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Large-scale Deep Learning for Cytoarchitecture Classification in the Human Brain

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The human brain can be subdivided into cytoarchitectonic areas. They are defined by the spatial organization of neuronal cells, including their distribution, size, type, orientation, as well as their arrangement into cortical layers and columns. Cytoarchitectonic areas are indicators for connectivity and function, making them a central component of multi-modal human brain atlases. Scaling the identification of cytoarchitectonic areas in histological brain sections to many brains and sections is critical to account for the high variability between brains, motivating the development of automated methods for cytoarchitecture classification. We provide an overview of current deep learning-based classification methods, describe associated methodological and technical challenges, and preview future developments.

Presenter: SCHIFFER, Christian (Research Center Juelich)

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