Abstract: Image data and image regression/classification are intensively studied in many computer vision tasks. However, most existing studies on such topics focused on outcome prediction, while the research on model interpretation and image region detection is rather limited, even though the latter is often more important. In this talk, we introduce the first Frequentist framework named Sparse Kronecker Product Decomposition (SKPD) to detect significant regions in image regression/classification problems. The SKPD framework is general in the sense that it works for both matrices (e.g., 2D grayscale images) and (high-order) tensors (e.g., 2D color images, 3D images) represented image data. Moreover, unlike many Bayesian approaches, our framework is computationally scalable for high-resolution image problems. The SKPD is highly connected to convolutional neural networks (CNN), particularly to CNN with one convolutional layer and one fully connected layer. The effectiveness of SKPDs is validated by real brain MRI data in the UK Biobank Database.

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