



Interactive Digital Photomontage

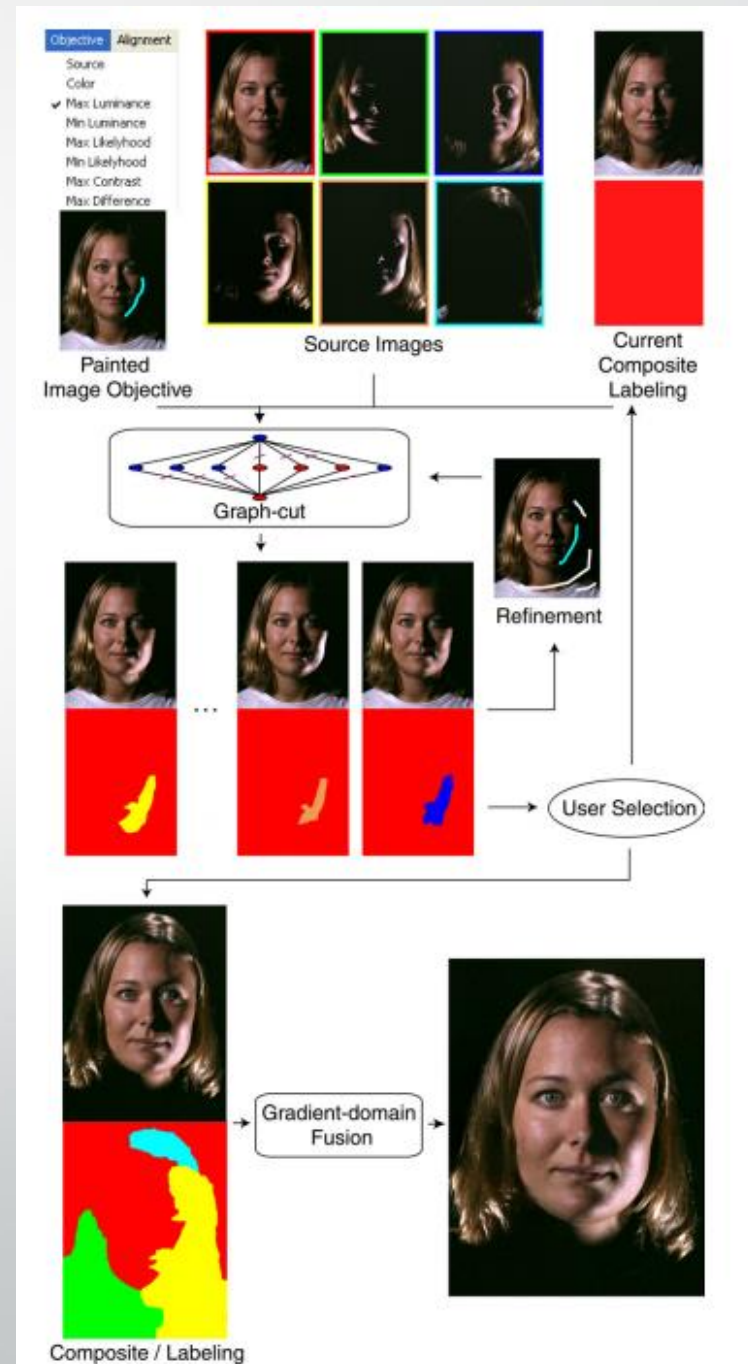
Aseem Agarwala, Mira Dontcheva, Maneesh Agrawala, Steven Drucker, Alex Colburn,
Brian Curless, David Salesin, Michael Cohen
University of Washington (US), Microsoft Research (US), 2004.

Ugo Schiapparelli, Axel Wolski

Aurelie Bugeau
17/11/2017 Advanced Methods for Image Processing

Introduction

- Interactive photomontage framework
- A wide variety of objectives
- Algorithms using:
 - Graph-cut optimization
 - Gradient-domain fusion



Photomontage framework presentation



Composite

Source

- Current photomontage result
 - Adding intermediate results to the set of source images
 - Selection of objectives
- Initial images
 - User can scroll through the source images
 - Possibility to select the part of the source image he wants

Objectives

Image objective can be applied globally to the entire image or locally to only a few pixels.

