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Doctoral Colloquium—Exploring AI-imagery, a Form of Secondary Computation Analysis

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Abstract. AI-imagery a computational secondary analysis approach explores the potential of AI-imagery as a computational secondary analysis approach. This Doctoral Colloquim paper, it delves into the current status of AI art and its function at the intersection of technology and creativity, while considering its implications for post-humanism. The paper also examines how immersive learning can enhance the appreciation and understanding of AI art. Through a literature review and a case study example, this exhibition/paper aims to demonstrate how AI art can be used as a type of data analysis for educational research and immersive learning. By shedding light on the possibilities of AI-imagery explored via immersive space, this paper invites us to envision the future of creativity and the role that AI can play in shaping it.

Keywords: AI, Arts-Based Practice, Data Analysis, Educational Research, Post-Humanism.

1 Introduction

During my PhD, I employed AI-imagery, a novel technique that combines artificial intelligence, social science educational research, and art, as a powerful tool for data analysis. With AI-imagery, I was able to not only creatively analyse and interpret vast amounts of data, but also generate new forms of expression and experimentation that expanded the scope of data visualisation, pattern recognition, and re-analysis. As a result, AI-imagery has the potential to revolutionize the field of (educational) research by providing innovative ways of visualizing and analysing complex data, creating interactive and immersive experiences that allow viewers to interact with the data/findings in novel ways.

For instance, AI art can be used to generate data visualisations that highlight patterns and correlations that may not be easily discernible in typical data visualisations, while also allowing educational researchers to convey their findings in ways that deviate from standard print-based distribution, thereby extending the reader's conversation. Additionally, AI-imagery could be employed to create interactive and generative art that enables real-time data discovery and modification. Although still in its early stages, AI-imagery holds great promise for transforming the way we analyse and present data in the future. Not just for research but for the computing classroom

Fig. 1. Immersive Gallery, Spatial.io with AI-imagery.

2 Literature

The literature comprises a varied range of topics, encompassing computational social science [1]; visual images as data with qualitative analysis [2, 3]. Wrapped in a posthumanist perspective [4, 5] Computational social science (CSS) is an expanding area of educational research that seeks to offer machine learning tools within interpretive analysis inquiry [1]. Frequently, data reduction and pattern recognition are utilised to lessen the interpretive profundity of qualitative research. CSS extends beyond mere procedures for managing extensive datasets: it is a fusion of ontological and epistemological research perspectives that expands the repertoire of educational researchers.

AI-imagery has the potential to offer innovative immersive methods for engaging with and analysing data. This enables viewers to explore and interact with data in dynamic immersive environments to gain a deeper understanding of patterns and correlations within findings [2]. Additionally, sharing research through immersive AI-imagery has the potential to make technical aspects of research, such as algorithms and programming languages, more accessible and appealing to a wider research audience. The audience actively participates in AI-magery, drawing on Bayley's posthuman pedagogies of 'the act of continual participation...new iterations' of phenomena/analysis [4].

Posthumanism in the context of AI-imagery raises significant questions about shifts in the understanding of the decentralised intra-interactions between technology and humanity. It explores how AI is transforming the way we think about research and how it may affect our concept of what it means to be human and to be researched. Posthumanism suggests that as technology continues to advance, the hierarchy and silos between human and machine will become increasingly mutable [4, 5]. In the context of AI-imagery, it raises issues about the role of the artist/researcher and the extent to which AI can be considered an artist and/or researcher. It also raises ethical concerns regarding the creator-creation relationship and the role of AI in altering our perception of creativity. Furthermore, the researcher as an AI artist, as well as the worlds of citations and ownership/creator, could become increasingly blurred.

Moreover, post-humanism in AI-imagery suggests that the AI algorithms themselves can be deemed as posthuman entities, given their ability to create and generate art independently. In this context, artists function as engineers, developers, and curators of these algorithms within a meshwork. Posthumanism raises critical concerns about the interconnection between technology and humanity [5]. AI-imagery offers a novel approach to research analysis and presentation, potentially expanding the way we think about creativity and art. LaGrandeur refers to this as the 'sense of [the] symbiotic, a smart collaborator' [6].

Additionally, AI-imagery explores the ethical and societal implications of AI, particularly within the field of educational research, where artificial intelligence is increasingly used for personalised learning experiences and data analysis. Providing space for AI exploration for teacher education enabled participants time and space to not only navigate the tools but also the ethical implications of AI in the computing classroom. Furthermore, AI-imagery could be used as a means of data analysis to examine the effects of AI on human decision-making, creativity, and autonomy. Regrettably, as the artworks underlying each generated image are concealed behind the ML models of the AI tools, I am unable to attribute credit to the original artists who co-created these works.

