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## Abstract

Users' activities on social media generate useful and valuable information about the general public that can be used in policymaking and the decision-making processes.

In this paper we review **social media analysis approaches** and its' **application areas** by sampling and reviewing studies from **IEEE Xplore**, **Science Direct**, and **SpringerLink**.

The primary focus of this paper is on the role of social media data in extracting, tracking, and evaluating general public activities, public opinions, and public behaviour.

Moreover, this study provides insight for those who wish to learn about social media's role as a data source for research related to our real-world issues and events.

## Research Questions

(Drus & Khalid, 2019) cited some of applications of Twitter data sentiment analysis. (Liu & Young, 2018) discussed social media data's ability to monitor physical activity by considering topic modelling, sentiment analysis, and social network analysis (SNA) as the approaches to study this data.

This study reviews the published papers related to social media analysis from a different angle to answer the following research questions:

**Q1:** What are the application areas of social media user-generated data analytics in real world?

**Q2:** What approaches have been used more often to learn about the public?

## Research Methodology

First, we classify papers related to social media data analytics into 4 categories:

**1. Task-oriented research** focuses on the tasks related to social media data analytics, such as opinion mining, rumour detection, and trend detection

**2. Approach-oriented research** focuses on the approaches that can be applied to analyse social media data to do these tasks

**3. Technique-oriented research** focuses on techniques and methods used to perform this analysis approaches, such as machine learning, data mining, natural language processing, and deep learning methods

**4. Application-oriented research** focuses on the applications of the extracted knowledge in various research fields.

**Second**, to answer the Q1 the following query strings has used: "social media", "social media analysis" and "social media analytics"

