

One Way Mapping for Synthesis

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Bijjective Mapping for Synthesis

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Layer Map Synthesis

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Degree Maps

Appearance manifolds for modeling time-variant appearance of materials / Wang et al. 2006

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Layer Maps

stacked layers

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Related Work

A control map is either provided by the user, or derived from a specific model of texture formation across a 3D surface:

- Image Analogies / Hertzmann et al. (2001)
- Synthesis of progressively-variant textures on arbitrary surfaces / Zhang et al. (2003)
- Appearance Manifolds for Modeling Time Variant Appearance of Materials / Wang et al. (2006)
- Time-varying surface appearance: acquisition, modeling and rendering / Gu et al. (2006)
- Context-aware textures / Lu et al. (2007)
- Inverse texture synthesis / Wei et al. (2008)

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Shape Synthesis

- Synthesizing layers = synthesizing shapes
- Similar to Texture Optimization (Kwatra et al. 2005)

Exemplar Estimation

Shape Synthesis

Synthesize only boundaries

Exemplar Estimation

Shape Synthesis

Easier to maintain local coherence

Shape Synthesis

Minimize a bi-similarity measure

$$D(E, T) = \frac{\sum_{x_E \in B_E} D(x_E, S_T) + \sum_{x_T \in B_T} D(x_T, S_E)}{|B_E \cup B_T|}$$

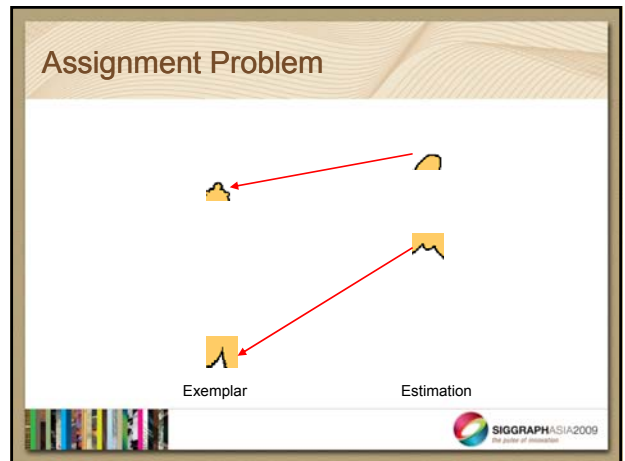
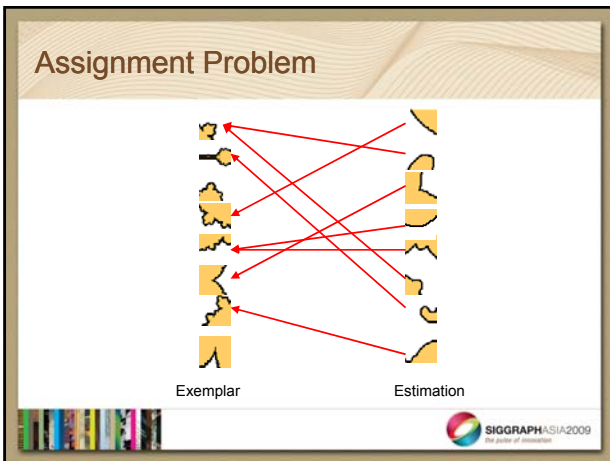
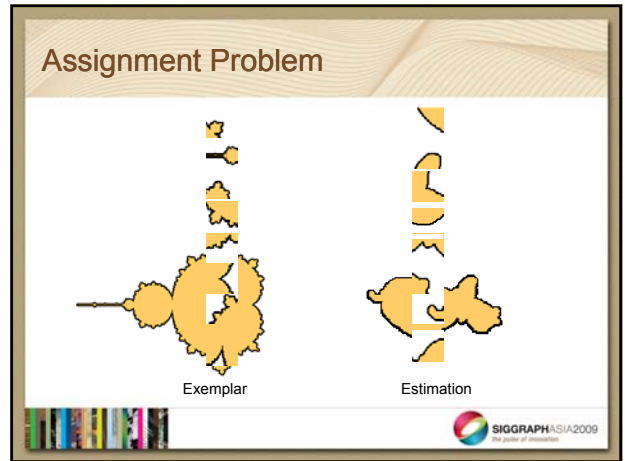
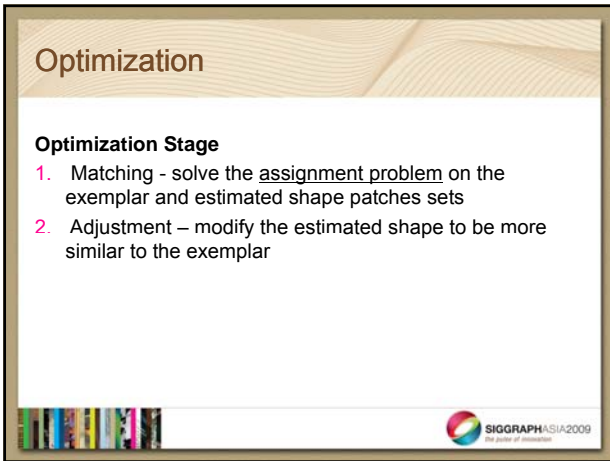
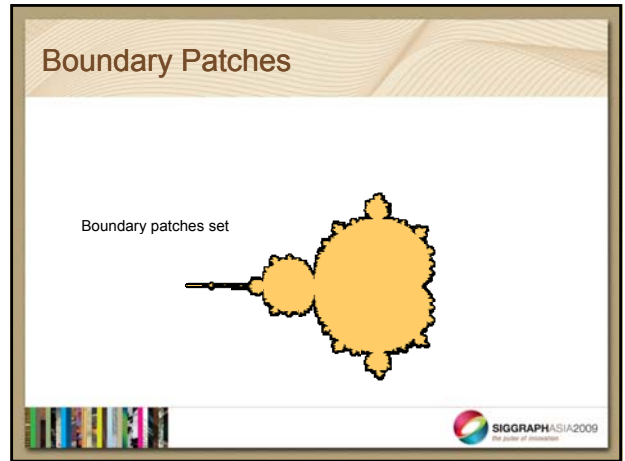
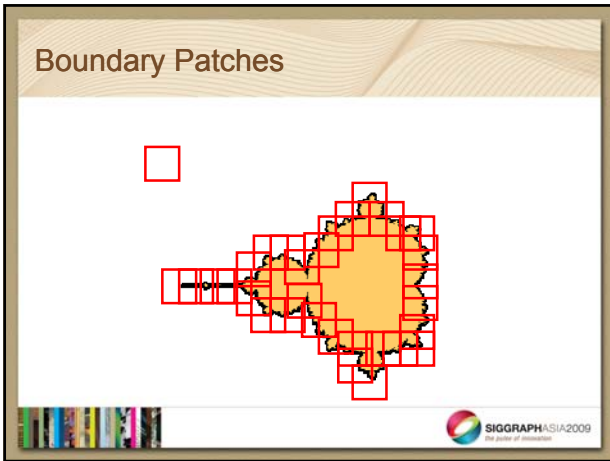
Exemplar Estimation

