



TRADITIONAL AND COMPUTATIONAL SOCIAL SCIENCE METHODOLOGIES OF RECRUITMENT

Presented by:

Yifan CAO and Toni LAW

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Background



Shackleton's recruitment ad



Early 1900's newspaper advertis

[illegible]

Research Question

**How has researchers utilized
Computational Social Science
Methodologies to better solve
traditional recruitment problems?**

Significance

1. How to Manage information explosion in E-recruitment

- The Fact

Just in 2016, the number of active monthly users on Facebook already reached **1.65 billion**; while almost simultaneously, LinkedIn owned **433 million** active users.

- New Demand

Human Resources Analysis has become an interdisciplinary topic combining with big data manipulation, asking for new methods like data collection, annotation, and analysis to predict candidates' work performance.

2. How to manage self-presentation in E-recruitment

- The Fact

A research conducted in 2012 by the University of Massachusetts in Dartmouth pointed out that **81% of Inc. 500 corporations** use LinkedIn for recruitment.

- New Demand

Job hunters need to refresh self-presentation strategies based on big data analysis to better match personal priorities with organization goals, to improve the probability of interview.

Significance

3. Understand new requirement for new positions

- The Fact

Over 50% of the roles on 2020 LinkedIn's emerging jobs list are within the technology, engineering and data science fields.

- New Demand

Job market practitioners don't have much experience on how to propose or measure such vacancy. Also, automated match systems are undergoing optimization, and it's hard to decide the new standards.

4. A fruitful academic field

- Explanation

few studies paid attention to describe quantitatively whether job seekers' efforts towards online self-presentation are efficient or not

how indicators from online job hunting platforms impacted users' impression management or communication techniques

- Prediction

Researchers relying too much on expertise as well as manual feature engineering, which is neither accurate enough nor easily transfer between different social science domain.

Traditional Social Science Methods and Data

Brief introduction of traditional social science method

1. Data Collection

- focus group
- interview
- questionnaire (such as Likert scale)
- participant observation

2. Data Analysis

- statistical significance
- p-value

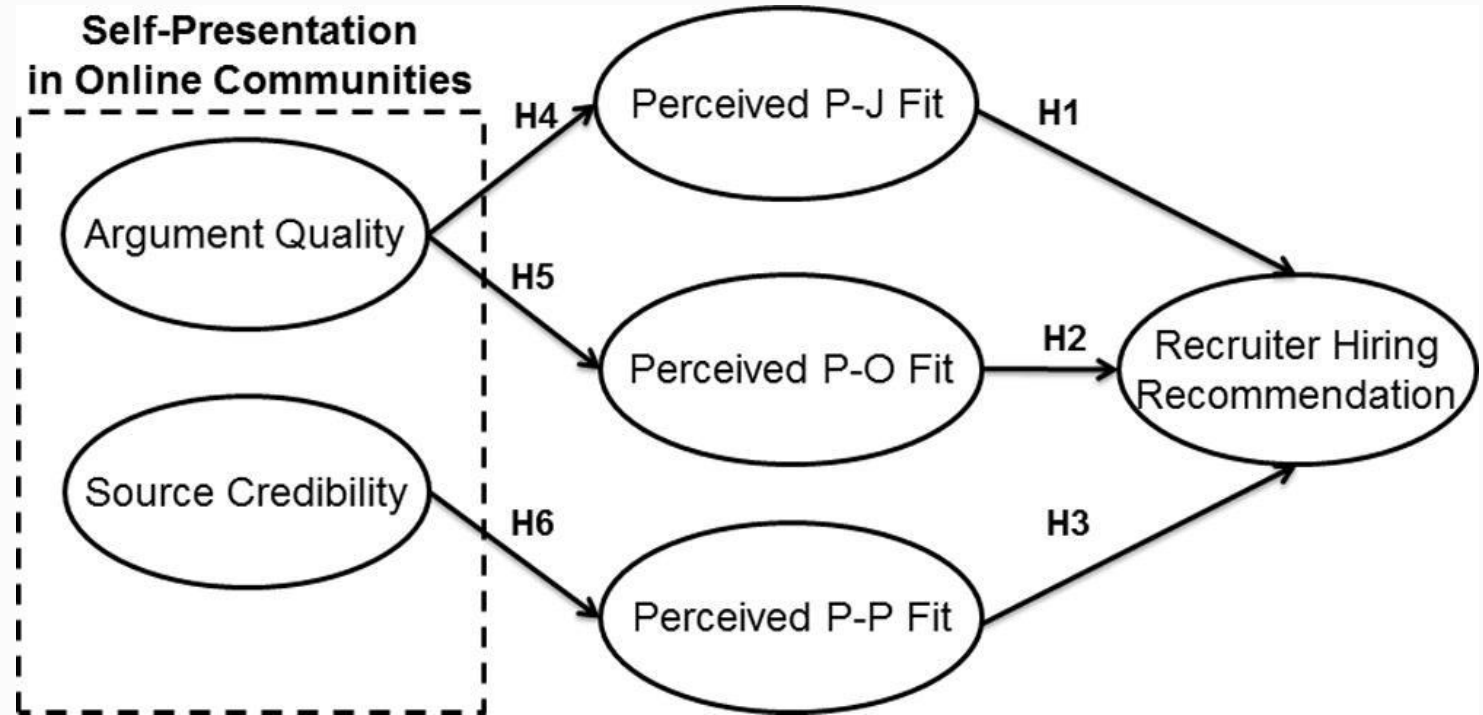
Traditional social science research highly relies on direct or indirect interaction with people involved, through literary or oral means.

