Exploring Photobios

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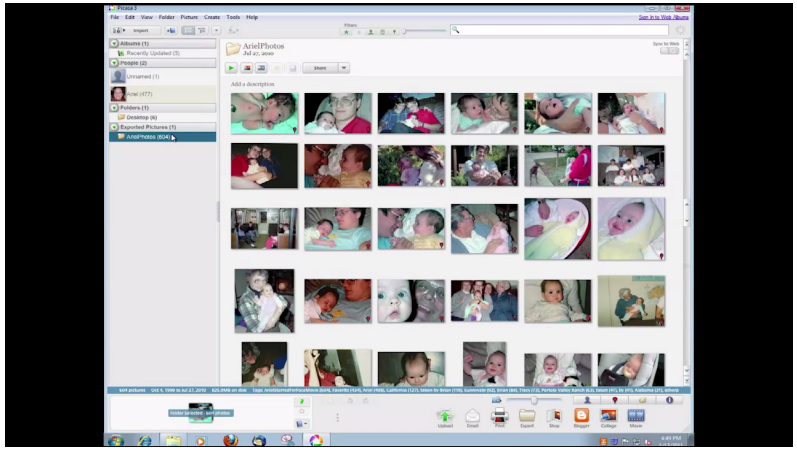
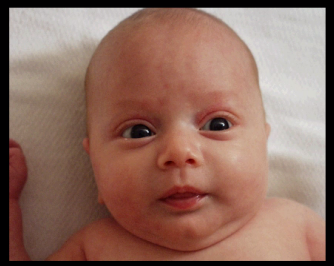
Proc. SIGGRAPH 2011

"Face Movie" in Google Picasa

- Select multiple photos in Picasa
- Click Create → Movie → From Faces



Create a "This is Your Life" Video



1 photo per week for 8 years!

Chronological

Create a "This is Your Life" Video

+ registered (eyes aligned)

Create a "This is Your Life" Video

+ optimized subsequence (expression and pose stabilized)

YouTube

Manually created version

Our Method

- Unstructured photo collection
- Completely automatic

© Photos: Amit Kemelmakher

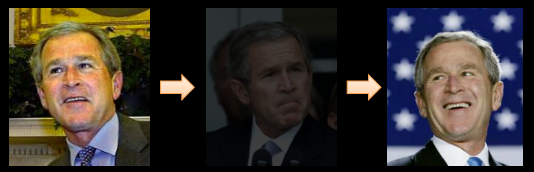
Method Overview

Similarities between photos → Photo ordering → Rendering

Method Overview

Similarities between photos → Photo ordering → Rendering & Analysis of cross dissolve

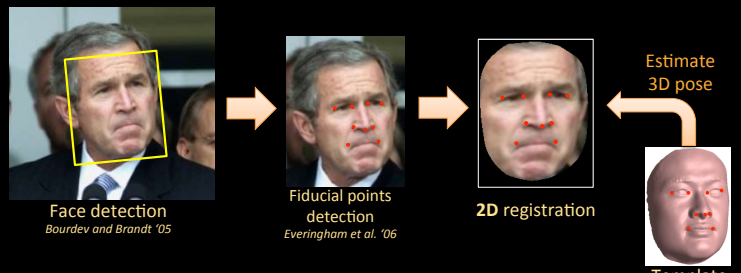
Pairwise Similarity



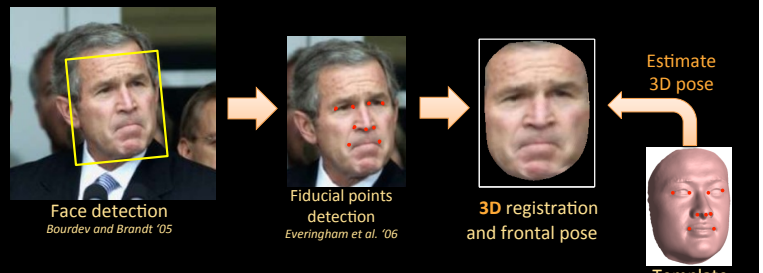
Similarity between 2 photos = Head Pose • Facial Expression • Time

© Photos: Reuters, AP Photo

Pose Estimation



Pose Estimation



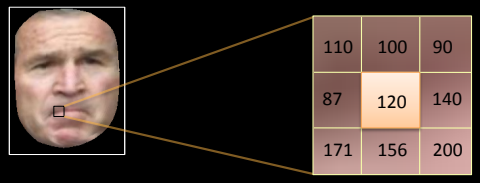
Aligned Images after 2D Registration

(with different poses)

Warped Images after 3D Registration

Facial Expression Similarity

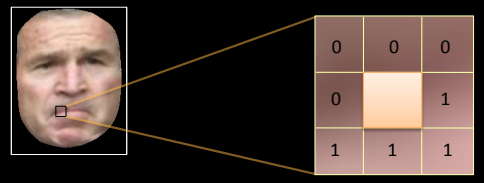
We use **Local Binary Patterns** – LBP (Ahonen et al. '06)



Use center pixel's value as a threshold for comparing with its 8 nearest neighbors

Facial Expression Similarity

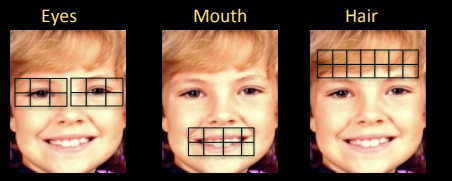
We use **Local Binary Patterns** – LBP (Ahonen et al. '06)



01111000 = **30**

Binary code — Integer

Facial Expression Similarity



- Each cell is represented by a histogram of LBP values
- Concatenate histograms into feature vector

