Accessible color palettes: New tool for web designers

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More than 20 percent of people who use the web can't always tell the difference between shades of colors—but very few of them are colorblind, according to a University of Michigan researcher.

Christopher Brooks, U-M research assistant professor of information, and colleagues surveyed more than 30,000 people to examine how dim conditions and bright sunlight, in addition to varied abilities, can influence how people differentiate color.

The researchers then used the survey results to develop ColorCheck, a web tool that can help digital designers see what colors large swaths of their audiences can't. The software compares color pairs and tells designers what portion of an image's hues certain percentages of the population can and can't tell apart. ColorCheck also pinpoints trouble spots on an image by laying a mask of black pixels over them.

"People with color vision impairment are often thought of as a special population," Brooks said. "In this work, we show that people have different levels of color vision impairment depending on where and how they are viewing user interfaces.

"In an increasingly aesthetic and design-sensitive world, the issue of color differentiation is really an issue of information gain and information equity. Color is often used in very meaningful ways, and excluding a portion of the population from making sense of this information because of their situational factors is a problem."

Brooks sites the rise of infographics as one way that color is used much more now than it was decades ago.

ColorCheck allows designers to see if key parts of their designs, e.g., color-coded graphics, will be perceivable by their target viewers, Brooks and colleagues say. The designer could then use this information to make decisions about whether to change their color choices.

The researchers found that deficits in color differentiation ability are more widespread than previously assumed, suggesting that large numbers of users might experience problems with usability, comprehension of graphic material or aesthetics.

"We have demonstrated that color choices can limit the ability of large proportions of users to perceive images as the designer intended," said Katharina Reinecke, assistant professor of computer science and engineering at the University of Washington. "With laptops and mobile devices becoming increasingly ubiquitous, we believe that it is time digital content is designed accordingly."

Reinecke says the tool is available for use, though there isn't a graphical user interface. The team is currently working on that. They say that their method would be straightforward to embed within visual information environments, from consumer-level tools such as Microsoft Powerpoint to design-specific tools like Adobe Photoshop.

"In our work we've shared our dataset publicly so anyone can take our approach and build tools to support it, with the hope that this will encourage vendors to think about supporting color vision impairment techniques in their products," Brooks said.

The researchers conducted the survey using a unique online experimental platform they developed themselves, called Lab in the Wild. Anyone can

participate in their surveys. Participants aren't compensated, but they receive immediate information about how they performed compared to the population.

More information: The source code for the color differentiation survey and the ColorCheck tool are available at labinthewild.org/data

The study, "Enabling Designers to Foresee Which Colors Users Cannot See," received a Best Paper Award at CHI 2016, the top international conference on human-computer interaction.

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