3 Case Study

Case Study: AI-imagery as a Tool for Secondary Computational Analysis in a Ph.D. Study

In my Ph.D. study, I employed AI-imagery as a form of secondary computational analysis. This was in addition to the primary data analysis methods of interpretative phenomenological analysis (IPA) [7] and natural language processing (NLP) using Python. The primary analysis generated text prompts for the secondary analysis and dissemination, and AI-imagery was used to provide an additional visual lens on the findings by employing the notion of imagery as data [3] which was aligned with the study's methodology and data processing technologies [7, 8].

3.1 Methods

The procedures for the AI-imagery method transforming the findings from the primary analysis into text prompts for the AI-image generation tool. This phase required some time to ensure that the sequence of the phrases affected the generated image. The next step was to choose the style or filter that would be applied to the image. This involved the researcher's connection to their data, participants, and subjectivity, as the choice of style was the researcher's, presenting their findings differently in visual form. Several free internet programmes offered slightly different outcomes, and in this paper, Dalle.2. was used to create Figures 1 and 2.

The initial image generation, aligned to the study – which explored how to raise awareness of data ethics for trainee computing teachers through AR ballet and biometrics – illustrating dancer participant findings was followed by the immersive gallery creation. To ensure access for all, a purpose-built tool was used, Spatial.io, to explore both webXR and AI-imagery. Spatial.io is a freemium model platform with large scaleability. The platform is a no-code web and mobile application with voice, video, chat, and avatar interaction. For some participants this was their first time engaging with web immersive tools.

This case study illustrates how AI-imagery can be used as a tool for secondary computational analysis in addition to primary data analysis methods such as IPA and NLP. By providing an additional visual lens on the findings, AI-imagery enables researchers to present their findings in a different form and generate new insights into the data.

The biometric data from the study were collected using Emotiv EEG headsets and exported to CVS. The movement joint data PPE (postpose-estimation) was a pipeline: 2D video preferably recording at 60 fps (frames per second) > MocapNET, PPE model [9] to generate joint data > translation custom code to remap joint data for use with games engines > BVH format > Testing in Blender(™) then build in Unity. Biometric dataset were not analysis for neuroscience but for use as computing education

3.2 Output

The output from AI-imagery is explained using two examples: figure 2 and 3 below. The first example represents the theme body becomes data, as seen in Fig 1 below, this theme was drawn from the majority of participants as they all spoke about the body as/becomes/is data. Figure 1 uses the personal experiential statements of both dancer and educator participants. The body within the image is undressed, exposed, and vulnerable with the screen-type imagery being drawn out of the body. This aligns with the participants' experiential statements (IPA) regarding embodiment:

'I think there is a difference. The virtual can sometimes like an extension of oneself, or an alternative, or even an extreme version of oneself'.

A pull-and-push sense of motion within the image emphasises how biometrics of the individual are captured and disseminated. Pulled via surveillance and pushed when or if the individual opts to share their data. The AI-imagery webVR gallery was designed to present AIimages findings as an immersive experience entangled with but somewhat separate from the thesis [10]

Fig 2. AI-image of the body becomes data**.**

Fig 3. AI dalle2 dance data-self & photoshop post processing.

The second example uses Figure 3: dancer data-self, the sense of identity through data-driven experience using biometric data to generate AR 3D rigged characters. The sharing of these data with others, strangers. Performance of the data-self differed from that of themselves and the human-dancer self. As seen in the quote, personal experiential statement (IPA) below.

'I felt very comfortable exposing and sharing data made by my physical actions and movements. But I felt a lot more reserved and slightly uncomfortable when I saw my brain data; that felt much more private for some reason'.

The process of generating figure 2 came from the theme data-self, which is not othering but an entangled yet dis- tinct component of their human identities. The participants also discussed the data-self in connection to bits/bytes of data. This resulted in the additional step of post image generation editing and pixelation that was added to the image via photoshop. The use of filters or styles, as used in most text-to-image ML systems, was crucial since it provided an additional diffractive lens [6] on the findings for me as the researcher.

4 Summary

Future works would be to incorporate text-to image model APIs within the immersive gallery environment for real-time image generation. This would require an additional ethical consideration as the data/findings within the immersive experience may be 're-analysed' and/or stored by third parties.

In summary, AI-imagery offers innovative and captivating avenues for data engagement and analysis, complementing traditional methods. Its dynamic and interactive approach empowers users to delve deeper into data patterns, leading to a more comprehensive understanding. However, as we continue to explore AI-driven visualisation and data analysis, it prompts us to ponder on the effects of AI on education and humanity as a whole. Moreover, this immersive exhibition is designed to provide an immersive research experience, allowing visitors to delve into and explore AI-generated visualisations and findings.

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