

## **3D image analysis (30 min talk + 15 min discussion)**

*Thursday, 15 April 2021 09:30 (45 minutes)*

Microscopy data is often large and 3d, and thus convolutional neural networks (CNNs) need to be applied in a tile-and-stitch manner to cope with GPU memory constraints. Concerning pixel-wise predictions obtained with UNet-style CNNs via tile-and-stitch, issues with discontinuities at output tile boundaries have been reported. However, a formal analysis of the causes has been lacking. In particular, it had not been understood how inconsistencies can arise even in case of valid padding. Our work shows that the potential for discontinuities to arise is intricately tied to the shift equivariance properties of the employed CNNs. Our theoretical analysis entails simple rules for designing CNNs that are necessary to avoid discontinuities when predictions are obtained in a tile-and-stitch manner.

### **Poster title**

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**Session Classification:** Session III