

## **Master Thesis: Automatic Task Learning**

In supervised learning, a specific task is solved using input-label pairs (e.g., classification of MNIST digits). In self-supervised learning, an artificial task is created for representation learning, but no labels are required. In this thesis, you go one step further by developing a method that requires neither a specific task nor labels. In automatic task learning, a network learns 'what it wants', adhering only to certain constraints. This framework raises several interesting research questions: (1) What does the learned representation look like? What clusters form and what tasks are learned? (2) Do the clusters correlate with labels that are commonly assigned to a dataset? (3) Can the learned representations be used for transfer learning similar to self-supervised methods?

You may use existing ideas from the chair to get started, and you may use both natural or medical imaging datasets for your experiments. To be successful, you should have a solid understanding of deep learning and hands-on experience with a major framework, such as PyTorch (both of which you can, for example, acquire in our deep learning course). If you are highly motivated and interested in this topic, please contact [benjamin.bergner@hpi.de](mailto:benjamin.bergner@hpi.de)