Boundary Patches

Boundary Patches

Boundary patch

Boundary pixel



Assignment Problem

Exemplar Estimation

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Assignment Problem

Usually sets don't have the same size...

Exemplar Estimation

$$Q|B_E| + R$$

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Adjustment

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Adjustment

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Adjustment

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Adjustment

A target pixel is determined using a voting mechanism


Estimation

Vote weights:


- Quality of match: $\frac{1}{1 + D(x_s, x_E)}$
- Gaussian kernel

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Style Transfer




The diagram shows a horizontal arrow pointing from left to right. On the left side, there are four irregular, orange-colored shapes of varying sizes and orientations. On the right side, there are two similar orange shapes, with the word "Exemplars" written below them. The background of the slide has a light wood-grain texture.

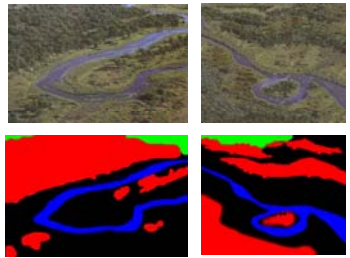
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Layered Shape Synthesis

1. First layer shape is initialized randomly
2. After first layer is complete we synthesize next layer in an enclosed area by using a mask.
3. More details in the paper...


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Texture By Numbers

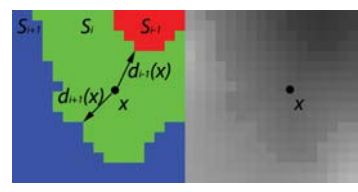


Four images are arranged in a 2x2 grid. The top row shows two natural landscape photos of a river valley. The bottom row shows two corresponding segmented images where the river and land are represented by different colors (red, blue, black, green). The background of the slide has a light wood-grain texture.


Image Analogies / Hertzmann et al. (2001)

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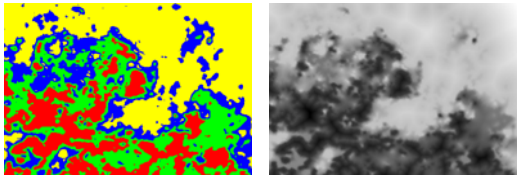
Continuous Map




The diagram shows a grid of colored regions labeled S_{i+1} , S_i , and S_{i-1} . A point x is shown within a region, with arrows indicating distances $d_{i+1}(x)$ and $d_{i-1}(x)$ to the boundaries of the adjacent regions. The background of the slide has a light wood-grain texture.

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Continuous Map



Two images are shown side-by-side. The left image is a colorful, noisy map with regions of yellow, blue, red, and green. The right image is a grayscale, textured image of a cloudy sky. The background of the slide has a light wood-grain texture.