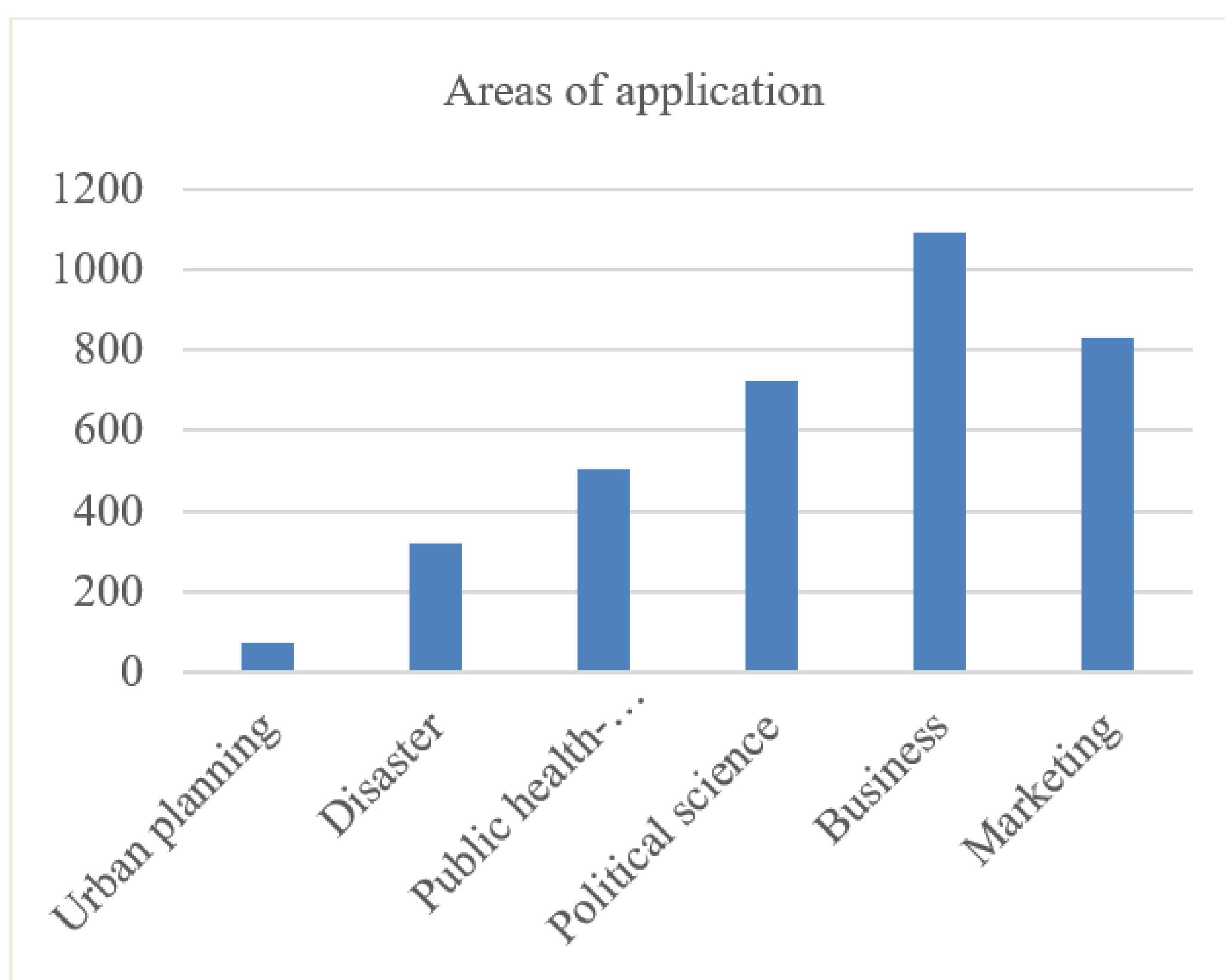
## Research Methodology

- ✓ We sampled studies belonging to the **Application-oriented group** to find various **research areas** that utilized social media data in **real-world investigations**

Next, we constructed new queries by combining each of the detected areas with the previous queries such as "*social media analysis*" AND "*public health*" (Boolean AND) to answer Q2.

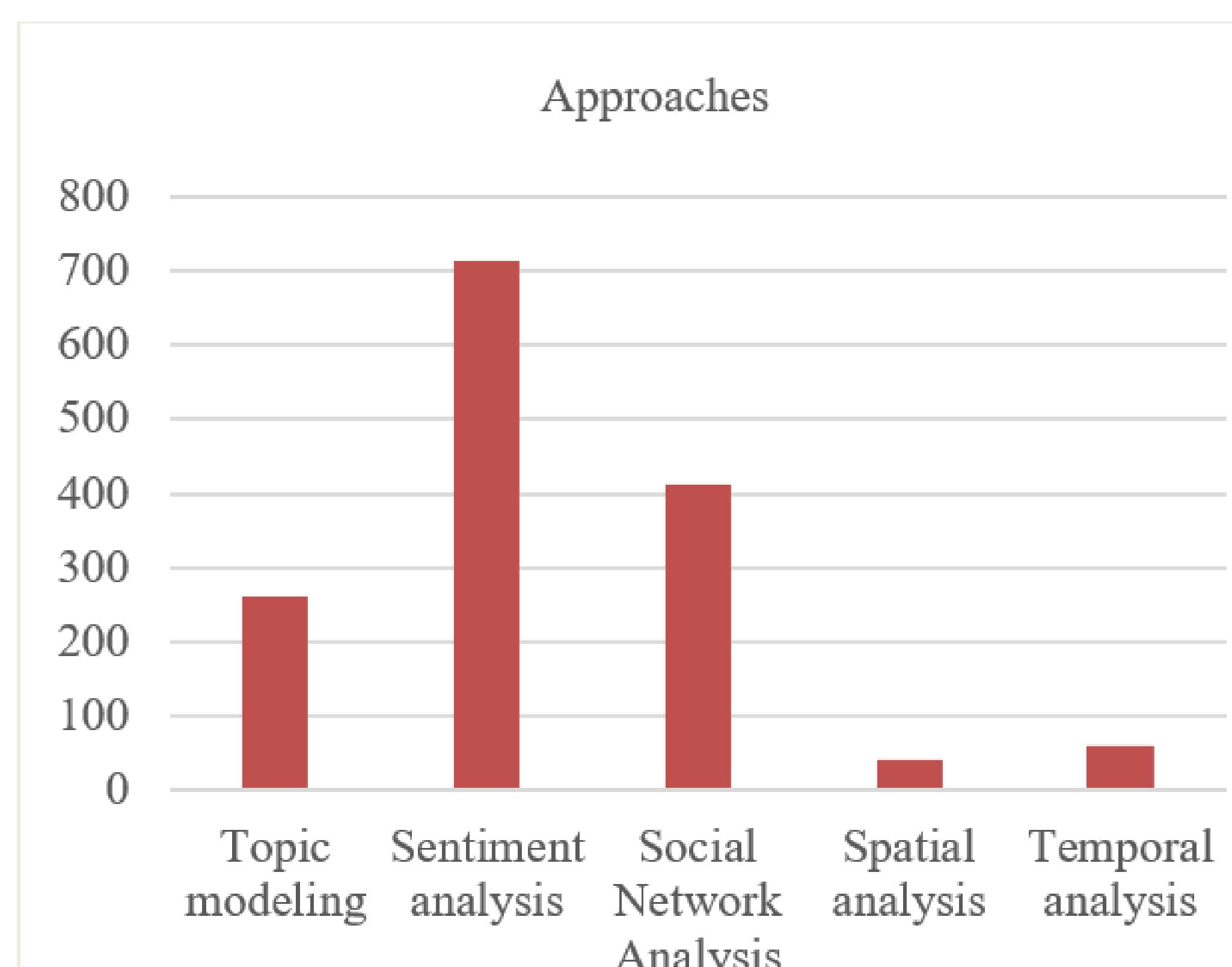
- ✓ We sampled studies belonging to the **Approach-oriented group** to find what **analysis approaches** have been used in each area.