- Designated color
- Minimum/maximum :
 - Luminance
 - Contrast
 - Likelihood
 - Difference
- Designated image

Seam objective is always specified globally across the entire image.

- Colors
- Colors & gradients
- Colors & edges

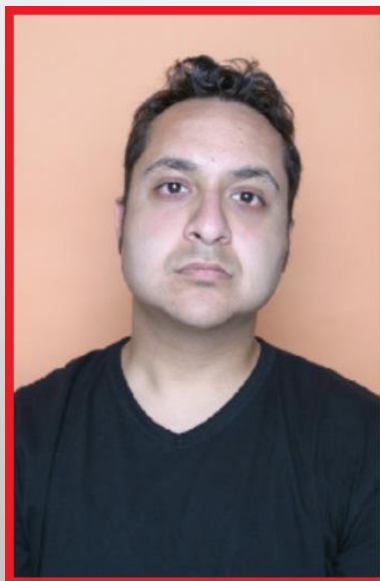
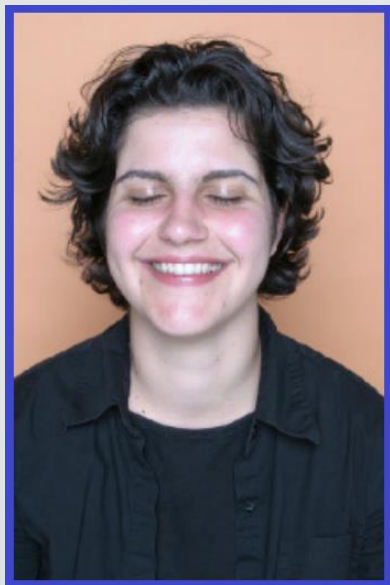
Brushes

- **Single-image brush :**
 - Use more frequently
 - Between the current composite and each of the source images independently
- **Multi-image brush :**
 - All source images are fused together to obtain best locally and globally result.
 - This operation can take significant time

Algorithms use

- **Graph-cut optimization**, Boykov et. al [2001]
 - Find the best seam
 - But artifacts may still exist
- **Gradient-domain fusion**, Fattal et. al [2002]
 - Use color gradients rather than sources of color
 - Smooth out color differences between juxtaposed image regions
 - Use **discretisation of the Poisson** equation to make best-fit image

Different applications & results



Selective Composites



Extended depth of field



Relighting



Stroboscopic visualization of movement

Clean-plate production



Panoramic stitching



Conclusions

- Advantages:
 - Easily and quickly to use
 - A wide variety of applications
- Drawbacks:
 - Need similar images
- Future:
 - Apply this approach to other type of data (2.5D layered images, 3D volumes, ...)
 - Many more applications could use this approach

References

- A. Agarwala, M. Dontcheva, M. Agrawala, S. Drucker and A. Colburn, "Interactive Digital Photomontage", SIGGRAPH, 2004 <http://kneecap.cs.berkeley.edu/papers/photomontage/photomontage.pdf>
- <http://grail.cs.washington.edu/projects/photomontage/>
- Documentation of photomontage framework
<http://grail.cs.washington.edu/projects/photomontage/release/photodocs/index.html>
- Graph Cuts https://moodle1.u-bordeaux.fr/pluginfile.php/304243/mod_resource/content/2/GraphCuts.pdf
- Y. Boykov and M.-P. Jolly, "Interactive Graph Cuts for Optimal Boundary & Region Segmentation of Objects in N-D Images", ICCV, 2001 <http://www.csd.uwo.ca/~yuri/Papers/iccv01.pdf>
- R. Fattal, D. Lischinski and M. Werman, "Gradient domain high dynamic range compression", SCSE, 2002 <http://www.cs.huji.ac.il/~danix/hdr/hdrc.pdf>
- Poisson https://moodle1.u-bordeaux.fr/pluginfile.php/271243/mod_resource/content/0/Poisson.pdf