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# A Review on Region Detection And Matching For Object Recognition

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**Abstract: Object Recognition is based on Objective and Subjective dimensions where the objectivity is guided by the parameters like colour, texture, shape, size and scale whereas the subjectivity is guided by the perception and cognition of the image interpreters .In this paper we aim to study various object recognition method based on region detection and matching. The motivation is to search and propose a method which can obtain the similar and significant objects in different images with the best accuracy and in less execution time.**

**Keywords:** ***Local Region Detection, Object Segmentation, Region based Image Matching, Object recognition***

## 1. Introduction

Detecting regions is important to provide semantically meaningful spatial cues in images. Matching establishes similarity between visual entities, which is crucial for recognition. More specifically, we have considers four key questions: 1) How can we extract distinctively-shaped local regions that also ensure repeatability for robust matching? 2) How can object-level shape inform bottom-up image segmentation? 3) How should the spatial layout imposed by segmented regions influence image matching for exemplar-based recognition? and 4)How can we exploit regions to improve the accuracy and speed of dense image matching? The key aspects of region-based object detection are starting from region detection at both local and object level and to bring them together into the novel framework of region-based image matching for the ultimate goal of object Detection. Key issues reviewed for Object Recognition are local region detection, object segmentation, region-based image matching, and fast image matching for exemplar-based recognition.

### 1.1 Local Region Detection

Local features—image regions of locally salient appearance patterns—are a basic building block for image retrieval and recognition tasks. The general feature extraction pipeline consists of (a) a detection stage, which selects the image sites (positions, scales, shapes) where features will be extracted, and (b) a description stage, which uses the image content at each such site to form a local descriptor. Because extracted regions tend to preserve object boundaries, they are informative for object shape. At the same time, because they link sampled elements across multiple segmentation, they are robust to unstable segmentations and thus repeatable across images and their dense coverage of the image ensures to retain reliable feature statistics that are critical for recognition and matching.

### 1.2 Object Segmentation

We obtain multiple overlapping segmentations. These segmentation hypotheses do not serve as detected regions; rather, we use them to guide the extraction of initial component features. Next we want to take these elements and define the neighbour hood structure across the entire image.

### 1.3 Region based Image Matching

Having established local- and object-level region. We bring together these detected regions into a novel image matching strategy for object recognition.

### 1.4 Fast Image matching for exemplar based recognition system

To develop scalable exemplar-based recognition. At the same time, improve the matching quality, striking a balance between geometric regularization and accurate localization and obtain substantial gains in both matching speed and accuracy.

## 2 Challenges in Object Recognition

Starting from region detection at both local and object level and bringing them together into the novel framework of region-based image matching for the ultimate goal of object recognition.

### 2.1 Problem in Local Region Detection [3]

Researchers have developed a variety of techniques to perform detection, ranging from sophisticated interest point operators to dense sampling strategies. While by design such methods provide highly repeatable detections across images, their low-level local sampling criteria generate many descriptors that straddle object boundaries, and—if they are too local—may also lack distinctiveness (i.e., patches of texture vs. actual object parts).

### 2.2 Problem in Object Segmentation [4]

Despite significant strides in recent years, it is widely acknowledged that a bottom-up process alone cannot reliably recover object-level segments—in particular, when objects are composed of heterogeneous colors and colors, or objects of similar appearance appear adjacent to one another. Multiple segmentation approaches typically aim to find full-object segments by varying segmentation parameters. However, such a multi-parametric approach inherently entails noisy segments with redundancy, degrading overall feature quality.

### 2. 3 Problem in Region based Image Matching

There are two key limitations to current techniques. First, pre-computing the distortion for all tentative matching pairs is computationally expensive, making very densely sampled feature points off-limits in practice. As a result, most methods restrict to a sparsely sampled set of features (such as local maxima in scale-space, edge points, etc.). While generally effective for matching object instances, sparsely sampled interest points provide a weaker representation for category-level matching; much evidence suggests that a dense coverage of features is preferable. A second limitation is that non-parametric methods typically identify a single group of corresponding points that undergo a common (low-distortion) transformation. Yet in typical real images, each part of a non-rigid object—or each instance of multiple objects in the image—can undergo a different transformation, suggesting that we should identify multiple groups of corresponding points, each with a different geometric configuration .we want to introduce a category-independent shape prior for image segmentation as shapes are often shared between objects of different categories.

### 2.4 Problem in Fast Image Matching for Exemplar based Object recognition

Compared to existing approaches that compute pair wise relations among all points, we want approach that substantially reduces the computational complexity of enforcing pair wise geometric constraints on the candidate match pairs. This complexity advantage does come at the price of considering geometric relations only between adjacent points on the string when solving for the optimal match for large images also.

## 3 Existing Approaches

### 3.1 Sift Flow Algorithm [7]

SIFT Flow relies on the conventional pixel-level MRF model: each pixel defines a node, and graphs from different resolutions are treated independently. That is, no graph edges span between pyramid levels. Although pixels from different resolution levels cover different spatial extents, they still span sub-image (local) regions even at the coarsest resolution. SIFT Flow defines the matching cost at each pixel node by a single SIFT descriptor at a given (down sampled) resolution, which risks losing useful visual detail.

