

Enhancing Education of Medical Image Analysis and Deep Learning with Virtual Reality

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Introduction

The complexity of deep neural networks calls for innovative ways to educate and investigate their inner components. As AI technologies in healthcare become more and more interdisciplinary, enhancing the educational profile of doctors, and other end-users and key participants in the development of these technologies, is necessary to ensure efficacy, safety, and robustness of developed AI technologies.

Materials and Methods

The aim of enhancing education is targeted by using a VR environment that provides an immersive experience for user. By using the effect of immersion we want to create an environment that guides the attention of the user without any distraction completely on the subject. In our case this is the topic of deep learning on the example of a digit recognition AI. Like that a user learns the basic principles of AI technology on an interactive audio-visual journey.

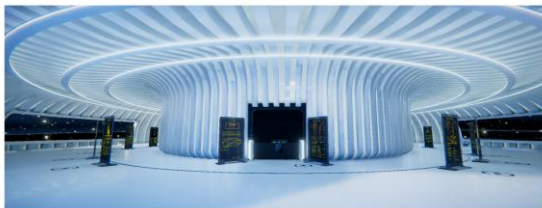


Fig. 1 AITORUS VR Environment created with the Unity Game Engine development platform and third-party assets.

The VR technology is in our case also relevant for analysing 3D data with a stereoscopic view. Like that are we introducing an interactive visualization concept for analysing the Blackbox data of an AI, during the whole training process.

Results

With this VR environment we have created a stand-alone software that is capable to provide a user the immersive experience we were aiming for. In combination with the VR headset and our visualization method it is possible to interpret which specific areas tend to be more important for specific

neurons and in which relation they stand to the image content.

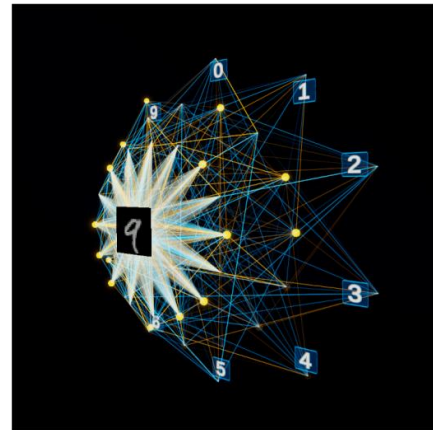


Fig. 2 Our interactive, symmetrical, 3D visualization concept for analysing AI weight data, to search for specific patterns, that lead to a specific output.

Discussion

The experiences we made with a total of 12 testpersons show that they majority choses to stay in the VR environment for an average time between 30 to 60 minutes. Because the majority of them shows a lack of awareness of time we conclude that an immersion is experienced.

References

Charlene Jennett, Anna L. Cox, Paul Cairns, Samira Dhoparee, Andrew Epps, Tim Tijs, Alison Walton. Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies*, Volume 66, Issue 9, 2008, Pages 641-661, ISSN 1071-5819.

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