

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

SOCIAL NETWORK ANALYSIS MID-TERM PRESENTATION

Presented by
Sitdhibong Laokok
63199130350

2021

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A network diagram consisting of approximately 20 circular icons, each representing a person with different features like hair color, glasses, and clothing. These icons are interconnected by a web of dashed lines in various colors (blue, green, yellow, red, purple). The connections are dense in the center and become sparser towards the edges, illustrating a complex social or professional network structure.

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



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WHY SHOULD ANYONE RESEARCH OSNs?

Data availability:



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WHY SHOULD ANYONE RESEARCH OSNs?

Data availability:

Multiple authorship:



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WHY SHOULD ANYONE RESEARCH OSNs?

Data availability:

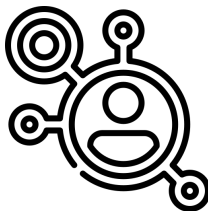
Multiple authorship:

Agent Interaction:

Temporal dynamics:

Instantaneity:

Ubiquity:



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WHICH NETWORKS ARE EXPLORED?

Twitter: Text Analysis



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WHICH NETWORKS ARE EXPLORED?

Twitter: Text Analysis

Facebook: Relationship, Networking



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Twitter: Text Analysis

Facebook: Relationship, Networking

YouTube: Recommendation



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WHICH NETWORKS ARE EXPLORED?

Twitter: Text Analysis

Facebook: Relationship, Networking

YouTube: Recommendation

Flickr: Image Processing



flickr

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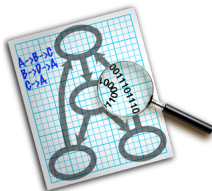
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- ▶ Graph database: AllegroGraph, Neo4j
- ▶ Graph drawing software: Graphviz, Tulip
- ▶ Visualization: Cytoscape
- ▶ Analysis: igraph, NetworkX, NetworkKit



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GEPHI - THE OPEN GRAPH VIZ PLATFORM

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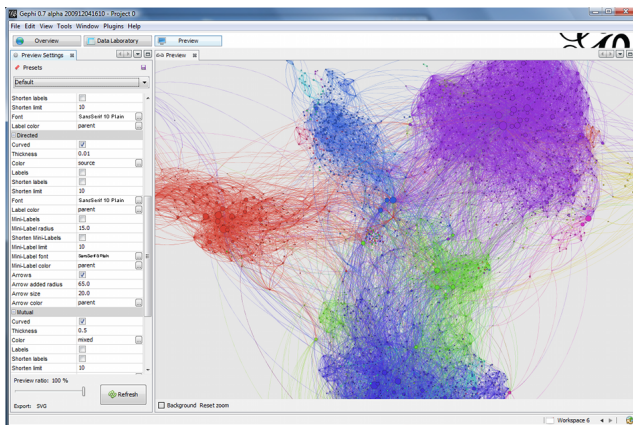


FIGURE: Gephi

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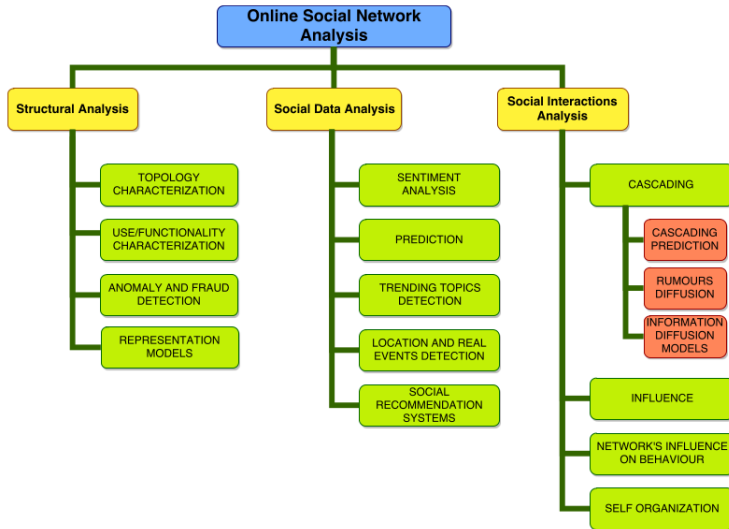
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- ▶ **Structural analysis:** Simply knowing what are those services and why so many people were being attracted to them.
- ▶ **Social data analysis:** What OSNs produce.
- ▶ **Social interaction analysis:** How users interact on the network and have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

