Development of an Artificial Neural Network for Semantic Segmentation of Nuclei and Mitochondria in Transmission Electron Microscopy and Serial Block Face Scanning Electron Microscopy Images

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3D reconstruction of cellular organelles requires the recognition of the organelle envelope in serial section from Electron Microscopy, and outlining of organelles by hand. This process takes an extremely long while, and is largely inefficient. This study has implemented within the Keras/Tensorflow computational platform an artificial neural network based on a Res-U-Net architecture, capable of automating the recognition of the nuclear and mitochondrial envelope from Transmission Electron Microscopy. This program makes the 3D reconstruction process exponentially shorter and more efficient.

Awards Won: