Traditional vs. Computational E-recruitment research: the diversity and combination of social science methods

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1. Abstract

With the development of big data generated from online platforms and social networks, practices and researches of many domains have changed a lot, especially in recruitment. Recruitment based on online big data, also known as E-recruitment has become a remarkable phenomenon as well as a fresh topic attracted many researchers' attention.

However, how to fulfill research accomplishment has been caught in debate. Explanation or prediction? What kind of results will be the most fruitful? How to analyze big data resources? Generally, there are two kinds of methodologies related, one is traditional way, another is combined with computational technologies.

Thus, comparison is essential to get a comprehensive understanding of both methodologies, which is also helpful for us to know how to make connection with latest research strategies in our own social science studies focusing on E-recruitment.

2. Introduction

2.1 Background of E-recruitment and Big data analysis

If you were seeking for employment in 2000, your best shot would be to open up a newspaper, flip to the job advertisement section, circle the jobs that interest you and

mail in or drop off a copy of your resume and wait at home for an interview. Similarly, if you were a recruiter, you would have to post an advertisement on the local or nation-wide newspaper, wait for resumes to come in, manually screen through the resumes received and call the candidates that may fit your job description. Newspaper job advertising has been the backbone of recruitment for over a century, starting from early 19th century and becoming the main source of recruitment throughout the 20th century. Starting from the turn of the 21st century, job recruiting has begun to shift to online recruiting, or more specifically known as E-recruitment.

After only 20 years, E-recruitment has become prevalent and is now the major source of recruitment. According to a survey conducted on LinkedIn, approximately 50% of job applicants now come from public job boards such as Indeed, Monster and Glassdoor. Around 30% of job applicants come in from the company's own career websites. Compared to traditional methods of recruitment, E-recruitment is much more efficient, lowers recruitment costs, and allows recruiters to reach a much larger crowd of candidates.

However, E-recruitment isn't flawless and also creates several new challenges. Because E-recruiting platforms are so easily accessible, recruiters have had a significant increased influx of job applicants. Increase in response does not necessarily increase the number of suitable candidates. Filtering large number of unsuitable candidates has

become a burden for recruiters. On the other hand, under such a competitive circumstance, adjusting self-presentation strategies for greater opportunities of getting interviewed through online platforms is another critical question especially for job seekers vice versa.

Technological advancement has brought us into an era of digitization, and this era is fast-paced and constantly changing. Over the past decade, utilizing and analyzing big data has become ubiquitous in all fields, including social science. The main advantage of big data is that it contains huge amount of valuable information and therefore does not require intuition and general wisdom from experience and allows the decision-making or predicting become an evidence-based process (Roberts, 2013). Big data is also readily available 24/7 and can be accessed as long as you have internet.

Recruiters have also started to turn to social networking platforms hoping to achieve higher accuracy in recruiting. Personal information and interests that are posted on social media may reflect a more authentic side of a candidate. Social media pages allow employers to see a more authentic side of a candidate, not just the suited up and glamourous side of them when they come in for an interview. Compared with competitors who don't turn to social network, employers who turn to social networking platforms are able to reach more potential and enthusiastic young candidates (Fiaz et al., 2017). These employers were also able to better determine the personality of the

applicant (Fiaz et al., 2017) and therefore better match a job opening.

Accordingly, our study strives to answer these questions：*How has researchers utilized Computational Social Science Methodologies to better solve traditional recruitment problems?* Also, as a new demand, *what kind of opportunities and challenges in this specific study field have computational social science methodologies generated?* We chose this focus because of two reasons: Firstly, efficiently or automatically matching job opening with suitable job applicants is currently a challenge in E-recruiting. Secondly, how to increase the chance of getting interviews or job offers is a major concern of fresh graduates and job applicants.

2.2 Overview of this literature review

Previously, scholars put much efforts on increasing E-recruitment efficiency from both sides, and they already accomplished some valuable achievements through traditional methods, which are also benchmarks of our study.

To make better comparison, we divided our literature review into 3 sub-sessions: Firstly, we will elaborate the social science research value of E-recruitment from 4 perspectives, which are the requirement of managing information explosion for HRM, the importance of optimizing self-presentation for job hunters, the need of understanding new positions, and also the huge potential in academy. Then, we will respectively introduce the research methodologies of traditional social science and

computational social science focusing on related topics of E-recruitment. In this section, we will dissect popular practices and analysis technologies in academic works, also present their research outcomes.

