

Learned wavefront set extractor for inverse problem regularization

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The study of singularities plays an important role in different areas of imaging science, the fact that images are formed mostly by anisotropic features makes also the study of the orientation of singularities necessary. The mathematical concept that defines the singularities and orientations of an image is known as wavefront set and it has been widely covered in the area of computed tomography reconstruction. As with other pseudo-differential operators, the X-ray transform maintains a relation of the wavefront sets of the image and the sinogram, due to its continuous nature, it is not straight-forward to compute the wavefront set in real data. Typically, even a problem like limited-angle tomography is severely ill-posed, an alternative method that just perform the recovery of an image with the same wavefront set will be just mildly ill-posed. In this talk I will present a method that uses fully convolutional neural networks and shearlets to compute the wavefront set of an image, and the path to use it as a post-processing step for CT-reconstruction.