- **Social Media Analytics**

1. Introduction
2. Social media & social networks
3. Social media data
4. Applications of social media
5. Challenges, biases and limitations
6. Text and reference books
7. Technical issues related social data analysis

Social media

- Social Media: Web and mobile based Internet applications that allow the creation, access and exchange of user generated contents that is ubiquitously available
  - Fun video ☺
- Social networking sites: Facebook, Twitter, Wikipedia..
- Blogs, wikis, news, online forums,
- Majority of them yield unstructured data

Social media cont….

- Social media is affecting various aspects of our life
- Mobile/tablets based apps

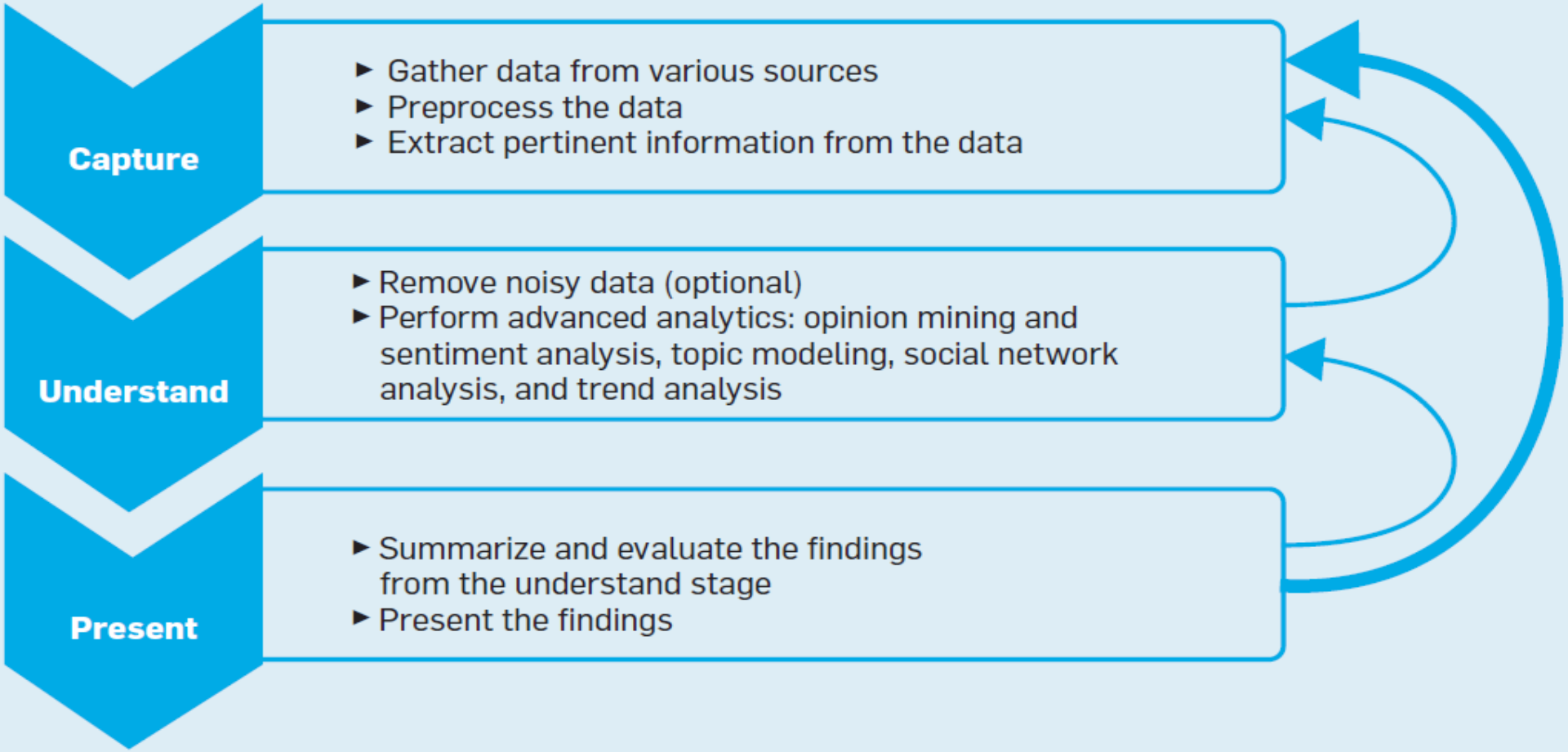
- Twitter feeds for sentiment analysis

- Computational Social Science

Social media analytics

- Social Media Analytics deals with development and evaluation of tools and frameworks to collect, monitor, analyze, summarize, and visualize social media data
  - Facilitate conversation and interaction between online users
  - Extracts useful patterns and information

Figure 1. Social media analytics process.