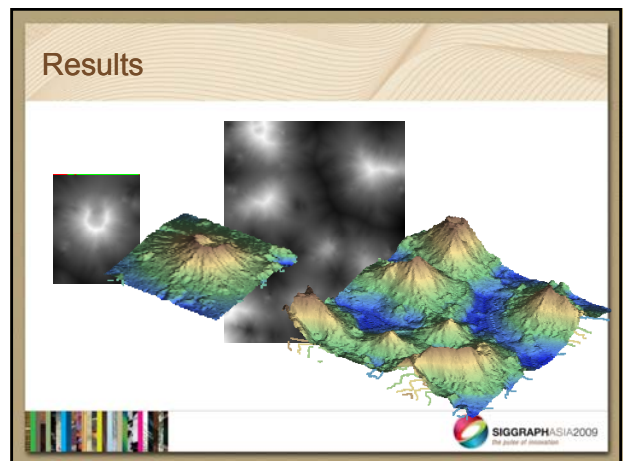
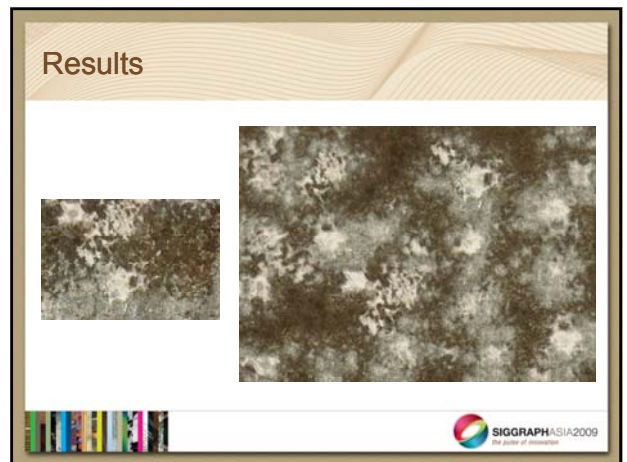
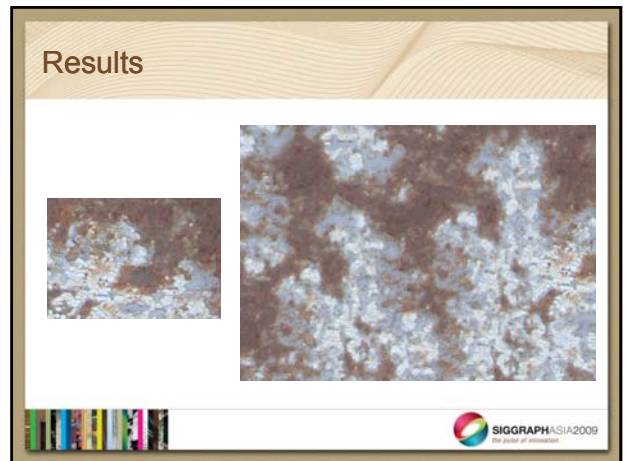
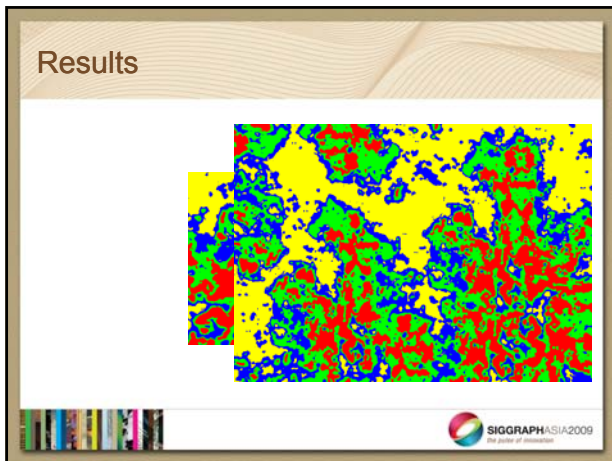
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Results




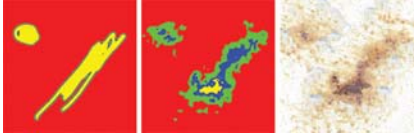
A single image showing a textured, mottled surface with various shades of brown, tan, and grey, resembling a natural material like stone or wood. The background of the slide has a light wood-grain texture.

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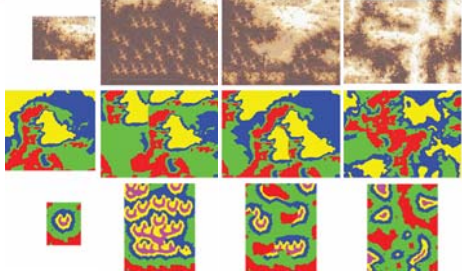


Results


User control




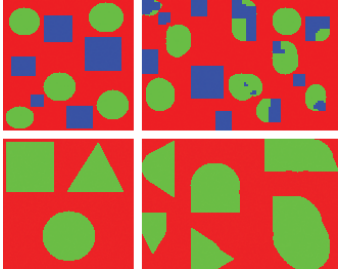
Comparisons



Kwatra et al. (2005) Kopf et al. (2007) Our

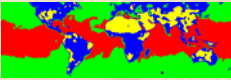



Limitations



Summary

1. Synthesizing *layer maps*
2. *Shape Synthesis* – synthesis of shapes
3. *Assignment problem* –
 - Bijective mapping
 - Maintaining global patch statistics



Thank you

