Data Storytelling: Revolutionising Human-Data Interaction or Just Passing Hype?

Roberto Martinez-Maldonado
Monash University
Australia

ABSTRACT

Supporting stakeholders in various sectors to interpret dashboards and visualisations presents significant design challenges that might often be overlooked. The interpretation of visualised data by decision-makers and professionals is essentially the construction of a narrative about the underlying processes. Implementing data storytelling techniques in the design of these visualisations can foster deeper insights by aligning the intended objectives, goals, and outcomes with visual elements. The purpose of this tutorial is to guide participants in integrating data storytelling techniques into their visualisation and dashboard designs, ensuring the communication of meaningful insights.

CCS CONCEPTS

• **Human-centered computing** → **Visualization techniques**.

KEYWORDS

data storytelling, human-data interaction, data visualisation

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1 INTRODUCTION

The modern digital age is characterised by an unprecedented surge in data generation, leading to the coining of the term "big data" [1]. However, the vastness of this data presents numerous challenges in terms of human-data interaction. At its core, raw data, especially when large and intricate, can be abstract, impersonal, and difficult for the average person to interpret. According to Edward Tufte, a pioneer in the field of data visualisation, "information overload" can make it hard for individuals to discern patterns and make informed decisions [8]. Furthermore, with the increasing complexity of data structures, there's a widening gap between those with technical expertise and the general public, leading to issues of data literacy [2]. Data storytelling emerges as a promising solution to these challenges.

Data storytelling can bridge the gap between this abundant raw data and scaffolding human understanding. Data storytelling refers to the practice of using data, visualisations, and narratives to communicate complex information, insights, or findings in a compelling and easily understandable manner [4]. It involves crafting a narrative around data, combining analytical elements with storytelling techniques to engage and inform a particular audience. The goal of data storytelling is to transform raw data into a coherent and relatable story that not only conveys the significance of the data but also resonates with the audience on an emotional and intellectual level [6]. This approach can ideally make data-driven insights more accessible, and actionable, enabling decision-makers and the general public to grasp the insights and implications behind the data more effectively.

The notion of data storytelling is being embraced in several contexts such as journalism [9], education [5], organisational studies [3]. Yet, through a human-centred lens, it becomes evident that crafting intuitive dashboards and visualisations for various stakeholders is not as straightforward as it may seems. At the heart of a person interacting with visual data is the weaving of a tale. If it is a tale that makes sense only for a particular context. However, how can one ensure that this tale is not just accurate, but also insightful and, at the same time, it is told with integrity? By infusing data storytelling techniques into visualisation design, we can better align the narrative with intended objectives, outcomes, and overarching goals, but we can also introduce bias and predetermined agendas that can strongly influence the interpretation of the insights.

This tutorial focuses on conveying data insights as a narrative that a given audience can understand using storytelling principles (e.g., plotlines, unexpected story twists and motivating conclusions) and data visualisation foundations (e.g., graph annotations, emphasis with colour and decluttering graphs) [7]. This tutorial aims to guide participants on the nuances of integrating data storytelling elements into visual designs, ensuring that they not only present data but tell a compelling story with it. At the same time, we will discuss on the potential risks of driving the attention of an audience to a partial set of data points and insights.

2 AIM OF THE TUTORIAL

The aim of this tutorial is to offer a set of tools/methods for carefully creating visual data stories apt for specific contexts, directing the user's focus towards vital insights. This tutorial is designed to empower human-computer interaction researchers, practitioners, students and other stakeholders to integrate data storytelling techniques seamlessly when constructing visualisations and dashboards. The tutorial's main components are:

- (1) An overview of tools and strategies for data storytelling,
- (2) A practical exercise where attendees will design a basic prototype of their visualisation or dashboard infused with storytelling elements, and

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- (3) A discussion on potential issues and ethical considerations associated with data storytelling.

3 PROGRAM

3.1 Agenda

Here's the agenda for our half-day (3-hour) tutorial:

(1) Kick-off and Overview (10 mins)
(2) Foundations of Data Storytelling (30 mins)
(3) Group Conversation (20 mins)
(4) In-depth Exercise (Part 1): Delving into Data Visualisations and Storytelling (40 mins)
  (a) Identifying narratives or key insights from data
  (b) Selecting the right visualization tailored to your dataset
  (c) Connecting visual components with identified stories or insights
(5) In-depth Exercise (Part 2): Further Exploration of Data Visualisations and Storytelling (40 mins)
  (a) Integrating visual features with narratives or insights
  (b) Showcase and Feedback Session
(6) Reflection on Ethical Concerns in Data Storytelling (40 mins)

4 PARTICIPANTS

This tutorial is open to all interested individuals. To partake, attendees must complete the registration process. We anticipate a minimum of 20 participants for the tutorial. Our recruitment strategies encompass promoting through social media platforms like LinkedIn and Twitter.

5 RESOURCES AND TOOLS

The tutorial will be conducted entirely in-person. Materials will be shared with participants in situ. Collaborative tasks might employ online platforms such as the use of Miro and Google Slides. Participants will be asked to bring a Laptop so they can use at least Excel to create data stories. For the hands-on activity, participants are given two options: 1) Bring a visualisation or dashboard, possibly in a low-fidelity prototype form, to enhance; or 2) Utilise sample visualisations or dashboards that we'll provide for hands-on practice.

6 BIOGRAPHY OF THE INSTRUCTOR

Dr. Roberto Martinez-Maldonado received his Ph.D. degree in Information Technologies from the University of Sydney, in 2014. He is currently a Senior Lecturer of Learning Analytics and Human-Computer Interaction with the Faculty of Information Technology and Coordinator of the Centre for Learning Analytics with Monash University, Melbourne, VIC, Australia. He is a co-author of numerous research papers. He is the first Mexican and Australian to win the Swiss-based Jacobs Foundation Research Fellowship (2021–23) for his pioneering research in Human-Centred AI in Education. His research focuses on advancing the understanding of socio-technical issues around the use of artificial intelligence in education, promoting the use of human-centred methodologies to create learning analytics interfaces with integrity and enhancing authentic learning spaces with multimodal data-intensive computing capabilities. He has been Program Chair of the International Conference on Learning Analytics and Knowledge and the International Conference of Artificial Intelligence in Education and he is a regular Associate Chair of the Learning and Education subcommittee of the SIGCHI Conference on Human Factors in Computing Systems. He is Associate Editor of the International Journal of Artificial Intelligence in Education.

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