

# Bias and Misinformation in Interactive Social Visualization System: A Survey

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## Abstract

Nowadays interactive social visualization system (ISVS) plays an important role in storing and managing collective intelligence, accelerating information transmission, and improving information comprehension in daily life since it presents large-scale information through graphic illustrations that can be intuitively, and thus easily, comprehended by its users. However, graphic synthetization of large-scale data and their complicated relations into intuitively recognizable patterns inevitably causes different degrees of information loss. Given that the drastically increasing number of system users are non-experts of data science, misinformation, misunderstanding, and mistrust of system and data are prevalent among users. Therefore, the study of bias and misinformation in ISVS from non-expert users' perspectives is crucial to appropriate system design. This project surveys current studies regarding misinformation in ISVS and factors causing it, including structure, sequence and underlying social context of ISVS design and use.

## Motivation

Interactive Visualization System (IVS) has been recognized as one of the most efficient tools to store, manage, analyze, and present a vast amount of data while transforming complicated information into intuitive, recognizable and comprehensive graphic patterns, and thus would play a vital role in knowledge acquirement and decision-making, such as scientific discovery, geographic recognition in national defenses, and mapping customer preferences. However, information loss is always an inevitable problem in this kind of system. For well-trained scientists and business analysts, information loss does not necessarily mean misinformation, since scientists are often familiar with the nature and structure of the data they use, as well as the system they take advantage of. On the contrary, for the drastically increasing number of non-expert users in social visualization system who often lack knowledge of data science, misinformation, misunderstanding, and mistrust of system and data often occur. Specifically, structuring and sequencing strategies of data visualization can lead to users' different interpretations, underlying social contexts can lead to different interpretations of same graphs, and even ways of human's interaction with visualization system can be affected by social contexts. In view of this, the studies from non-expert

users' perspectives can contribute to better system designs, accurate information transmission, and efficient information use in the digital era where more and more non-experts rely on electronic devices to acquire knowledge and make decision.

## Relevant Research

Bias and misinformation in interactive social visualization system have been an emerging popular topic for researchers to optimize large-scale social data presentation, deliver accuracy information, and prevent bias, misunderstanding and mistrust [12]. However, current surveys often focus on specific types of bias and misinformation in ISVS, and do not outline a full view in this field. For example, J. Hullman and N. Diakopoulos's survey [20] summarized that visualization interpretation can be used as a visual "rhetoric" such that end-user's interpretation can be easily affected by different data visualization interpretation methods, based on the same source of data. Merely, the pursuit of delivering as much useful information as possible without delivering a "Frame" for data visualization has never been stopped for data visualization researchers. J. Hullman, R. Kosara, and H. Lam's survey [9] focused on structuring strategies as a guidance for optimum visualization. In our survey, we will set a much broader picture to comprehensively survey current studies regarding misinformation in ISVS and factors causing it, including structure, sequence and underlying social context of ISVS design and use, instead of concentrating on a specific subtopics.

## Key Researchers, Institutions, and Labs

Researcher	Affiliation	Research Centers
Jessica Hullman	CS and TSB Northwestern University	MU Collective
Eytan Adar	iSchool University of Michigan	Michigan Interactive & Social Computing Lab
Karrie Karahalios	CS UIUC	Social Space Group
Jeffrey Michael Heer Yea-Seul Kim	CS and iSchool University of Washington	Interactive Data Lab
Bongshin Lee Steven Drucker	Microsoft Research	EPIC and VIDA
Maneesh Agrawala	CS Stanford University	Brown Institute
Robert Kosara Heidi Lam	Tableau Research	

## Top Conferences & Journals

- ACM CHI Conference on Human Factors in Computing Systems
- IEEE Conference on Visual Analytics Science and Technology
- IEEE Information Visualization
- ACM Conference on Computer-Supported Cooperative Work and Social Computing
- IEEE Transactions on Computer Graphics and Applications

## Weekly Plan

Week (date)	Topic
1.(6.17-6.23)	Relevant Survey search
2.(6.24-6.30)	Reading Week, Survey outline
3.(7.1-7.7)	Detailing Content
4.(7.8-7.14)	Finish 1st Draft
5.(7.15-7.21)	Refinish 2nd Draft
6.(7.22-7.28)	Survey final Draft

## Feasibility

Our topic regarding interactive visualization system has two focuses: social visualization and misinformation from non-expert users' perspectives. Different from scientific visualization system whose main users are well-trained scientists, interactive social visualization system has much more non-expert users who has far less knowledge of data and thus often misuse and misunderstand ISVS. Since ordinary people rely more and more on electronic devices with ISVS-related applications to acquire knowledge and make decision in daily life, there have been many researchers at the intersection of computer science, information science, and social science who have recognized the increasing importance of this topic and produced many relevant papers. In view of this, we believe a survey in this topic is feasible and deserves attention.

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