Interactive tools may help people become their own big data journalists

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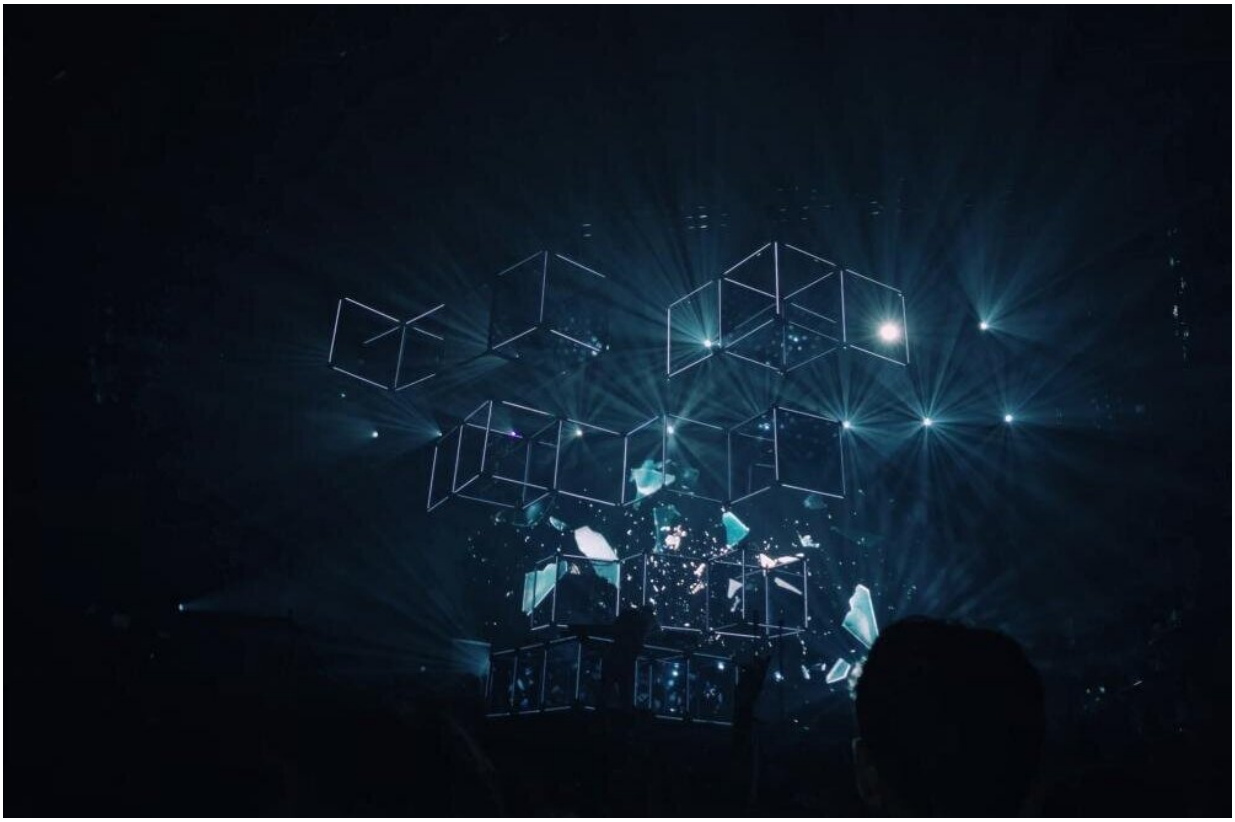

With so much data being collected and visualized by online media sites, interactive tools may help users better understand personally relevant information, as well as check on misinformation, according to researchers. Credit: Fabio/Unsplash

Interactive tools that allow online media users to navigate, save and

customize graphs and charts may help them make better sense of the deluge of data that is available online, according to a team of researchers. These tools may help users identify personally relevant information, and check on misinformation, they added.