E-recruitment studied in traditional method

- *How to write a killer LinkedIn profile* (Brenda Bernstein, 2019),
- *LinkedIn in 30 minutes: how to create a rock-solid LinkedIn profile and build connections that matter* (Angela Rose, 2017)
- *Self-presentation and hiring recommendations in online communities: Lessons from LinkedIn* (Johannes Kuo-Huie Chiang, 2015)
- *LinkedIn Versus Resumes: the Impact of Person-Organization Fit* (Zide, 2015)
- *Recruiter and Applicant Use of LinkedIn: A Spotlight on India* (Shahani-Denning, Comila, 2017)
- *Talent Flow Analytics in Online Professional Network* (Richard J. Oentaryo, 2018)

Traditional Social Science Methods and Data

Example



With the information openly provided by each job seeker once connected on LinkedIn, recruiters can review the self-presentation categories for each job seeker, which includes

- | | |
|-------------------------------------|-------------------------------------|
| (1) portrait | (8) publications |
| (2) profile summary | (9) education |
| (3) experience | (10) discussion posts and comments, |
| (4) volunteer experience and causes | (11) recommendations |
| (5) projects | (12) endorsed skills and expertise |
| (6) languages | (13) interests |
| (7) certifications | (14) honours and awards. |

Traditional Methods and data - Advantages

- **Comprehensible**
- **Easily attract readers' interest**
- **More likely to gain widespread reputation**

Traditional Methods and data - **Limitations**

- Common Method Variance (CMV) problems
- External validity and generalization
- Cost of time and labor

Computational Social Science Methods and Data

Methods:

- Simulations
- Machine Learning Algorithms
 - Logistics Regression
 - *Decision Tree*
 - *ID3 Algorithm*
 - *Gradient Boosting Decision Tree*
 - K-means clustering

Big Data

Computational Social Science Methods and Data - **Advantages**

Situ et al. 2017. "Predicting the Probability and Salary to Get Data Science Job in Top Companies." Industrial and Systems Engineering Research Conference: 933-939.

- **Logistic Regression** were used to predict the probability of recruitment and has achieved good performance
- **Decision Tree**
 - Powerful and most popular because of simplicity
 - Significantly reduce time and labor
 - Relatively easy to prepare
 - Informative and simple to explain
 - Visual image

Computational Social Science Methods and Data - Advantages

- ID3 (Iterative Dichotomiser 3) Algorithm
 - Entropy-based algorithm
 - Categorizes attributes and generate decision tree
 - Straightforward and flexible
 - Allows companies to include both quantitative aspects and qualitative aspects
 - Reduced screening time of resumes

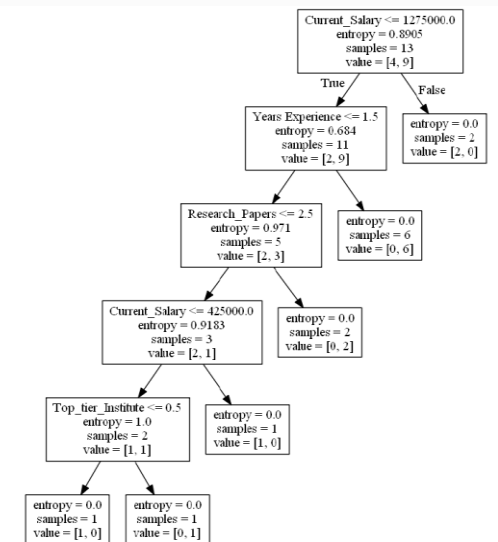
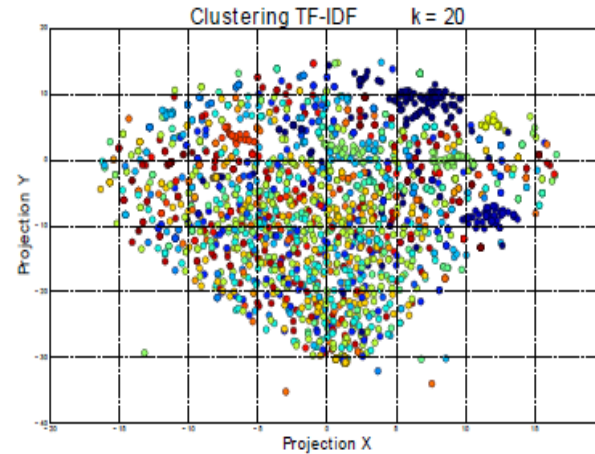


