On the role of images for navigating knowledge on Wikipedia

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Extended Abstract

Wikipedia is a critical source of free encyclopedic knowledge and one of the most visited websites on the Internet. While written text is the primary mean of conveying information on Wikipedia, the site also includes a vast amount of visual content, including over 5 million distinct images on the English version alone. As an important hub for knowledge sharing and learning, the role of images on Wikipedia is a topic of increasing interest to researchers and educators alike. Educational psychology research has shown that illustrations can serve many cognitive functions, including capturing attention, evoking emotions, and enhancing understanding [1]. Given the potential benefits of visual content, the question of whether and to what extent images can improve access to knowledge on Wikipedia is an important and timely research question [3].

In this study, our primary objective is to investigate the role images play in navigating knowledge on Wikipedia, by examining how readers interact with articles that contain visual content. We aim to answer the following research questions: (1) Are readers more likely to engage with knowledge in presence of images?, and (2) Do images help readers find the information they need?

To develop our study, we focus on a dataset of 17 million article sections extracted from the 6.2 million articles of the English Wikipedia. Sections represent discrete units in which articles are divided to better organize their content. Among all, only 20% of sections are illustrated. To quantify engagement at the level of sections, we analyze a large-scale dataset of page loads collected over a month in March 2021. For each section, we measure the degree of readers' interactions by quantifying the likelihood of clicking on an internal link (i.e., a link to another Wikipedia page). We thus compare engagement for sections with images to those without. To reduce the effect of confounders, we also perform a propensity score matching analysis, and extract 4.5 pairs of sections–one without images and one with at least one image–ensuring that section characteristics are balanced between the two groups. We find that, overall, sections with images have a higher click-through rate (CTR) than those without, indicating that images tend to stimulate more engagement with surrounding links and increase interest in local knowledge. To deepen our investigation, we split the analysis by topic, characterizing each section using a 64-dimensional vector of topics from the Wikimedia ORES topic model (https://www.mediawiki.org/wiki/ORES). Our results show that illustrated sections are more engaging for almost any topic, as can be seen in Figure 1, with geographical topics having the highest median CTR difference, consistently with previous results [2]. Linguistics was the only topic with a negative CTR difference, likely due to the scarcity of images, which were mostly alphabetic symbols and small icons.

To delve deeper into our findings, we conduct a longitudinal study to track changes in user engagement over time. Specifically, we measure the difference in CTR between two different time periods, March 2021 and December 2022, to evaluate the impact of new illustrations. Using a difference-in-differences analysis, we compare sections that got illustrated (the *treatment*
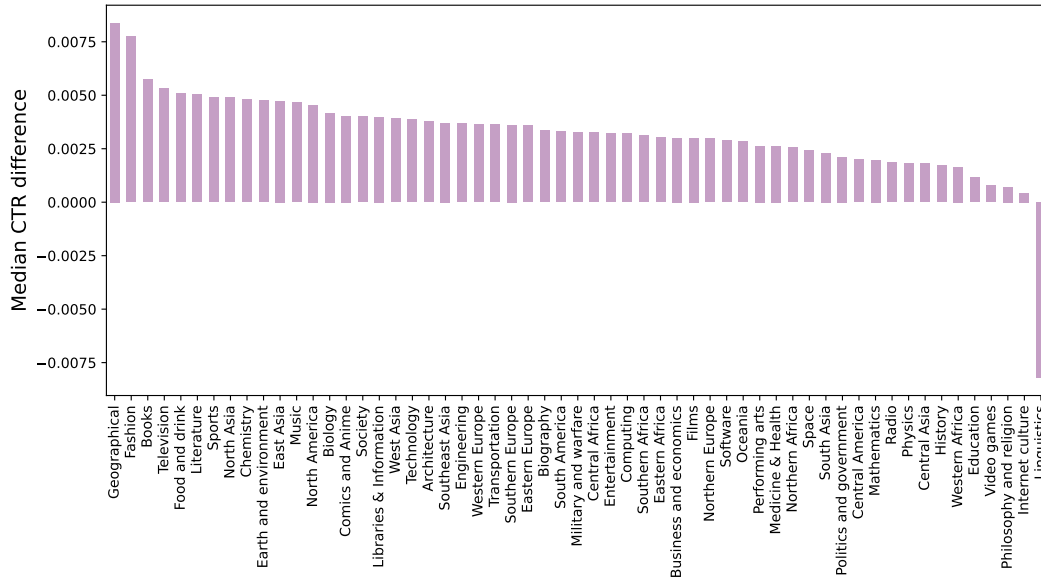
Figure 1: Median click-through rate difference across topic. The higher the difference the more likely to click on links of sections with images than those without.

group) with those that remained without images (the *control* group). Our analysis reveals no significant changes in engagement between the two groups overall. However, when we stratify the data by the month of image addition, we find that CTR tends to be higher as time passes, suggesting a positive impact of illustrations on reader behavior that grows stronger over time.

Finally, (2) to verify that images are helpful to find information in the page, we plan to design a crowdsourcing experiment where we ask readers to navigate between two Wikipedia articles only using its internal links, manipulating articles to add or remove images, hence testing how images influences the ability of finding information.

By exploring the impact of images on engagement with knowledge on Wikipedia, our study contributes to a growing body of research on multimedia learning and information consumption. In addition to advancing theoretical understanding, our study has practical implications for both educators and platform designers seeking to enhance the user experience beyond Wikipedia, as it sheds light on the potential benefits of incorporating visual content into educational materials and online platforms. Ultimately, we hope our findings will inform the development of more effective and engaging ways to present knowledge online.

References

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