

## Perceptual Grouping Using Superpixels

Sven Dickinson  
Department of Computer Science  
University of Toronto

Perceptual grouping played a prominent role in support of early object recognition systems, which typically took an input image and a database of shape models and identified which of the models was visible in the image. When the database was large, local features were not sufficiently distinctive to prune down the space of models to a manageable number that could be verified. However, when causally related shape features were grouped, using intermediate-level shape priors, e.g., co-termination, symmetry, and compactness, they formed effective shape indices and allowed databases to grow in size. In recent years, the recognition (categorization) community has focused on the object detection problem, in which the input image is searched for a specific target object. Since indexing is not required to select the target model, perceptual grouping is not required to construct a discriminative shape index; the existence of a much stronger object-level shape prior precludes the need for a weaker intermediate-level shape prior. As a result, perceptual grouping activity at our major conferences has diminished. However, there are clear signs that the recognition community is moving from appearance back to shape, and from detection back to unexpected object recognition.

Shape-based perceptual grouping will play a critical role in facilitating this transition. But while causally related features must be grouped, they also need to be abstracted before they can be matched to categorical models.

In this talk, I will describe our recent progress on the use of intermediate shape priors in segmenting, grouping, and abstracting shape features. Specifically, I will describe the use of symmetry and non-accidental attachment to detect and group symmetric parts, and the use of closure to separate figure from background.