LAYMAN SUMMARY FOR MINOR RESEARCH PROJECT

Automatic Cerebral Perfusion Imaging using Deep Learning for Digital Subtraction Angiography

This research project focuses on improving the visualization of blood flow in brain vessels. This is important for patients with neurovascular diseases like ischemic stroke. The primary method for this visualization is called Digital Subtraction Angiography (DSA), from which additional perfusion parameter images are generated. However, a manual annotation step is required to compute these images, which can be time-consuming.

The goal of this project was to automate this process using deep learning. Specifically, an artificial intelligence (AI) model was trained to segment the internal carotid artery (ICA) in DSA images. Subsequently, the AI model is used in a developed automated application to predict ICA segmentation. In the final step of the processing, ICA segmentation is used to compute the perfusion parameter images: cerebral blood volume (CBV), cerebral blood flow (CBF), time to maximum (Tmax), and mean transit time (MTT). This application allows for the generation of parameter images for multiple patients (multiple ICA segmentations).

Overall, the results of the research showed that the automated application performed similarly to the manual annotation method, suggesting that it could be a valuable tool in clinical practice and future research. This automated approach has the potential to save time and provide accurate assessments of perfusion parameter images.