Expression Flow for Face Editing
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Joint 3D shape fitting

Recovery 3D geometry from images

Decouple expression and identity

\[ s_t = \bar{s} + V \otimes \beta_t \otimes y_t \]

How to fit the model?
- Minimize geometric error
- Same identity \( y_t \) across all frames
- Expression \( \beta_t \) change over time
- New shape is close to distribution of training set
- Video: Expression changes smoothly

Photo Compositing

System Overview

Results

- Replace bad features on face
- Warp shape of face globally
- Make the face shape compatible with the new face component

Video Stitching

Recover missing frames

Generate smooth transition of
- 3D geometries
- Face pose
- Face position
- Face appearance

Expression Editing

Change expression coefficient

\[ \beta_i' = \beta_i + \alpha \ast (\beta_i - \beta_f) \]

Mapping the sequence

\[ D(i, j) = ||\beta_i' - \beta_j||_2 \]

Results