

### Saliency, Scale and Image Description (by T. Kadir and M. Brady) Class Notes

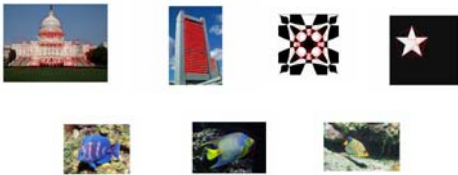
- **Goal:** Develop a method for extracting image content descriptions based on salient image features across multiple scales.
- **Applications:** Object recognition, video tracking and image retrieval
- **Basic idea:** Development of a local and isotropic entropy-based measure that is robust to scale, rotations and multi-scale self-similarities.
- A **salient region** of size  $s$  of an image centered at a given pixel  $p$  is defined as having a high-entropy probability distribution function (pdf) associated with the *feature vectors* that used to describe the pixels of the region. For instance, pixels can be represented by their gray label, that is just a scalar, or by larger vectors including color texture, and pixel position in the image:  $(r, g, b, \text{gabor1}, \dots, \text{gabor6}, x, y)$ .

### Saliency, Scale and Image Description (2)

- The **algorithm** described in p. 19 can in principle be used with feature vectors of arbitrary dimension. In practice only few components (~6) can be used. This is due to the fact that density and entropy estimations are difficult to obtain in high dimensions (the number of data samples needed to estimate a pdf increases exponentially with the dimension of the feature vectors).
- This algorithm generally produces a very **large number of salient** regions in a image. Therefore clustering methods are needed to summarize saliency information. (The author uses a kind of hierarchical clustering). Other methods can also be used.

### Saliency, Scale and Image Description (3)

- The algorithm is robust enough to produce regular salient features on classes of similar objects. Probabilistic modeling can be used to "absorb" irregularities in order to perform **recognition of object classes**.



### Temple



### Capitol



### Houses and Boats



## Houses and Boats



## Sky Scrapper



## Car



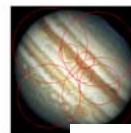
## Buses



## Fish



## Other ..



## Symmetry and More

