

A Case-Based Reasoning Approach for Detection of Salient Regions in Images

A. Kapoor, K.K. Biswas (IIT Delhi)

Salient region

- ❖ Although a number of objects could be visible to the human eye at any point in time, the attention gets focused on a particular object or a group of objects which are more conspicuous by virtue of their contrast with the surrounding (**salient regions**)
- ❖ Human eye is perceptually more sensitive to certain colors and intensities and objects with such features are considered more salient
- ❖ Most work based on color based features
- ❖ CIELab more perceptually uniform space, and matches human vision to closest extent

CIELab colorspace

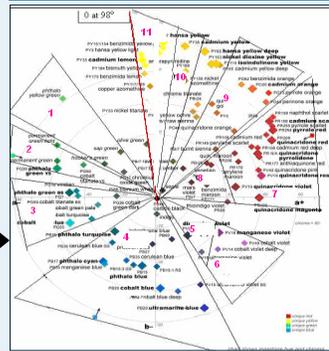
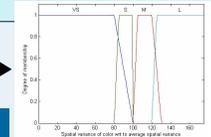


Figure 1: 11 zones of CIELab colorspace

Color Features

1. Background location information
2. Color distance (contrast) from background
3. Spatial variance
4. Saliency color ordering
5. Black and white portions
6. Size of object (Connected component analysis)

We treat them as fuzzy parameters



Methodology

1. Preprocessing
2. Color quantization
3. Locating background colors
4. Fuzzy Color Feature evaluation for salient regions
5. Example images of each category given to CBR for learning
6. Case creation
7. Detection of salient object based on created case set.

What is CBR ?

- ❖ Case Based Reasoning (CBR) aids in **example based learning**
- ❖ Here it allows the system to learn from a diversity of cases
- ❖ Images of various categories are fed to CBR along with their salient object coordinates.
- ❖ CBR creates a set of cases based on this
- ❖ This also infers the general characteristics of the dataset

Color distance

- ❖ CIELab colorspace is categorized into 11 colors
 - ❖ Color distance is the of nearness of a segment color number C_s to any of the background color numbers C_b :
- $$CD = 1/6(|C_s - C_b|)$$
- ❖ Colors are taken in circular order

Spatial Variance

- ❖ The spatial variance is the measure of the spatial distribution of colors
- ❖ Spatial variance of any salient color is expected to be less than the average spatial variance.

Locating background colors

A color is treated as background color if it occupies at least 25% of the border.



Case 1: (figure 2a)
IF the area of background color is large
AND spatial variance is medium
AND color distance is large
THEN region is salient

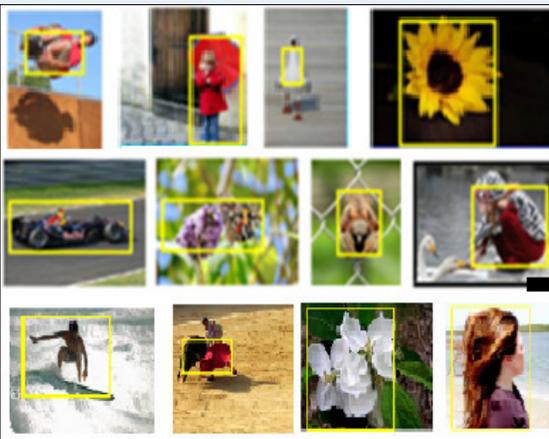
Case 2: (figure 2b)
IF the area of background color is medium
AND spatial variance is very small
AND color distance is small
THEN region is salient

Case 3: (figure 2c)
IF the area of background color is large
AND spatial variance is very small
AND color distance is large
THEN region is salient

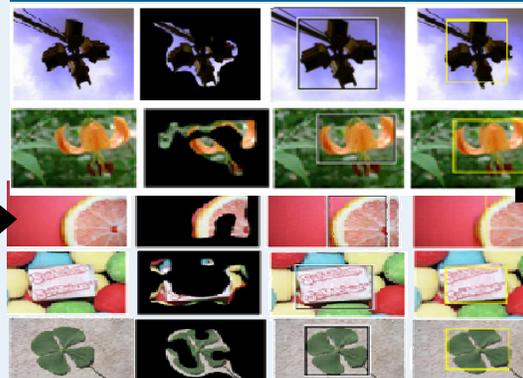


Figure 2 : a b c

Sample results



Sample Comparative Results



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Some Applications

- ❖ Object detection and tracking in videos
- ❖ Automatic image cropping
- ❖ Image Retrieval
- ❖ Medical applications
- ❖ Trademark images
- ❖ Advertising
- ❖ Remote Sensing