Finally, we will zoom out and reach the comparison section. Also, this work is associated with our final project, which is about figure out the key features of preferred online resumes, and also provide some practical suggestions for job hunters.

3. Importance of this topic

With the boosting of social network, such as LinkedIn, Facebook etc, E-recruitment has become a noticeable trend in current job marketing. Comparing to traditional practices, online job-hunting platforms or websites have created numerous channels as well as opportunities for employees' self-presentation, and employer's recruitment vice versa. This phenomenon has become so overwhelming that every single individual gets influenced by it more or less.

"The media is the message." said McLuhan, the transformation of recruitment media/method will definitely cause some changes to employment strategies. Through computational technologies, new standards are gradually established but haven't been fully understood or studied yet.

Unveiling the secret behind E-recruitment is not only significant for practitioners in job marketing, but also becoming an interesting topic in Social science. Specifically

speaking, there are 4 dimensions possess huge importance as well as potential to explore.

3.1 How to manage information explosion in E-recruitment

Information explosion in recruitment already happened. Take 2016 for example, the number of active monthly users on Facebook already reached 1.65 billion; while almost simultaneously, LinkedIn owned 433 million active users. Online databases of resume, social media profiles and employment histories surely increase communication efficiency in job marketing, but numerous information generated from social networks also challenged HR to involve more in data mining and big data analysis.

Previously, Human Resource Management (HRM) used to apply data analysis for evaluating allowance, employee attitudes, variety or affirmative action, and benefits. Nowadays, 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 (Marler & Boudreau, 2017).

Thus, based on big data, a new paradigm of HRM is taking shape. How to manage big data within E-recruitment has become a new focus in HRM field.

3.2 How to manage self-presentation in E-recruitment

On the other hand, the innovation of recruiters' talent acquisition practice heavily influenced job seekers' strategies. A research conducted by the University of Massacusetts in Dartmouth pointed out that 81% of Inc. 500 corporations use LinkedIn for recruitment (Barnes & Lescault, 2012).Therefore, managing online self-presentation has undoubtedly become a necessary task for job seekers.

However, between online self-presentation and hiring recommendation always existing the "screening" gap. To improve the probability of interview, job hunters need quantitative suggestions based on big data to better match personal priorities with organization goals, by providing information related to recruiter interests for certain position (Schwämmlein & Wodzicki, 2012).

3.3 Understand new requirements for new positions

Data explosion not only triggered revolution in recruitment process for both HRM as well as job seekers, but also generated plenty of new opportunities in job market. Currently, enterprises generally acknowledged the value of big data, and dying for digital transformation. Every industry is in lack of data scientists to extract insights from accumulated data.

No wonder that, over 50 percent of the roles on 2020 LinkedIn's emerging jobs list are within the technology, engineering and data science fields. All of this kind of fresh jobs are associated with data analysis to some extent, but people involved 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.

Particularly, for job seekers who switched major into this direction, may feel confused

about how to meet new requirements.

Big data analysis can hugely help with set standards and clear demands for both

HRM and job hunters. Interestingly, the study of new careers grow out of big data can

only be accomplished by big data methods.

3.4 A fruitful academic field

Big data and computational methods like machine learning or feature engineering

are taking off within employment industry. While, from academic perspective,

obviously, this is an emerging inter-discipline, and a huge amount of issues still

remain to be optimized.

For explanation paradigm, it is assumed that computer-mediated communication

accelerated recruitment process, also enable new channels for self-presentations.

Nevertheless, few studies paid attention to describe quantitatively whether job

seekers' efforts towards online self-presentation are efficient or not (Guillory &

Hancock, 2012). Furthermore, there is not much studies based on big data analysis

discussing how indicators from online job hunting platforms impacted users'

impression management or communication techniques (van der Heide, D'Angelo, &

Schumaker, 2012).

For prediction paradigm, there are more possibilities to explore. Specifically

speaking, when it comes to job-oriented qualification assessment and matching metric

model construction, 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.

Generally speaking, this is a new interdisciplinary field, which needs much effort

to standardize and keep trying to make the outcome more accuracy and more

comprehensible.

4. Description

4.1 Traditional Social Science focusing on E-recruitment

From traditional framework, researchers always regard social science as a field

characterized in description and explanation. This pattern is extraordinarily obvious

for anthropology, sociology, psychology and communication. Expertise majoring in

those disciplines are devoted to summarizing rules from observable phenomenon or

historical experience before big data analysis merged into traditional research

methodologies.

