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A cartoon+texture image decomposition based on interpolation spaces

Image decomposition is referred to separating a given image into multiple layers of components with different characteristics. That is an essential problem in image processing since usually there is a need for extracting or modifying specific geometric structures of an image before further analysis. We focus on the decomposition of image f

$$f = u + v$$

where u is a piecewise constant component and v is an oscillation component. When f is a smooth image contaminated by noise, it comes back to the image-denoising model.

One of the typical methods for achieving this target is the variational method. From the famous (BV, L^2) decomposition, inspired by the $(BV, B\dot{M}O^{\alpha})$ and $(BV, \dot{W}^{\alpha,p})$ decomposition, we establish a new model $(BV, \dot{W}^{\alpha,p,\infty})$ for image decomposition.