### 3.2 Patch Match Algorithm [2]

The Patch Match algorithm computes fast dense correspondences using a randomized search technique. For efficiency, it abandons the usual global optimization that enforces explicit smoothness on neighbouring pixels. Instead, it progressively searches for correspondences; a reliable match at one pixel subsequently guides the matching locations of its nearby pixels, thus implicitly enforcing geometric smoothness. Patch Match abandons explicit geometric smoothness for speed. However, this tends to hurt matching quality—the matching positions of even nearby pixels are quite dithered, making the results noisy.

### 3.3 Dense Spatial Pyramid Matching [5]

DSP combines the strengths of the above two. Like Patch Match, we remove neighbour links in the pixel-level optimization for efficiency and SIFT Flow which imposes stronger smoothness by MRF connections between nearby pixels, providing visually more pleasing results. It rely on a flat pixel-based model to achieve substantial gains in both matching accuracy and runtime.

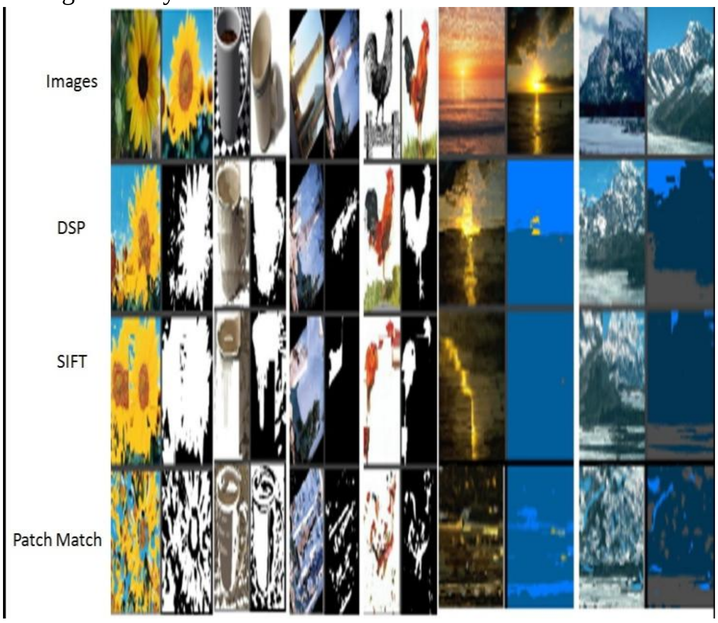


**Figure 1:** Object Recognition using various Techniques

## 4 Discussion and Concluding Remarks

Here in this paper we have reviewed different challenges of region detection and matching for Object Recognition. To my best knowledge, however, dense correspondences have not been taken into account for co-segmentation. Dense correspondences will add richer information for segmentation: for example, pixel correspondences can help compute multi-level segmentations by relating different levels of regions between images. Last but not least, it is of practical importance to develop computationally efficient methods. For region detection and object segmentation. For example, state-of-the-art bottom-up and/or object-level segmentation methods take several minutes for segmenting images, which is a bottleneck for scalable recognition.

The goal is to leverage low-level

geometric information to build a high-level object or scene recognition system that is robust to geometric variations. In contrast to existing applications whereas the prevailing approaches operate at the pixel level, we want to propose model that simultaneously regularizes match consistency at multiple spatial extents—ranging from an entire image, to coarse grid cells, to every single pixel on RGB images and an algorithm that will handle large sized images. [6]

So we are concluding by comparing existing techniques to achieve above goals. We will try to improve procedure and from the results we will conclude further to an efficient object recognition phase.

## References


[1]A. Berg, T. Berg, and J. Malik ,"Shape Matching and Object Recognition Low Distortion Correspondences," Computer Vision and Pattern Recognition (CVPR), 2005.

[2]C. Barnes , E. Shechtman , D. Goldman, and A. Finkelstein, "The Generalized PatchMatch Correspondence Algorithm," European Conference on Computer Vision (ECCV), 2010.

[3] J. Kim and K. Grauman, "Boundary Preserving Dense Local Regions," Computer Vision and Pattern Recognition (CVPR), 2011.

[4]J. Kim and K. Grauman ,"Shape Sharing for Object Segmentation," European Conference on Computer Vision (ECCV), 2012.

[5] Jaechul Kim ,Ce Liu & Fei Sha and Kristen Grauman "Deformable Spatial Pyramid Matching for Fast Dense Correspondences," IEEE 2013 Conference on Computer Vision and Pattern Recognition

[6] Lin Kaiyan, Wu Junhui,Chen ji,Shi huping ,"A Real Time Image segmentation Approach for Crop Leaf ,"IEEE 2013

[7] Liu, Ce, Jenny Yuen, and Antonio Torralba," SIFT Flow: Dense Correspondence across Scenes and Its Applications," IEEE 2011


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