IMPLICIT KERNEL PRESENTATION AWARE OBJECT SEGMENTATION FRAMEWORK

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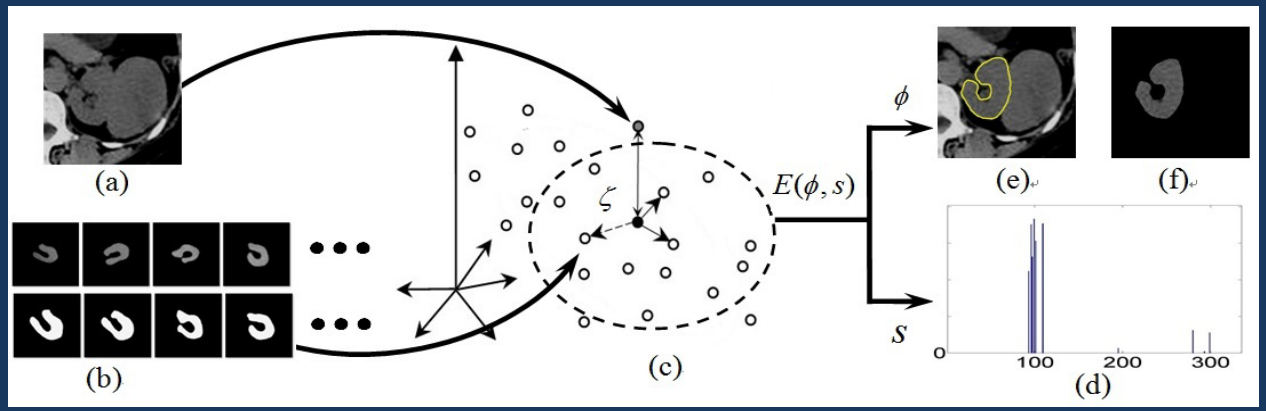
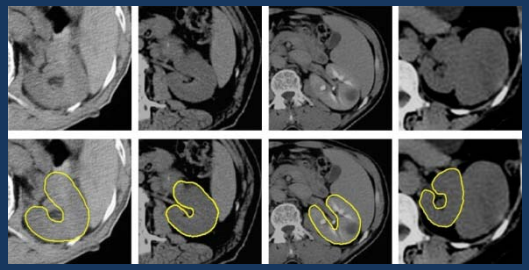
Introduction

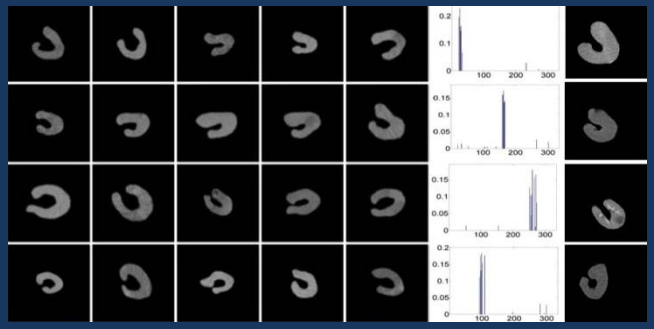
Given a set of training shapes and an input image with a shape similar to some of the elements in the training set, this paper introduces a new implicit kernel sparse model with a twofold goal. First, to obtain an implicit kernel sparse neighbor based combination that best represents the object. Second, to accurately segment the object taking into accounts both the high-level implicit kernel presentation and the low-level image information. A new energy function that combines the variational image segmentation with the implicit kernel presentation is introduced to accomplish both goals simultaneously





The Framework

The figure above is the main framework. (a) the input image (b) the training set, (c) the kernel space, the ellipse marks the convex set defined in proposition 1, (d) the recovered sparse coefficient, (e) and (f) are the extracted object.



The IKSR

A novel Implicit Kernel Sparse Representation (IKSR) was introduced in this work. The paper proved that the model was equivalent to a reconstruction error constrained sparse shape representation in the Hilbert space. The energy minimization drove an evolutionary curve to segment the object taking into account both the low-level information and the high-level representation.

The Segmentation Results

The first row of the figure above is the original samples. The objects in the images are surrounded or connected with a large area of similar backgrounds. The second row is the segmentation results of our IKSR framework.

The Sparse Representation

The first to fifth columns of the left figure are the original samples corresponding to the five largest coefficients, the sixth column is the recovered sparse coefficients, and the last column is the segmentation results of our method.