Misinformation in Social Media: Diffusion, Detection and Intervention

Liang Wu, Fred Morstatter, and Huan Liu

March 4, 2016

1 Abstract

A rapid increase in social media services in recent years has enabled people to share and seek information effectively. The openness, however, also makes them one of the most effective channels for misinformation. Given the speed of information diffusion on social networks coupled with the widespread propagation of fake news, phishing URLs, and inaccurate information, misinformation escalates quickly and can significantly impact users with undesirable consequences and wreak havoc instantaneously. In this tutorial, we define the concept of misinformation in social media, discuss the diffusion of misinformation in social media, and introduce challenges of its identification, intervention, and prevention methods in terms of misinformation and misinformation spreaders. We use examples to illustrate how to mine misinformation in social media, and also suggest available datasets as well as possible future work.

2 Target Audience

This tutorial will target researchers and practitioners who are interested in the area of misinformation mining and have basic knowledge of network analysis, data mining, and machine learning. It will be delivered at a college junior/senior level, and should be easily accessible to interested parties from both industry and academia.

3 Rationale

Misinformation on social media platforms has become a major problem in recent years, which not only causes online public anxiety, but also triggers panic in physical world. In the 2013 World Economic Forum, misinformation spread has been voted as top ten globally significant issues[1]. This swell of malicious content would be pertinent and highly interesting the communities that regularly attend SBP. Over the last few years, many research efforts have been dedicated to finding misinformation and the spreaders on social media. The approaches that have been taken to address this problem span a broad spectrum of research including work from information diffusion, social network analysis, social media mining, and machine learning. As such, we expect that the interest in our tutorial will be comparable to the interest this topic has drawn from its respective fields.

Misinformation modeling, diffusion, detection, and intervention are topics that will attract researchers of many disciplines from both academia and industry. The learning outcomes of the tutorial are:

- The attendees will have an understanding of how misinformation is spread in social media: misinformation with different goals and corresponding diffusion models.

- The attendees will have an understanding of misinformation spreaders in social media: their behaviors, network topology and detection.

- The attendees will be made aware of areas for research in misinformation mining in social media.

- The attendees will learn how misinformation could be detected and how the adverse effect could be mitigated with different techniques.

---

[1] http://reports.weforum.org/outlook-14/top-ten-trends-category-page/

4   Author Bios

1. **Liang Wu** is a PhD student in Computer Science at Arizona State University in Tempe, Arizona. Among his publications is an WSDM paper that investigates how social status can be discovered and used in facilitating relational learning, 1 paper in ICDM, 1 KDD workshop paper, and a book chapter: Mining Misinformation in Social Media. Liang won the Honorable Mention Award of KDD Cup 2012, ranking 3rd on leaderboard. He has been a Research Intern at Microsoft Research Asia. More information can be found at `http://www.public.asu.edu/~liangwu1`. Contact him at wuliang@asu.edu.

2. **Fred Morstatter** is a PhD student in computer science at Arizona State University in Tempe, Arizona. Fred won the Dean's Fellowship for outstanding leadership and scholarship during his time at ASU. Among his publications is an ICWSM paper that investigates the representativeness of Twitter's Streaming API, a WWW Web Science paper that seek to find periods of bias automatically in streaming Twitter data, 2 KDD demo papers, an article in IEEE Intelligent Systems, and a book: Twitter Data Analytics. He has served as a PC member of ICWSM 2014 and 2016, IEEE/CIC ICCC 2014 Symposium on Social Networks and Big Data, and has been a co-chair of the Social Computing, Behavioral-Cultural Modeling and Prediction Conference's Grand Challenge organizing committee in 2014, 2015, and 2016. He has been a Visiting Scholar at Carnegie Mellon University as well as a Research Intern at Microsoft Research. He is the Principal Architect for TweetXplorer, an advanced visual analytic system for Twitter data. A full list of publications can be found at `http://www.public.asu.edu/~fmorstat`. Contact him at fred.morstatter@asu.edu.

3. **Huan Liu** is a professor of Computer Science and Engineering at Arizona State University. He obtained his Ph.D. in Computer Science from University of Southern California. At Arizona State University, he has been recognized for excellence in teaching and research in Computer Science and Engineering and received the 2014 President's Award for Innovation. His research interests are in data mining, machine learning, social computing, and artificial intelligence, investigating interdisciplinary problems that arise in many real-world, data-intensive applications with high-dimensional data of disparate forms such as social media. His well-cited publications include books, book chapters, encyclopedia entries as well as conference and journal papers. He is a co-author of Social Media Mining: An Introduction by Cambridge University Press. He serves on journal editorial boards and numerous conference program committees, and is a founding organizer of the International Conference Series on Social Computing, Behavioral-Cultural Modeling, and Prediction. He is an IEEE Fellow. More can be found at `http://www.public.asu.edu/~huanliu`.