Facial expression similarity = λ_1 Eyes + λ_2 Mouth + λ_3 Hair

Chi-squared distance

Compare concatenated histograms between 2 images

Facial Expression Similarity

Method Overview

Similarities between photos → Photo ordering → Rendering & Analysis of Cross-dissolve

Face Graph

Given 2 images, find shortest path using Dijkstra's algorithm

Edge weight = "distance" between images

Automatically Generated Transition

Source

Target

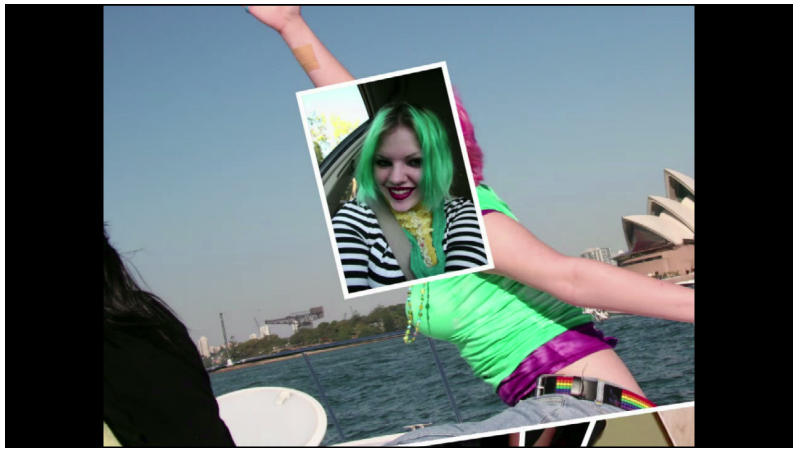
Least cost path through Face Graph from Source to Target

Method Overview

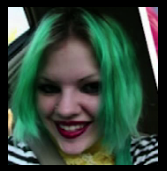
Similarities between photos → Photo ordering → Rendering

Render the Sequence

- **Goal: Give impression of natural motion**
- **Morphing = warping + cross-dissolve**
  - needs accurate correspondence
- **Cross-Dissolve *only*:**
  - Because images are in approximate local alignment, gives the appearance of synthesized motion

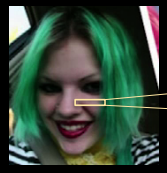


Linear Cross-Dissolve

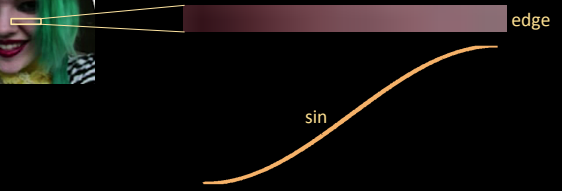
(1-t)  **+ t** 

t = 0, …, 1

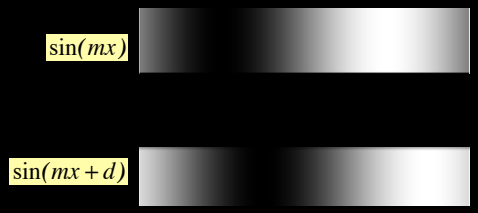
Edge Approximation



Edge ≈ Sin

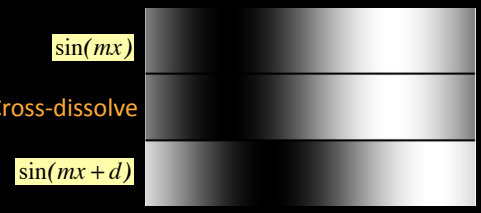


Cross-Dissolve of Sine Waves

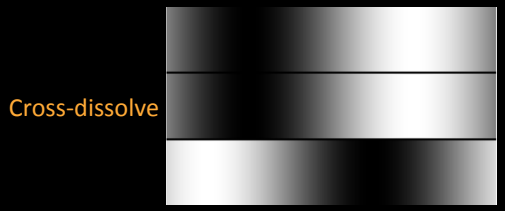


d = phase shift

Cross-Dissolve of Sine Waves



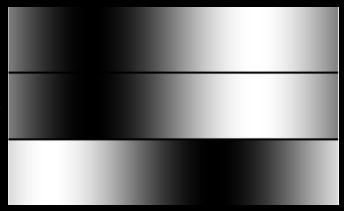
Contrast



Low contrast in mid-transition

Large phase shift

Speed



Ease-in ease-out dynamics

Large phase shift
Contrast boosted

Lighting

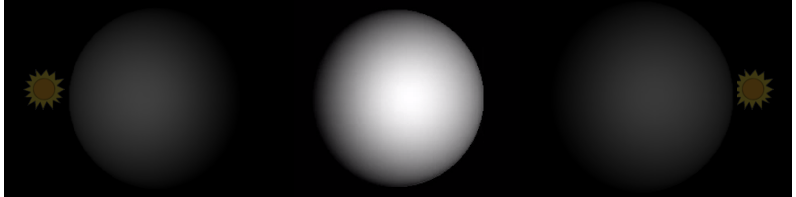


Image 1

Cross dissolve
= light motion

Image 2

Results

"Face Movie" in Google Picasa

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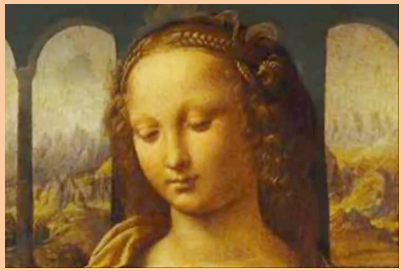
Picasa™

Example Result

Growing up

500 Years of Female Portraits

- **A similar idea applied to female portraits in Western Art**



Philip Scott Johnson, 2007