Image Morphing

Prof. George Wolberg

Dept. of Computer Science

City College of New York

Objectives

- In this lecture we review digital image morphing, a powerful visual effect for creating a fluid transformation from one image to another.

  - Background

  - Morphing Algorithms
    - Mesh (parametric grid)
    - Line pairs
    - Scattered points

  - Examples

Inbetween Image Generation

Cross-dissolve vs. Image Morphing

cross-dissolve
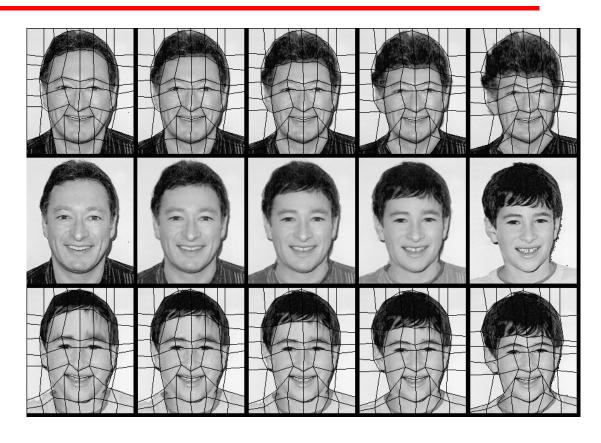

source image — dest. image
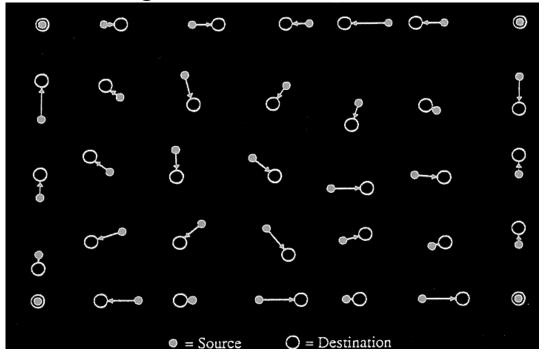
warped source image — warped dest. image
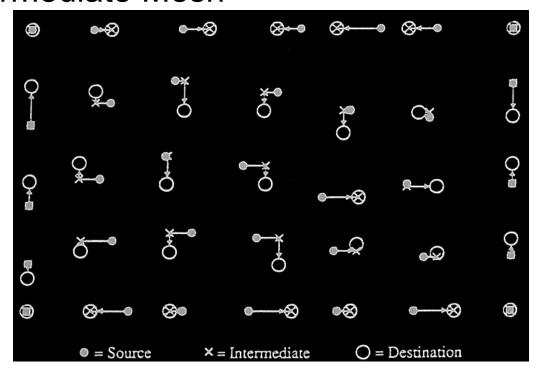
image morphing

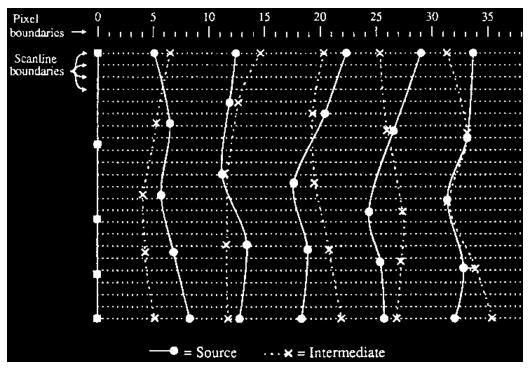# Mesh Warp (1)

Mesh Warp (2)

Source / Target Meshes

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Mesh Warp (3)

Intermediate Mesh

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Mesh Warp (4)

Horizontal Resampling

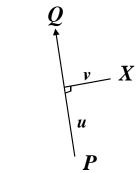Wolberg: Image Processing Course Notes

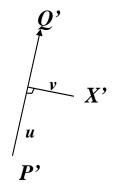# Mesh Warp (5)

Vertical Resampling
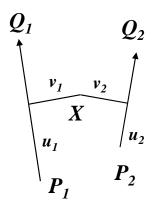
Line Warp (1)

