A speculative design for future handwritten text recognition: HTR use, and its impact on historical research and the digital record.

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Introduction

We present a speculative design of handwritten text recognition (HTR), a form of automatic image-to-text recognition, resulting in plain text files of historical materials which can be presented in a variety of formats (Muehlberger et. al 2019). HTR is beginning to shift historical methods and practice, from sampling data to exhaustive interrogation of primary sources (Muehlberger et al. 2019). The aspiration of recognising the hands of people from various backgrounds, nationalities, professions, and education, with equal competence, surety and speed, has largely been realised (although this remains to be seen for marginalised communities). However, questions of equity, diversity and inclusion in the technology and tools of HTR are yet to be properly addressed. This paper will adopt a speculative design approach to imagine a minimal HTR design, informing how collaboration and inclusivity are approached in the next stage of its development.

Research Context

HTR is impacting current historical methods, including the ways in which scholars research, analyse and interpret the past (Anderson 2004). This technology is opening up archives, allowing for the study of neglected and endangered language materials, ranging from Kazakh (Toiganbayeva et al., 2022; Nurseitov et al., 2022), Devanagari scripts (Yashoda et al., 2018), to 15th century Vietnamese ChuNom handwriting (Vu et al., 2021). HTR improvements have coincided with the proliferation of language registers and dictionaries, made accessible to researchers (Abdallah et al.,

2020). This has led HTR to transcribe text where OCR has failed, dealing with cursive scripts, diacritics and unpredictable spacing (Alrehali et al., 2020).

Methodology

Foundational evidence was collected using a grounded theory method (GTM), grouping and categorising emerging themes in relevant texts (Glaser and Strauss 1967). Materials were first collected through a purposive sampling, beginning with Rosenzweig's discussion of how digital technologies would lead to an abundance of data: resulting in the need for new search and research strategies (2003). Reiterative sampling process continued, until saturation was reached (Charmaz 2006). A total of 120 works were collected.

These works informed our analysis of where HTR currently performs well. The technology has the potential to make historical resources more equitable, allowing for audiences to be mutually empowered. That said, HTR could easily be applied to well-known archives, risking the cementation of hegemonic archival structures and the re-inscription of colonial perspectives (Risam 2019). Through a more nuanced application, institutions could instead name instances of oppression when seen, framing their collections more inclusively and sensitively (Chew 2021). Therefore, our GTM provides a clear indication that HTR is likely to teem with diverse political, legal, and cultural investments and controversies, as with other digital methods (Thylstrup 2019). HTR's impact on intellectual property rights also emerged from our study, problematizing simplistic 'first use' provisions used by content holding institutions, due to the sharing of training data and models. How to credit work without limiting future innovation is considered, bypassing traditional intermediaries in publishing and making datasets usable for a broader audience.

What followed was an evidence-based speculative design of the future of HTR. Speculative design can be seen as a way of rethinking assumptions about the role of a product in daily life and primarily acts to stimulate discussion (Lukens / Disalvo, 2011: 38-40). It has been described as a 'perceptual bridge', allowing developers to better engage their audience and inform decisions surrounding a product's use, aesthetic and function (Auger 2013: 11-12). As such, HTR's current design and usage was questioned, generating new connections (Galloway / Caudwell, 2018: 96).

From this, emerged an analysis of how HTR could be compatible with minimal computing approaches (Matsumoto et al. 2005). How might HTR retain its most fundamental functions, eliminating nonessential portions, to increase its accessibility and limit its cost? We also considered the feasibility of this, while retaining digitisation standards. Minimal design was cited as a way to provide oppressed groups greater ownership over their histories: presenting the capability of scanning, transcribing and publishing their own records on their own terms. By extension, such a HTR design could allow the Digital Humanities to better theorise notions of race, gender, class and environment (Galina 2013). In this way, HTR emerges as a form of 'cultware' (Kent 2008), bringing together discussions of how groups in different cultural settings, with varying philosophies about information and digital technology, can benefit from such a tool.

To achieve this, it is necessary for humanities researchers and information professions to cohere around using HTR. This is likely to see regional hubs of expertise collaborate across 'trading zones' (Kemman 2021). Projects which rely on digital technologies often attempt to address problems in need of an array of expertise, or require a scale of work above the individual researcher (McCarty 2016). Therefore, this speculative approach lays out how de-

velopers and humanities scholars can form new networks of scholarly collaboration to best use and develop technologies like HTR.

Conclusion

In this work, we provide an evidence-based speculative design of how HTR may impact historical research and the digital record in the near-future. Our first aim was to highlight the current work being done with HTR, returning favourable results in recognising texts of different languages, many endangered. This paper also discusses how a cautious and judicious curating of resulting data is still needed and desirable (Guldi / Armitage, 2014: 105), ensuring that institutions move away from literary, historical and cultural canons.

Using a GTM method, a speculative design of HTR is given in the form of a minimal computing approach. This highlights how HTR can become an impetus for collaboration across cultural settings and disciplines. That said, if HTR is to embody such values, then a critical appraisal of the technology's development and use is needed. We recommend that the scholarly community focus on greater training, strengthening repositories of relevant data, building infrastructure surrounding HTR; the ethical implications of the tool, creating standards for preservation and sharing practices, and exploring opportunities in embedding HTR with other machine learning tools. As such, we demonstrate that speculative design methods have much to offer the Digital Humanities, as a means to elucidate the affordances of different technologies.

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