** User's interesting by geolocation distribution
- ▶ **User profiles:** To classify user characteristic by their behavior, such as *Broadcasters* – Celebrities, *Acquaintances* – Casual users, and *Miscreants* – Spammer, stalkers
- ▶ **Conversation:** To finding patterns and particularities that enabled the creation of a simple mathematical model capable of describing the dynamics of the conversations.
- ▶ **Network deterioration:** The impact of "cascades of users leaving" on the networks resilience was deeply studied, and a metric.

# ANOMALY AND FRAUD DETECTION

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

- ▶ **Anomaly and fraud:** Structure can reveal the presence of anomalies, indicating that users might be acting in suspicious ways.
- ▶ **Spamming behavior:** Identified users acting as spammers considered the network's structural properties and also use the textual content of messages.

- ▶ **Structure models:** Singletons (users without connections), Isolated communities (generally around a popular user) and a Giant component (users connected to many users)
- ▶ **Spatio-temporal models:** To represent transformation processes taking place in a network.



# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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63199130350

INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

## SENTIMENT ANALYSIS

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- ▶ **Taking advantage of corpora particularities:** Short message is advantage of sentiment classification, such as Tweet in Twitter. Text processing techniques were proposed to extract and reduce features and an algorithm was build reaching over 80% of accuracy in classification.



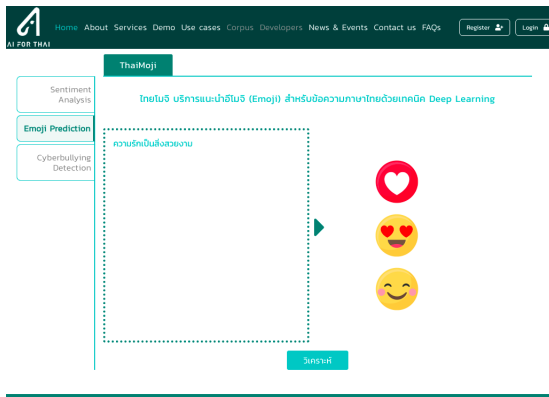
## SOCIAL DATA ANALYSIS

- ▶ **Taking advantage of corpora particularities:** Short message is advantage of sentiment classification, such as Tweet in Twitter. Text processing techniques were proposed to extract and reduce features and an algorithm was build reaching over 80% of accuracy in classification.
- ▶ **Applications**



# SENTIMENT ANALYSIS

- ▶ **Taking advantage of corpora particularities:** Short message is advantage of sentiment classification, such as Tweet in Twitter. Text processing techniques were proposed to extract and reduce features and an algorithm was build reaching over 80% of accuracy in classification.
- ▶ **Applications**



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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS



## PREDICTION

- Elections
- Box-office revenue
- Book sales prediction
- Disease spread
- Stock market prediction for sentiment analysis



FIGURE: Revenue Product sale prediction

## PREDICTION

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## SOCIAL DATA ANALYSIS

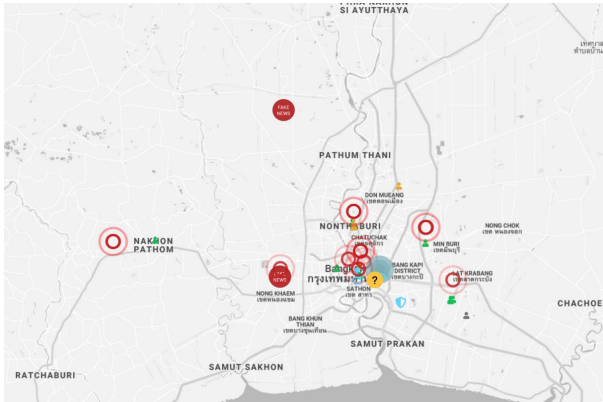


FIGURE: COVID-19 Tracking

# TREND TOPICS DETECTION

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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63199130350

INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

- ▶ **Message analysis:** To calculate the the *trend momentum*, *trending topics*, *analyzing the frequency words during specific time frames*
- ▶ **Network analysis:** To identify related trending topics by using network information to create a probabilistic model of interactions.
- ▶ **Tracking memes evolution**



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# SOCIAL RECOMMENDATION SYSTEMS

- ▶ **Trust networks:** Groups of related users are considered to have valuable opinion on some matters
- ▶ **Improving traditional recommendation systems**
- ▶ **Content selection**

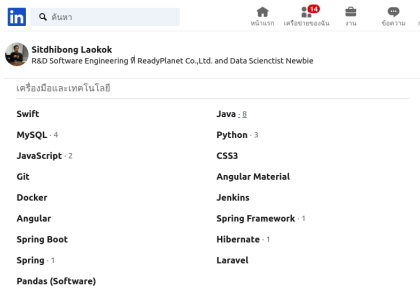


FIGURE: Trust networks

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

# OUTLINE

## INTRODUCTION

## ONLINE SOCIAL NETWORKS AS OBJECT OF STUDY

## CATEGORIES OF STUDY

## STRUCTURAL ANALYSIS

## SOCIAL DATA ANALYSIS

## SOCIAL INTERACTION ANALYSIS

ONLINE SOCIAL  
NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS

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- ▶ **Characterizing rumors:** Text's features and the characteristic of users involved in the propagation of the information
- ▶ **Rumor containment rumors:**

## SOCIAL INTERACTION ANALYSIS



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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

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## SOCIAL INTERACTION ANALYSIS

- ▶ **Characterizing rumors:** Text's features and the characteristic of users involved in the propagation of the information
- ▶ **Rumor containment rumors:** To detect source of rumors, "**rumors centrality**" was developed



Thank you

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NETWORK ANALYSIS:  
A SURVEY OF  
RESEARCH  
APPLICATIONS IN  
COMPUTER SCIENCE

PRESENTED BY  
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INTRODUCTION

ONLINE SOCIAL  
NETWORKS AS  
OBJECT OF STUDY

CATEGORIES OF  
STUDY

STRUCTURAL  
ANALYSIS

SOCIAL DATA  
ANALYSIS

SOCIAL INTERACTION  
ANALYSIS