Considering the obvious qualitative feature of social science, under extreme circumstances, some academic fieldwork achievement even become bestsellers on Amazon. Take ***Primates of Park Avenue: A Memoir*** (Wednesday Martin,2015) and ***Pricing Beauty: The Making of a Fashion Model*** (Ashley Mears,2011) for example, these scholars take their personal daily life as the object of study and throw light on social issues by storytelling strategies.

Generally speaking, traditional social science research highly relies on direct or indirect interaction with people involved, through literary or oral means. Among these techniques, focus group, interview, questionnaire (such as Likert scale) and participant observation are the most frequently used methods for data collection. Based on that, scholars will then come to data analysis process, which mainly focus on verifying statistical significance of the observed difference by calculating p-value in previous practice. Worse still, this most widespread statistical method has been criticized as misused and also misinterpreted during 2016 (Wasserstein, 2016).

With the development of online social network, the potential topic in social science has extended dramatically, particularly in employment activities. This phenomenon triggered new passion for social scientists, and they quickly switched emphasis towards the influence of social networks on recruitment: *How to write a killer LinkedIn profi*le (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 LinkedI*n (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). Also, there are

many other social science researches focus on organization culture, employee

satisfaction, wage strategies and job-hopping behaviors, based on the public data

obtained from online social network.

However, transformation in research methodologies doesn't happen

simultaneously with the revolution of study topic. Among those research outcomes

related with E-recruitment, a large proportion of scholars still applied traditional

methods, mostly from psychological and sociological domain.

The study of self-presentation on LinkedIn is a typical example of this kind:

researchers firstly grouped 5 HR executives to gather pilot test and focus interview,

based on that information, they raised 6 hypotheses about what kind of self-

presentation strategies will positively/negatively influence HRs' hiring

recommendation. Besides, they also participated in a LinkedIn job hunting group to

observe the interaction between potential employers and employees. Finally, they

designed questionnaires adopted various techniques, such as Kristof-Brown's (2000)

three-item scale, Howard and Ferris' (1996) three-item scale and Bhattacherjee and

Sanford (2006) three-item scale, for HR professionals to assess their opinions towards

job seekers' argument quality, source credibility, fit perceptions and hiring

recommendations.

Although their person-organization analysis framework was well structured, but

the research outcome inevitably depended on HR professionals' personal judges.

Thus, they have to apply diverse methods, such as Cronbach's alpha indicator and

partial least squares (PLS) method to evaluate the reliability of these responses.

Worse still, qualitative methods cause them huge trouble to solve Common method

variance (CMV) problems.

4.2 The limitations of traditional method

Even with the help of statistical method, traditional research about recruitment and

E-recruitment are still characterized as descriptive and explanatory, which represents

obvious pros and cons. The bright part about traditional social science practice is

comprehensible, which can easily attract readers' interest and make academic

achievement more likely to gain widespread reputation, in some case, even bring

potential commercial value to researchers.

Nevertheless, qualitative methods surely bear with insurmountable drawbacks.

Firstly, the common method variance (CMV) problems. For traditional method collects data from interaction with people involved, no matter from self-report or oral/written interview, scholars always trapped by assigning significance of correlations to avoid inflated or attenuated description. To get rid of the critique on bias is always a burden.

Secondly, external validity and generalization limitation. For the results of traditional method are always summarized from relatively small amount of sample in certain kind of areas/occupations/communities, it can be hard to ensure the reliability or portability of research outcomes.

Last but not the least, the cost of time and manpower are always huge. According to the author of ***Pedigree : How Elite Students Get Elite Jobs*** (Rivera, 2015), it takes 9 months to accomplish the participant observation before drawing any hypothesis.

Generally speaking, with the advent of information era, it calls for a combination between traditional qualitative method with big data analysis in social science research. On the one hand, scholars get access to new research materials, that is big data; on the other hand, new materials need computational method to deal with. Also, new process generate new consequence, as a result, explanation is no longer satisfactory, prediction is the new demand.

4.3 Computational Social Science focusing on E-recruitment

4.3.1 Advantages of using computational social science methods and data

To solve the limitations of traditional social science methods, researchers have tried to embed computational social science methods in recruiting. Research scientists have used simulations, and machine learning algorithms to improve recruitment practices and increase efficiency of the process.