- **Network analysis** + machine learning + natural language processing (NLP) + statistics

Social network analysis (SNA)

- SNA provides a set of concept and metrics for systematic study of social network graphs
  - Used to understand underlying structure, connections and theoretical properties
  - A social network graph consists of nodes (users) and associated relationships (edges)
  - Direct: friendship, Indirect: voting, tagging and commenting

- To identify the relative importance of different nodes (edges) within the network
  - To identify key influencers in viral marketing

- Used to model network dynamics and growth
- Personalized recommendations and to detect sub communities
- Nicholas Christakis on Social Networks

Unstructured data

- Scraping: collecting online data from social media in the form of unstructured data, e.g. metadata, image tags, messages.
    - Social media data available through APIs
    - Due to commercial values, websites often impose various restrictions
    - DataSift, Gnip; Thomson Reuters for News data
- Opinion Mining: Automatic systems to determine human opinion, e.g. sentiment analysis, relevance etc.

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Applications in business and management

- **Retail** companies - to harness their brand awareness, service improvement, advertising/marketing strategies, identifying influencers

- **Finance**: to determine market sentiment, news data for trading
  - Sentiment of random sample of twitter were correlated with Dow Jones Industrial Average prices
  - Twitter data to forecast individual NASDAQ stock prices

Public health and sociology

- Given that two people have been in approximately the same geographic locale at same time, on multiple occasions, how likely they know each other ? –social ties (PNAS, 2013)
  - Geotagged Flickr photos

- Forecasting the Influenza season using Wikipedia (MIT Tech. Review, Nov 3, 2014)
  - Wikipedia access logs + Center for Disease Control & Prevention (CDC) influenza-like illness reports

- Monitoring diseases: HealthMap

Government and public officials

- Monitoring public perception on political candidates, election campaigns and announcements
- Prediction at national level of happiness, unemployment etc.
  - Use of social media metrics to improve the share-ability and reach of articles
  - Social media job loss index: econprediction.eecs.umich.edu

- An article on real world applications
- Crime Patrol to identify "potential lone wolves"
  - Sudden change in behavior
  - www.orgnet.com

- DeitY & DST (India) DARPA and NSF (USA), IPTS(EU), and Social Computing laboratory by the Chinese Academy of Sciences

Social media startups

- Health: healthMap
- Third party data providers: SEMRUSH, Gnip
- To measure market sentiment: Social Market Analytics
- Text Mining of social networks: Ayasdi
- Social networks for crime control: orgnet
- Twitter for unemployment prediction

Some ideas..

- Encourage voluntary participation
- Social networks and latrine adoption ?
  - Track toilet use using smartphones and tablets
- Cell phone data to develop disaster response systems/management
  - Stampede, floods ?
- Tools for better visualization and understanding

Challenges, biases and limitations

- Introduction
- Often contains data and metadata - not readily treated using traditional analysis tools
  - e.g. tags, implicit and explicit social networks

- Holistic data sources: combining data from different sources to get meaningful insights (microblogs, blogs, real-time markets, customer data, reviews)

- Quality v/s quantity, Garbage in and garbage out
- Google Flu Trends

Challenges cont.

- Restrictions imposed by websites on data collection

- How social media providers change the sampling and filtering of data streams ?
  - Platform specific sampling problems: streaming APIs of twitter, are not an accurate representation of the overall platform data

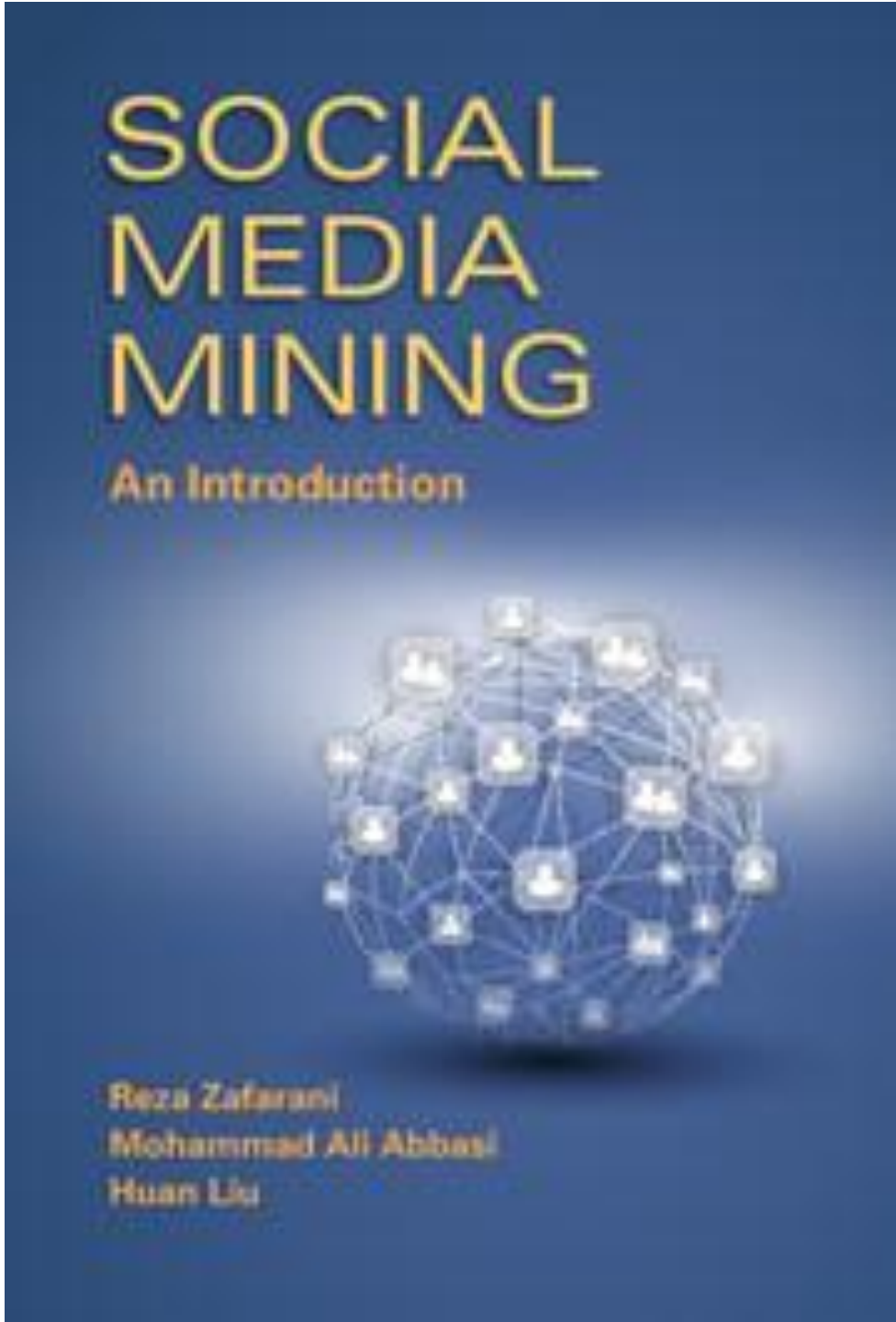
- Analysis may misrepresent the real world
  - Proxy population bias: very relevant in the Indian context
- Spread of unsubstantiated rumors
  - Rumors about Ebola
  - Fake news on social media

