

Explainable Graph Neural Networks for Biological Discovery from Super-Resolution Microscopy

Super-resolution microscopy (SRM) allows us to image sub-cellular structures showing protein constellations at nanometer resolution. Graph neural networks (GNNs) are an established method for applying deep learning architectures to tasks such as classification and clustering of complex point clouds. GNNs have seen limited application to SRM point clouds of protein localizations, in part due to the complexity and size of the data and lack of ground truth when the goal is to discover novel cell biology, e.g. how cancer cells work or how viruses infect cells at the nanometer level. This is where explainable XAI techniques can be invaluable. In this project, we aim to investigate the utility of existing XAI techniques for GNNs applied to SRM data. Novel algorithmic improvements may need to be developed depending on the results and progress.