Sparse Recovery in Myocardial Blood Flow Quantification via PET

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Quantification of myocardial blood flow is an important task to estimate the risk of a patient to suffer from various cardiovascular diseases, like cardiac infarcation. Instead of using a simple frame-by-frame approach to reconstruct dynamic PET images (and thereby neglecting the temporal correlation between the frames), we want to show how sparsity methods can be used in the framework of kinetic modeling to improve the reconstructions.

We introduce a linear model operator developed by Reader et al., which is based on a one-compartment model. The operator consists of an input curve, exponential basis functions (depending on possible perfusion values) and their associated coefficients. Assuming the input curve to be known, the goal is to, for each pixel, find a combination of only a few (ideally only one) basis functions that corresponds to the perfusion in that pixel over time.

We will use a general variational formulation with a Kullback-Leibler fidelity term and a sparsity introducing regularization and show some results.