The following figure shows the raw results of the second query strings. This figure depicts the distribution of the published papers for each application area.



Finally, after finding the most used analysis approaches, we created new queries by combining approaches and first queries such as "*social media analysis*" AND "*sentiment analysis*".

The following figure shows the raw results of these query strings. This figure displays the distribution of the published papers for each analysis approach.



## Results

### Social media data analysis areas of applications

#### Disaster studies

- Detecting human emotions toward disaster
- Tracking human emotions and behaviour over disaster times
- Understanding group behaviour during disaster
- Tracking trends during a disaster
- Determining disaster severity changes over time
- Identifying the zones affected by the disaster
- Discovering dynamics of human emotional
- Discovering people's need during disasters

#### Urban studies

- Tracking human activities
- Finding the distribution of human's dynamic
- Investigating transportation behaviour
- Finding urban land use and landscape
- Urban analysing and modelling

#### Public health studies

- Tracking and monitoring pandemics
- Track and detecting infectious disease and disease outbreaks
- Identifying and tracking adverse drug reactions
- Investigating mental health of people

#### Political science studies

- Mining and tracking people's opinions related to political issues
- Detecting political polarization
- Tracking political elections
- Tracking political events
- Predicting political events

#### Marketing and Business

- Mining users' views about the products and services
- Understanding customers' environment

- Finding customer habits and behaviours
- Finding usage behaviour
- Discovering purchasing behaviours
- Predicting sale
- Predicting people's needs

### Social media analysis approaches

#### Topic Modelling

- Detecting topical trends
- Monitoring human opinion,
- Tracking different topics and events on social media,
- Discover the discussion around a specific subject and realize people's opinions
- Detecting evolution of people opinion

#### Sentiment analysis

- Interpreting people's opinion, emotions, attitudes
- Tracking people's emotion over time
- Tracking the change of people's emotion towards an event

#### Social Network Analysis

- Understanding the circulation of information in the network
- Finding influential users
- Discovering the pattern of people's opinion connections

#### Spatial and Temporal analysis

- Discovering the temporal pattern and geographical information of data
- Discovering human mobility activities
- Discovering spatial distribution of public opinion
- Discovering the emergence, evolution, and decline of public opinion over time

## Conclusions

- We review 62 papers by sampling published papers between 2011- 2020.
- This study focuses primarily on user-generated data and network structure as data because of their abilities to reveal information about the general public that is used in decision-making and planning for real-world problems.
- Applying a proper mix of these approaches for each of these application areas can provide a powerful tool to achieve meaningful information and knowledge about the public for a target application.
- The spatio-temporal analysis is rarely used alone. It is used in most papers along with other approaches.

## Reference

- Drus, Z., Khalid, H. (2019). Sentiment Analysis in Social Media and Its Application: Systematic Literature Review. Procedia Computer Science, 161, 707-714.  
 Liu, S., Young, S. D. (2018). A survey of social media data analysis for physical activity surveillance. Journal of Forensic and Legal Medicine, 57, 33-36.