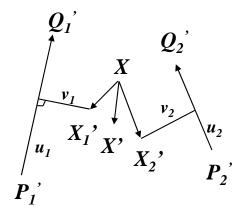Destination Image   Source Image

$$u = \frac{(X - P) \cdot (Q - P)}{\|Q - P\|^2} \qquad v = \frac{(X - P) \cdot Perp(Q - P)}{\|Q - P\|}$$

$$X' = P' + u \cdot (Q' - P') + \frac{v \cdot Perp(Q' - P')}{\|Q' - P'\|}$$

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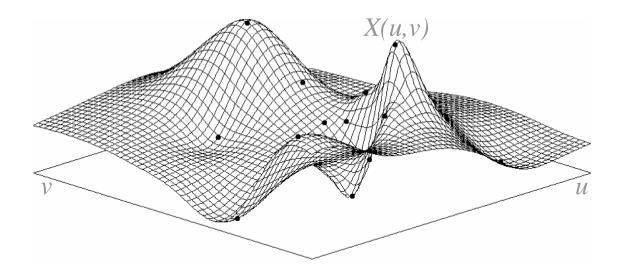
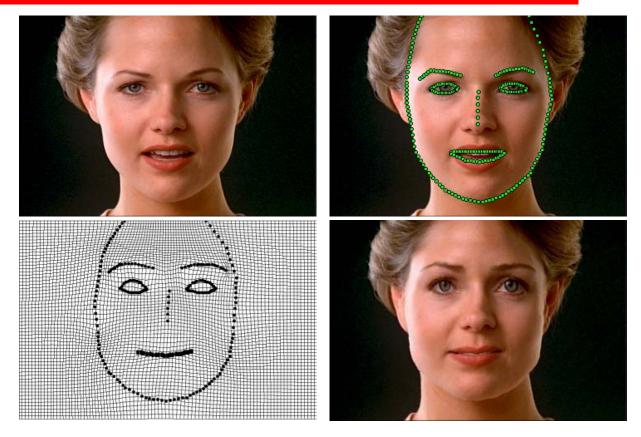# Line Warp (2)

Destination Image

Source Image

Scattered Point Constraints

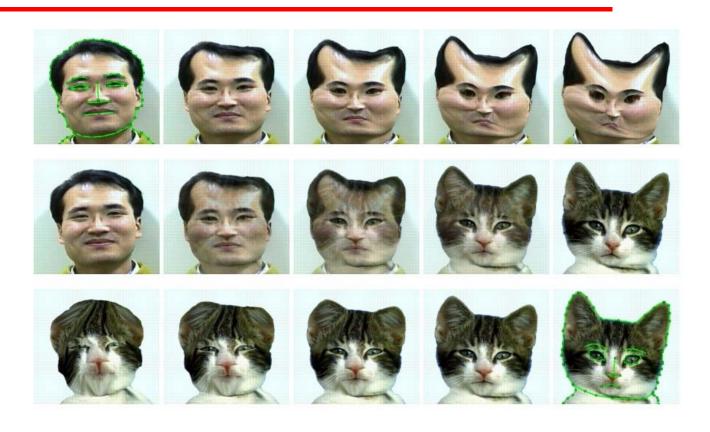Treat correspondence data as scattered data:

$$[x,y] = [X(u,v), Y(u,v)]$$

Example

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Uniform Transition

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Nonuniform Transition

Morph Sequence

Morph Sequence

Bibliography

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- Smythe, D., "A Two-Pass Mesh Warping Algorithm for Object Transformation and Image Interpolation," ILM Technical Memo #1030, Computer Graphics Dept., Lucasfilm Ltd., 1990.

- Lee, S., K.Y. Chwa, S.Y. Shin, and G. Wolberg, "Image Metamorphosis Using Snakes and Free-Form Deformations," Proc. Siggraph '95, pp. 439-448, 1992.

- Lee, S., G. Wolberg, K.Y. Chwa, and S.Y. Shin, "Image Metamorphosis with Scattered Feature Constraints," IEEE Trans. Visualization and Computer Graphics, vol. 2, no. 4, pp. 337-354, 1996.

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