

Being John Malkovich

Ira Kemelmacher-Shlizerman¹ Aditya Sankar¹ Eli Shechtman² Steven M. Seitz^{1,3}

¹University of Washington

²Adobe Systems

³Google Inc.

"Ever wanted to be someone else? Now you can."—tagline from the film Being John Malkovich

Our contribution:

Use your face to drive someone else.

- A fully automatic real-time framework that combines a number of face processing components in a novel way
- Works with any unstructured photo collection and/or video sequence
- No training, or labeling

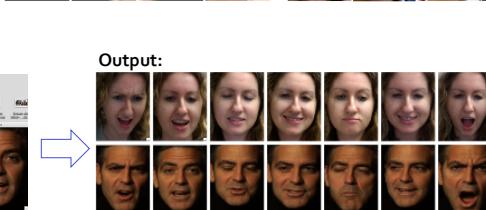
Input: Webcam



Input: Photo of person A



Output: Photo of person B with similar **facial expression** and **pose**



Results:

Puppeteering evaluation (full measure):



Without mouth similarity:



Without eyes similarity:



Cameron Diaz drives John Malkovich:



User drives George W. Bush: (870 photos in Bush's dataset)



The method:

Image alignment to canonical pose:

Photo collections:

Face and fiducial points detection
(Everingham et al 06)



Align and warp
using 3D neutral face



2D aligned:

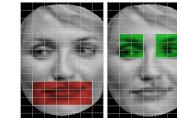


Warped to frontal pose:



Appearance representation:

- LBP (Local Binary Pattern) histograms (Ahonen et al 06)
- Applied on warped images
- Only for mouth & eyes regions
- Mouth region divided to 3×5 blocks
- Eye region divided to 3×2 blocks



Distance measure:

The distance between input frame i and target frame j is :

$$D(i, j) = d_{\text{appear}}(i, j) + \alpha^p d_{\text{pose}}(i, j) + \alpha^t d_{\text{appear}}(i - 1, j)$$

Appearance Pose Temporal continuity

Appearance: $d_{\text{appear}}(i, j) = \alpha^m d^m(i, j) + \alpha^e d^e(i, j)$

$d^{(m,e)}$ - LBP histogram χ^2 distances
restricted to the mouth and eyes regions
 $\alpha^{(m,e)}$ - corresponding weights

Pose: $d_{\text{pose}}(i, j) = L(|Y_i - Y_j|) + L(|P_i - P_j|) + L(|R_i - R_j|)$

Y - yaw, P - pitch, R - roll
 $L(d)$ - robust logistic normalization function

Temporal continuity: appearance dist. between frame $i - 1$ and j

Acknowledgments: This work was supported in part by Adobe and the University of Washington Animation Research Labs. We gratefully acknowledge Jason Saragih for providing the face tracking software. Also, in our experiments we used:
- videos of Cameron Diaz, George Clooney and John Malkovich downloaded from YouTube and mefedia.com
- a collection of photos of George W. Bush from the LFW face database.