Image Analogies
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Aaron Hertzmann1,2
Chuck Jacobs2
Nuria Oliver2
Brian Curless3
David Salesin2,3

1New York University
2Microsoft Research
3University of Washington

The Approach

Unfiltered source
Filtered source

Unfiltered target
Filtered target

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Function CREATEIMAGEANALOGY(A, A', B, B', s, t, q)
- Compute Gaussian pyramid for A, A', and B
- Initialize the search structure (e.g., for ANN)
- for each level l, from coarsest to finest, do:
  - for each pixel y ∈ IC, in scan-line order, do:
    - p = BESTMATCH(A, A', B, B', s, t, q)
    - R(p) = Nl(p)
    - next p
- return K

Function BESTMATCH(A, A', B, B', s, t, q)
- d(A) = BESTMATCH-MATCH(A, A', B, B', s, t, q)
- d(A') = BESTMATCH-MATCH(A, A', B, B', s, t, q)
- d(A) = BESTMATCH-MATCH(A, A', B, B', s, t, q)
- d(A') = BESTMATCH-MATCH(A, A', B, B', s, t, q)
- if d(A) ≤ d(A') + 2^l * s, then
  - return d(A)
- return d(A')
Implementation Details

- Use approximate nearest neighbor search and Ashikhmin’s coherence search heuristic
- Use feature vectors instead of pixel values
  - Feature vector can consist of RGB values plus additional “channels” such as luminance, outputs of derivative filters
- Luminance remapping to align color histograms of source and target images

Blur Filter

Edge Filter

Colorization

Texture Synthesis

- Source images (A, B) are blank/constant

Texture Synthesis
**Texture Transfer**

- A and A' is the same (or A is a blurred version of A')
- Optional: Tunable weight to control the tradeoff between matching (A, B) and (A', B')

### Artistic Filters

- Unfiltered source
- Filtered source

### Artistic Filters

- A
- A'
- B
- B'
Artistic Filters

More Artistic Filters

Texture-by-numbers

Dealing with progressively variant textures

- Project idea: inverse “texture by numbers”
Super-resolution

Super-resolution (result!)