EXPLORING PHOTOBIOS

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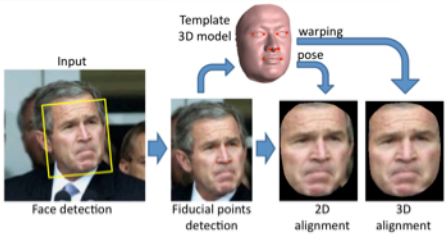
Abstract

We generate face animations from large image collections of a person's face, by computing an optimized, aligned subsequence. This approach is the basis for the Face Movies feature of Picasa. A key contribution is proving why the cross dissolve produces a strong motion effect [1].

The Face Graph

Automatic alignment and pose estimation



Local appearance similarity

Local Binary Patterns (Ahonen et al. 06) applied locally on warped images

The Graph

Nodes: Face images in the dataset
Edges: distances between images

$$D(i,j) = \left(1 - \prod_{S\in\{app,yaw,pitch,age\}} 1 - D_S(i,j)\right)^{\alpha}$$

$$D_{app}(i,j) = 1 - (1-\lambda^m d_{ij}^m)(1-\lambda^e d_{ij}^e)(1-\lambda^h d_{ij}^h)$$

$d^{\{m,e,h\}}$ - LBP histogram Chi-Sq distances restricted to the mouth, eyes, hair regions, normalized using robust logistic normalization function

$\alpha^{\{m,e,h\}}$ - corresponding weights

$D_{yaw}, D_{pitch}, D_{age}$ -L2 difference in pose and age normalized

Traverse paths on the graph to find smooth, continuous transitions from still images.

Acknowledgments

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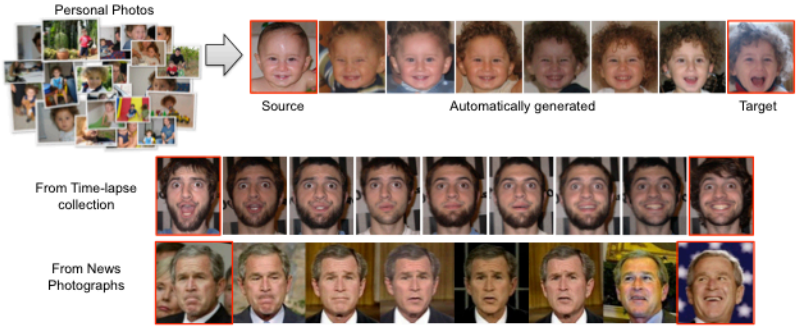
Results



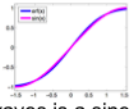
The Cross-Dissolve

A simple way to animate the above sequences without exact correspondence is to apply linear blending (cross-dissolve) to each pair of images:

$$I_{out}(t) = (1-t)I_{in_1} + tI_{in_2}$$

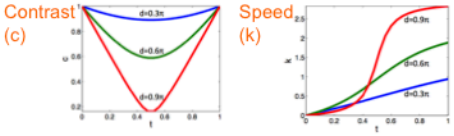
Cross-dissolve produces physical motion—Why?

1) Approximate an edge with a sine

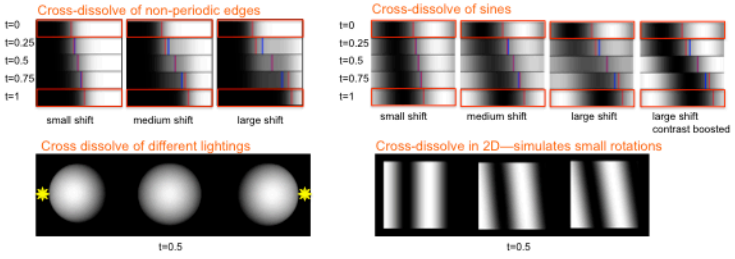


2) Cross-dissolve of two sine waves is a sine

$$(1-t)\alpha\sin(mx) + t\sin(mx+d) = c\sin(mx+k)$$

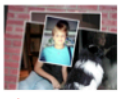


3) Observations:
- Nonlinear ease-in ease-out dynamics
- Lower contrast towards mid-point of the transition
- Lower freq. edges can move larger distances
- Applied to edges with approx. same freq.

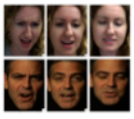


References, our related works, and applications

[1] Kemelmacher-Shlizerman I., Shechtman E., Garg R., Seitz S.M.. Exploring Photobios. SIGGRAPH 2011, was chosen to appear on the back cover.
- More info at: http://grail.cs.washington.edu/photobios/
- Picasa's Face Movie feature: http://googlephotos.blogspot.com/2010/08/picasa-38-face-movies-picnik.html



[2] Kemelmacher-Shlizerman I., Sankar A., Shechtman E., Seitz S.M., Being John Malkovich. ECCV 2010



[3] Kemelmacher-Shlizerman I., Seitz S.M.. Face Reconstruction in the Wild. To appear.