In a study advancing the concept of "news informatics," which provides news in the form of data rather than stories, the researchers reported that people found news sites that offered certain interactive tools—such as modality, message and source interactivity tools—to visualize and manipulate data were more engaging than ones without the tools. Modality interactivity includes tools to interact with the content, such as hyperlinks and zoom-ins, while message interactivity focuses on how the users exchange messages with the site. Source interactivity allows users to tailor the information to their individual needs and contribute their own content to the site.

However, it was not the case that more is always better, according to S. Shyam Sundar, James P. Jimirro Professor of Media Effects in the Donald P. Bellisario College of Communications and co-director of the Media Effects Research Laboratory at Penn State. The user's experience depended on how these tools were combined and how involved they are in the topic, he said.

"These three interactivity types come together in interesting ways that were not seen in prior research," said Sundar, an affiliate of Penn State's Institute for Computational and Data Sciences (ICDS). "We found that the presence of these tools in certain combinations could be good for users, however, in other cases, combining these tools might not be preferrable."

For example, the researchers found that the most engaging website featured a high level of modality tools and message interactivity, said Sundar.

Together, they seemed to improve users' retention of information they reviewed on the site, according to the researchers. When the website featured an increased level of message interactivity along with the availability of more tools, the researchers found participants demonstrated an improved recall of visualized information.

However, Sundar suggested that certain combinations of interactive tools could lower engagement.

"Just adding a lot of tools to a big data visualization is not necessarily going to be a good thing for users," said Sundar. "For example, developers should take note that a site with high source interactivity, such as a blogging feature, is actually bad for the user when combined with high modality interactivity."

According to the researchers, the modality interactivity tools affected user engagement by increasing the ability of participants to take in information—or perceptual bandwidth—as well as inducing feelings that the system was responsive and that they were in charge.

"When, for example, you are sliding and zooming with these tools, the site engages us because we are absorbed in it and that expands our perceptual bandwidth," said Sundar. "In other words, we can absorb more from the site because you can do all these things. You can look around the site, you can slide over a section, or even zoom in and get a bigger picture. All of that expands how much one can perceive."

Sundar said that the study is a first step in developing research around news informatics, which refers to the presentation and consumption of big data on online sites.

"There is a humongous amount of data coming in all the time with all kinds of ways to look at different aspects of an event or phenomenon,"

said Sundar. "So, these data-driven sites can allow users to make sense of it, if they are equipped with the right kinds of interactive tools. What news informatics is basically trying to do is enable users to extract as much information and intelligence or knowledge from data in a way that is personally relevant to them."

By encouraging people to explore big data on their own, interactive tools may help people better understand issues, explore data points that are relevant to them, and verify for themselves if the information is biased or false.

"With most big data stories, journalists go in and extract meaning from that data," said Sundar. "They write the story on the points that they find interesting and they might put their own spin on it. The types of interactivities we are talking about here can help users find information that they find personally meaningful and that they care about. This is a case of genuine information need."

However, not every news consumer will have such a need or be interested in exploring the data with such depth.

"It is important for sites using 'news informatics' to balance the exploration and expression needs of highly involved users with the simpler needs of less involved users," Sundar said.

The researchers recruited 166 participants, who were randomly assigned to interact with one of the 12 different websites—or experimental conditions—that featured various levels of tool combinations that could be used to explore an interactive visualization of public opinion about several world news events. To test modality interactivity, for example, the researchers added tools, such as clicking, dragging and mouse-overs, to the high condition while including fewer tools for the medium and low conditions. For high source interactivity, the site allowed the user

more customization features, such as the ability to change colors and writing a blog post, while medium and low conditions offered fewer tools. The researchers tested message interactivity by the presence—or not—of features providing interaction history of each individual user.

Participants were asked to assess the website, including whether they thought the site was easy to use and whether they felt any anxiety using the site. Participants also were asked about their level of engagement, as well as quizzed about the information that was on the site, such as global issues. The researchers recorded the time the participants spent using the site as another measure of engagement.

This research won honorable mention at the ACM Conference on Human Factors in Computing Systems (CHI'22) and was reported on May 3 in its proceedings.

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