Simulations allow us to examine the outline of unprecedented theoretical scenarios and machine learning allows us to build empirical models and make predictions with higher accuracy. Out of the many machine learning algorithms, Decision Tree is one of the most powerful algorithms and is a popular predictive modeling methodology because of its simplicity and high accuracy.

The research scientists of "Predicting the Probability and Salary to Get Data Science Job in Top Companies" crawled and cleaned data from two different data sets and were able to make predictions about a candidate's probability of employed by using gradient boosting decision tree and logistic regression. They were also able to find out what variable affected the probability of recruitment the most (Situ et al., 2017). The models generated achieved a high prediction accuracy rate of 78% and reduced cost of recruitment (Situ et al., 2017).

Because E-recruitment reaches such a broad range of candidates and is easily accessible, a lot of job applicants apply for jobs that are ideal but not suitable for them

because it just takes a few clicks to apply. Companies usually receive thousands of resumes just for one position. Manually going through these resumes and picking the right candidates are time consuming and labor intensive.

Iterative Dichotomiser 3 (ID3) algorithm in decision tree learning can help recruiters match suitable candidates and can significantly reduce screening time. ID3 algorithm is an entropy-based algorithm. ID3 algorithm can go through large data sets, categorize attributes according to their values to the company, and generate a decision tree model by going through the valuable attributes of each job candidate. ID3 can determine whether a candidate should be recruited or not based on the combination of various attributes (Hazra & Sanyal, 2016). ID3 algorithm is straightforward and flexible, and allows companies to include both quantitative aspects, such as 'Level of education', and qualitative aspects, such as 'number of research paper', that they value into the algorithm (Hazra & Sanyal, 2016).

Decision tree model is informative and requires relatively little effort for data preparation (Hazra & Sanyal, 2016). The image of a generated decision tree model is very self-explanatory and can be easily explained to those with little computational skills and experience. Not only have employers used machine learning to pick the right candidates to interview, machine learning has also allowed them to find passive

candidates that may be likely to switch jobs, an active approach that could not be taken in traditional recruitment.

While transforming to E-recruitment has granted both recruiters and job seekers cost-efficiency and wider reach, accuracy in matching remains a major obstacle. According to the study in *"Big data in enterprise management: Transformation of traditional recruitment strategy",* results have shown that information quality, popularity, security and ease of navigation of social networking sites has a significant effect on the effectiveness of e-recruitment (Fiaz et al., 2017).

In order to assist job seekers on choosing suitable jobs, researchers have used k-means clustering and topic modelling to analyze and extract information from big data sets in order to generate existing career paths for job seekers to see. Since different companies and recruiting agencies may have different job titles for jobs with similar job description, it may be confusing for job seekers, especially those who have little or no work experience, to apply for suitable positions. Research scientists have used TF-IDF *k*-means clustering and t-SNE *k*-means clustering to put jobs with similar job requirements but different job titles together into one cluster and to generate a visual image of the clusters (Marivate & Moorosi, 2017). After clustering jobs, research scientists can then extract information by mining professional social networking data sets to validate their clustering results and to generate a visual image of different

career paths (Marivate & Moorosi, 2017). Job seekers can then explore and understand different career paths and pick a suitable career path for themselves.

4.3.2 Shortcomings of computational social science methods and data

Computational social science and big data has transformed our lives significantly and have made our lives more convenient and efficient, but it may not all be sunshine and rainbow. Alongside with the advantages, utilizing computational social science methods and data also comes with drawbacks and challenges.

The main concern with using big data on social networking platforms to make decisions raises an ethical issue regarding user's security and privacy (Fiaz et al., 2017). Although looking at social networking pages might give an employer the sense that it reflects the candidate's personality, it is hard to validate the quality of the information. Employers must strive to ensure the integrity and credibility of the sources (Fiaz et al., 2017).

The main challenge with big data is the process of screening and extracting useful information for decision making. To solve this challenge, it is suggested that employers follow a four-step process: plan on how to handle and organize data, data acquisition, process the data and analyze the data (Garcia-Arroyo & Osca, 2019). It should also be noted that information extracted from big data sets may not be

complete, therefore it is crucial that research and data scientists validate the completeness of the data sets.

Researchers may find that when using computational algorithms, it requires homogeneous assumptions to be made before using sample data and variables (Situ et al., 2017). This may reduce the accuracy of algorithms because not all real-world data and variables are homogeneous.

