Automatic Image Retargeting

Fitting big pictures in small displays

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This is your grandfather’s portable computer
Retargeting Image to a Cell Phone

Crop

Scale

Our Result
The Goal

Crop  Scale  Retargeted
Implementation Outline

1. Segmentation
2. Importance Map
3. Decomposition
4. Background Renewal
5. Paste
6. Resize Segments

- If the segmentation fits the required size?
- If the decomposition fits the new background?
Mean-shift Image Segmentation

(Meer and Georgescu, *IEEE Trans on Pattern Analysis & Machine Intelligence*, ’02)
Importance Map Generation
Background Renewal
Importance Object Compositing

- Desired Size
- Original Bounding Boxes
- Auto Crop
- Desired Size
- Centroids
- Background Renewal
- Resize Background
- Paste First Object
- Add Second Object
- Bounding Boxes Overlap
- Resize Until Fits
- Add Third Object
- Bounding Boxes Do Not Overlap
- Paste Third Object
Objects and Shadows
Thanks

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Image Segmentation

Apply color measurement in CIE where pixels in each region form 3D histograms. Then we perform histogram intersection (*Swain and Ballard 1991*).
**Image Attention Model**

Saliency Map = $\frac{1}{3}(N(I) + N(C) + N(O))$

Importance Value = $\sum_{\text{Pixel gray-scale}} \cdot \text{Positional Weight}$

Positional weight based on a normalized Gaussian template centered at the image.
**Face Attention Model**

Importance Value = $\sqrt{\text{Area}_{\text{face}} \cdot \text{Positional weight}}$

Positional weight based on:

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Computing Importance Value

Importance Value for each Object =
Weight of the model \cdot N(\text{Importance Value in the model})