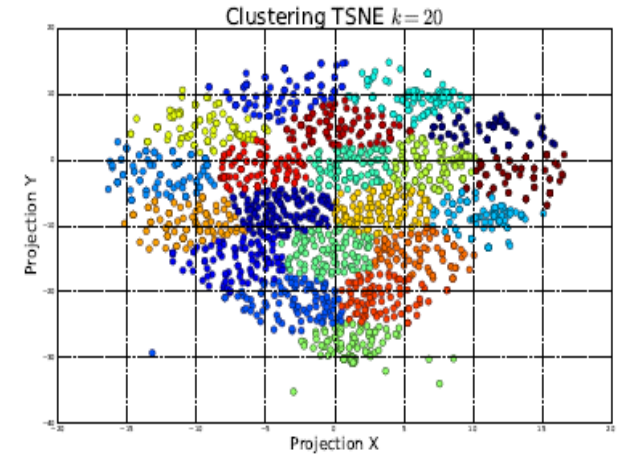
Fig. 2

Computational Social Science Methods and Data - Advantages

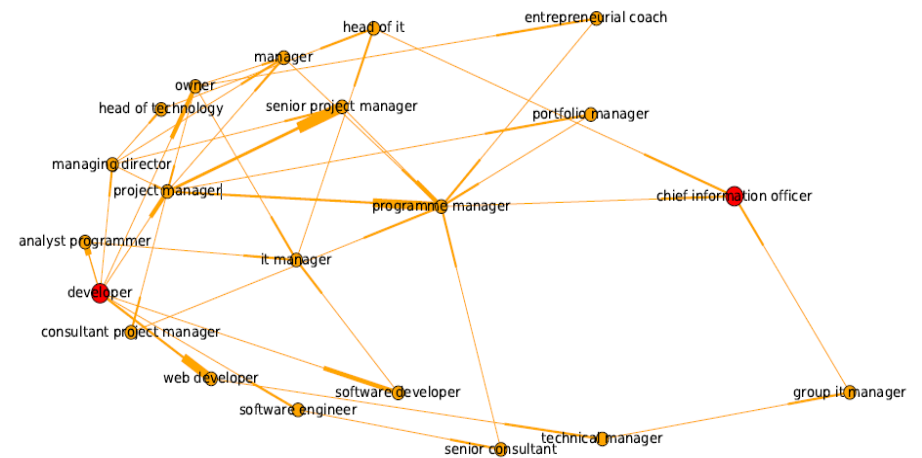
- K-means Clustering



(a) TF-IDF K-Means clustering $k = 20$

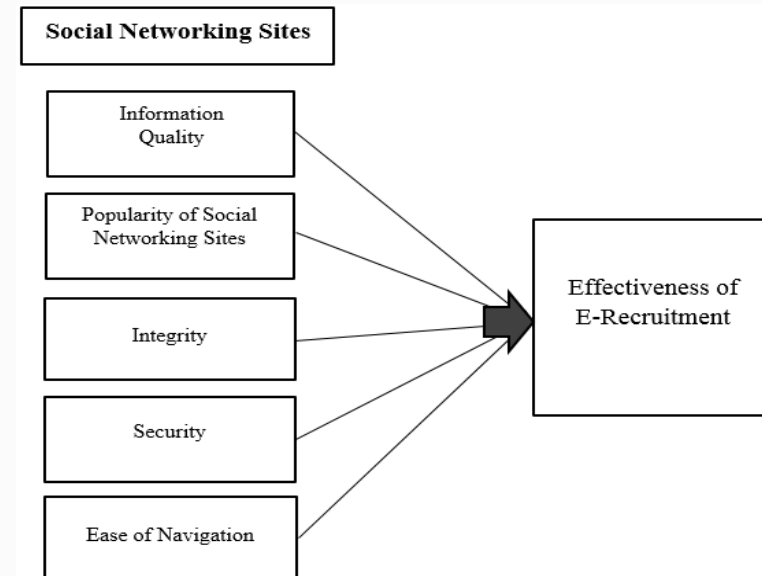


(b) t-SNE K-Means clustering $k = 20$



Computational Social Science Methods and Data - **Advantages**

- Big data
 - Huge amount of valuable information
 - Does not require general wisdom or experience
 - Available 24/7
 - Accessible as long as you have internet



Computational Social Science Methods and Data - Limitation

Big Data

- Main concern: Ethical issue regarding users' security and privacy
- Hard to validate quality of information
- Completeness
- Screening and extracting useful information for decision making

Computational Social Science Methods and Data - **Limitation**

Computational Social Science Methods

- Sometimes requires homogeneous assumptions
- Lacks emotional capacity, intuition and experience of a human recruiter
- Some qualities are not able to be included into algorithms

Discussion

Traditional social science method

- pros
 - qualitative
 - descriptive
 - explanatory
 - interpretative
- cons
 - small data
 - subjective
 - cost of time

Computational social science method

- pros
 - quantitative
 - predictive
 - big data
 - visualization
- cons
 - legality
 - data annotation cost

Conclusion



Thank you for listening!

Q&A