Another challenge in using computational algorithm is that an algorithm lacks the emotional capacity, intuition and experience of a human recruiter. After all, recruiting and hiring is still part of social and behavioral science. Although computation algorithms increase efficiency, it will marginalize candidates that are highly capable and suitable for the job, but do not fit into the criteria of the algorithm. There are also qualities that are not able to be included in algorithms. Qualities such as passion, communication skills and resilience cannot easily be measured with algorithms, but are qualities that are highly valued in many companies. These drawbacks and challenges should remind recruiters and future research scientists that computational social science methodologies and data should be used as complements and not as substitutes.

5. Discussion

The debate of traditional and computational social science is flourishing right now. There is no absolute perfect theories or methodologies, what really matters is how to manage them to fulfill research objectives. This is the same circumstance with current social science.

However, before combination, we must take a close look at the pros and cons respectively of these two methodologies. From the perspective of traditional social science, the key point is about qualitative analysis, sometimes storytelling strategies included. Also, researchers are always devoted to give explanation for phenomenon of certain domain, which means that their research outcomes are very interpretative as well as descriptive. The features of research outcome are according with the strategies used, which is mainly about interaction with group members or participation in the practical activities. Lots of advantages though traditional method own, it's really hard to analyze big data information, and interaction strategies can be easily challenged as subjective. Also, considering the cost of time and human resources, the findings out of traditional social science is not very effective, for probably those analysis frameworks can't transfer to other domains.

From the perspective of computational social science, the picture is very different. Based on data science, computational methods are able to manage big data with algorithm and advanced statistical technologies. With quantitative strategies,

such as data mining, machine learning, deep neural network as well as natural

language processing, researchers can achieve beyond description but prediction. This

kind of methodologies have already successfully used on topics like American

presidential election, and also automated job matching systems, showing great sense

of applicability and accuracy. Moreover, computational social science can be easily

visualized for presentation. Promising though it has been regarded as, some problems

remain unsettled. For example, how to guarantee the legality of big data resources,

and how to reduce data annotation cost. It's still in the developing status.

Generally speaking, different though these two research methodologies, but they

are not contrary. The wise strategy is to take advantages from both sides and generate

new combinations. Particularly in E-recruitment issues, researchers must draw lessons

from HR practices to construct feature engineering, but on the other hand, they could

also benefit from quantitative methods, to verify their hypothesis or prediction on a

larger scale.

6. Conclusion

In this study, we presented how traditional social science and computational

social science have influenced and transformed recruitment. The interesting narrative

of traditional social science methods are irreplaceable, but these methods also come

with many limitations. With technological advancement in recruiting practices, most companies have adapted new methods and tools during the recruiting process.

We presented how computational social science methods have solved the limitations created under traditional methods. Computational methods, such as machine learning, have significantly helped both recruiters and job applicants reduce cost, reduce noise, and increase efficiency during the job matching process.

Because of dynamics of technology, new innovations and research emerge every day, and we try to embed and embrace technology in all aspects of life in order to be not be left behind. Millennial and Generation Z job seekers often do not know how to present themselves and how to choose a suitable job because of the large influx of new information and distraction. Computational social science methods and data can assist job seekers in visualizing career paths and improve in self presentation.

We emphasize that there are still challenges and limitations with computational social science methods and that future researchers and recruiters need to be prudent when using this methods and tools. Computational social science is a tool to assist social scientists achieve greater results but not fundamentally change what they are trying to do, it is a complement and not a substitute.

7. Reference

Barnes, N. G., & Lescault, A. M. (2012, November 2). The 2012 Inc. 500 social media

    update: Blogging declines as newer tools rule. Retrieved from

    www.umassd.edu/cmr/studiesandresearch/2012inc500socialmediaupdate/

Bhattacherjee, A., & Sanford, C. C. (2006). Influence processes for information

    technology acceptance. An elaboration likelihood model. MIS Quarterly, 30(4),

    805–825.

Chiang, Johannes Kuo-Huie, & Suen, Hung-Yue. (2015). Self-presentation and hiring

    recommendations in online communities: Lessons from LinkedIn. *Computers in*

    Human Behavior, 48, 516-524.