Challenges cont.

- Distortion of human behavior: social platforms are build to serve specific, practical purpose- not necessarily to represent social behavior
  - Alter ego: Professionally managed accounts of prominent individuals
- Nonhumans: social bots and spammers
- Replication of results
  - social media platforms forbid the retention or sharing of data sets
- Over fitting
  - Performance of a technique should take into account the number of feature being used; Feature hunting
- Social data is dynamic in nature and their sheer size pose significant computing challenges

Text book

- Social Media Mining: An Introduction
  Zafarani et al. 2014



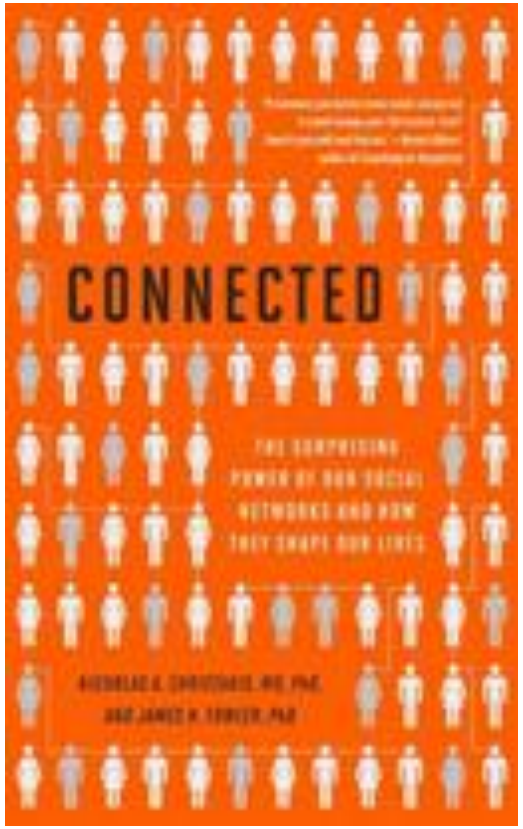
Getting started with social media..

- Gephi
- igraph

- Connected….

  by Nicholas Christakis

- Marketing Analytics



Different data sources

- Open publicly accessible academic alliance: DERP
- GitHub
- Wikipedia
  - HTTP based APIs that allows programmable access and scraping
  - Open source toolkit MediaWiki
- Facebook and Twitter data can also be accessed with some restrictions
  - JavaScript-based APIs, and return tagged data in XML, CSV or JSON.
- World Bank Databank ; data.gov.in

- News feeds
- Location and time sensitive feeds

Technical issues

- Social media data: XML, JSON, real-time financial data, spatial data
- Social media programmatic access:
  - Protect the raw data, but provide simple metrics
  - Google Trends, Google Analytics
- Data cleaning
  - DataWrangler
- Data Analysis Tools
  - Transformation tools: transforms textual inputs into tables, maps, charts etc.
    - Zoho
  - Analysis Tools: Gephi, Twitter Data Analytics

Application areas

- Economics and Finance
- Sociology/Psychology
- Marketing, management and organization science
- Geospatial: civil and environmental sciences
- Healthcare and public health
- Mathematics and Statistics
- Computer science


Thanks!