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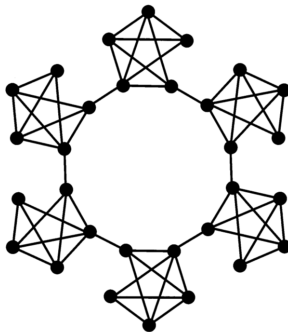
**STRUCTURAL
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TOPOLOGY CHARACTERIZATION

- ▶ **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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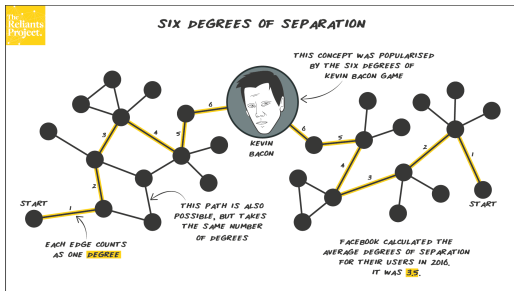
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USE AND FUNCTIONALITY CHARACTERIZATION

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- ▶ **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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- ▶ **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.

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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

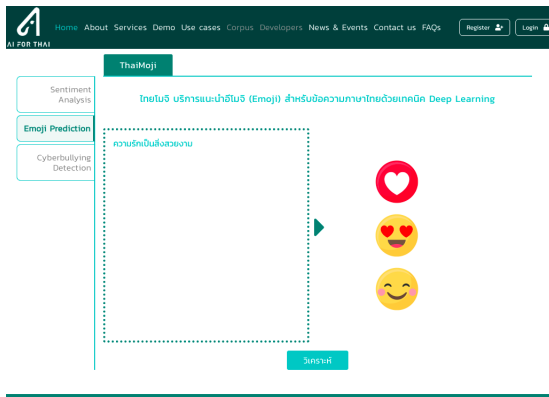
- ▶ **Taking advantage of corpora particularities:** Short message is advantage of sentiment classification, such as Tweet in Twitter. Text processing techniques were proposed to extract and reduce features and an algorithm was build reaching over 80% of accuracy in classification.

▶ 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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PREDICTION

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



FIGURE: Revenue Product sale prediction

PREDICTION

- Elections
- Box-office revenue
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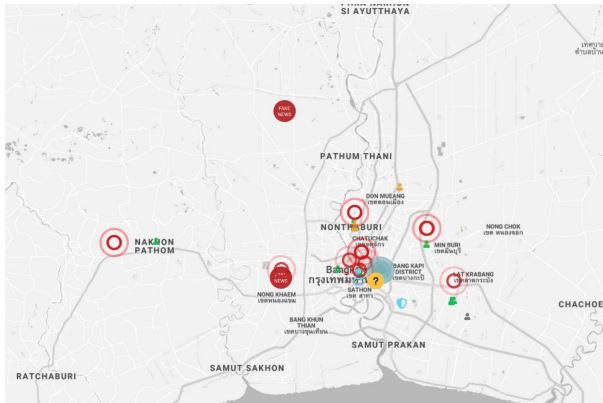


FIGURE: COVID-19 Tracking

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TREND TOPICS DETECTION

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- ▶ **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**

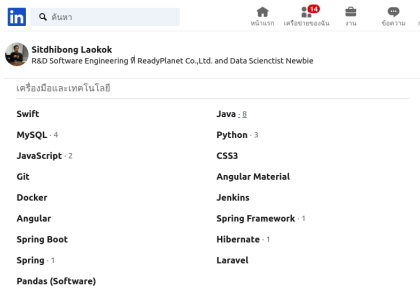


FIGURE: Trust networks

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- ▶ **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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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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