Garcia-Arroyo, J., & Osca, A. (2019). Big data contributions to human resource

    management: a systematic review. *The International Journal of Human Resource*

    Management, 1–26. https://doi.org/10.1080/09585192.2019.1674357

Guillory, J., & Hancock, J. T. (2012). The effect of Linkedin on deception in resumes.

    Cyberpsychology. *Behavior and Social Networking*, 15(3), 135–140.

Hazra, S., & Sanyal, S. (2016). Recruitment Prediction Using Id3 Decision

    Tree. *International Journal of Advance Engineering and Research*

    Development, 3(10). doi:10.21090/ijaerd.031010

Howard, J. L., & Ferris, G. R. (1996). The employment interview context: Social and

situational influences on interviewer decisions. *Journal of Applied Social*

Psychology, 26(2), 112–136.

Ikram, Q. Su, M. Fiaz and S. Khadim, "Big data in enterprise management:

Transformation of

traditional recruitment strategy," 2017 IEEE 2nd International Conference on Big

Data Analysis (ICBDA), Beijing, 2017, pp. 414-419, doi:

10.1109/ICBDA.2017.8078853.

Jacobs, E. (2015). 'Primates of Park Avenue: A Memoir', by Wednesday Martin.

FT.com,

FT.com, 2015-07-12.

Kristof-Brown, A. L. (2000). Distinguishing between recruiters' perceptions of

person–job and person–organization fit. *Personnel Psychology*, 53(3), 643–671.

Laine Talley, H. (2012). Pricing Beauty: The Making of a Fashion Model. By Ashley

Mears.

Berkeley and Los Angeles: University of California Press, 2011. Pp. xiv 305.

$65.00 (cloth); $26.95 (paper). *The American Journal of Sociology*, 117(6), 1853-

1855.

Marivate, V., & Moorosi, N. (2017). Employment relations: A data driven analysis of

job

markets using online job boards and online professional networks. *Proceedings of*

the International Conference on Web Intelligence. doi:10.1145/3106426.3115589

Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR Analytics.

The

International Journal of Human Resource Management, 28(1), 3–26.

doi:10.1080/09585192.2016.1244699

Nowak, Anne, MA,J.C.T.C., A.C.R.W. (2017). How to write a KILLER LinkedIn

profile ...

and 18 mistakes to avoid (updated for 2016). *Career Planning and Adult*

Development

Journal, 33(3), 49-50. Retrieved from

https://search.proquest.com/docview/2032375521?accountid=29018

Oentaryo, Richard J, Lim, Ee-Peng, Ashok, Xavier Jayaraj Siddarth, Prasetyo, Philips

Kokoh,

Ong, Koon Han, & Lau, Zi Quan. (2018). Talent Flow Analytics in Online

Professional Network. *Data Science and Engineering*, 3(3), 199-220.

Rivera, L. A. (2015). Pedigree. Princeton: Princeton University Press.

Roberts, B. (2013). The benefits of big data. *HR Magazine*, 59(10), 20-

22,24,26,28,30.

Retrieved from

https://search.proquest.com/docview/1445137722?accountid=29018

Rose, A. (2017). LinkedIn in 30 minutes: How to create a rock-solid LinkedIn profile

and

build connections that matter (Second ed., In 30 minutes book). Newton, MA: In

30 Minutes Guides.

Schwämmlein, E., & Wodzicki, K. (2012). What to tell about me? Self-presentation in

online

communities. *Journal of Computer-Mediated Communication*, 17(4), 387–407.

Shahani-Denning, Comila, Patel, Vidhi, & Zide, Julie. (2017). Recruiter and

Applicant Use of

LinkedIn: A Spotlight on India. *The Psychologist Manager Journal*, 20(2), 90-

105.

Situ, W., Zheng, L., Yu, X., & Daneshmand, M. (2017). Predicting the Probability

and Salary

to Get Data Science Job in Top Companies. *Industrial and Systems Engineering*

Research Conference.

Van Der Heide, B., D'Angelo, J. D., & Schumaker, E. M. (2012). The effects of

verbal versus

photographic self-presentation on impression formation in Facebook. *Journal of*

Communication, 62(1), 98–120.

Wasserstein RL, Lazar NA (2016). "The ASA's statement on p-values: context,

process, and

purpose". *The American Statistician*. 70 (2): 129–133.

doi:10.1080/00031305.2016.1154108. S2CID 124084622

Zide, J. (2015). LinkedIn Versus Resumes: The Impact of Person-Organization Fit.