



Expression Flow for Face Editing

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Joint 3D shape fitting

Recovery 3D geometry from images



Decouple expression and identity

$$s_t = \bar{s} + V \otimes \beta_t \otimes \gamma_t$$

Expression ← β_t ← Identity

How to fit the model ?

- Minimize geometric error
- Same identity γ_t across all frames
- Expression β_t change over time
- New shape is close to distribution of training set
- Video: Expression changes smoothly

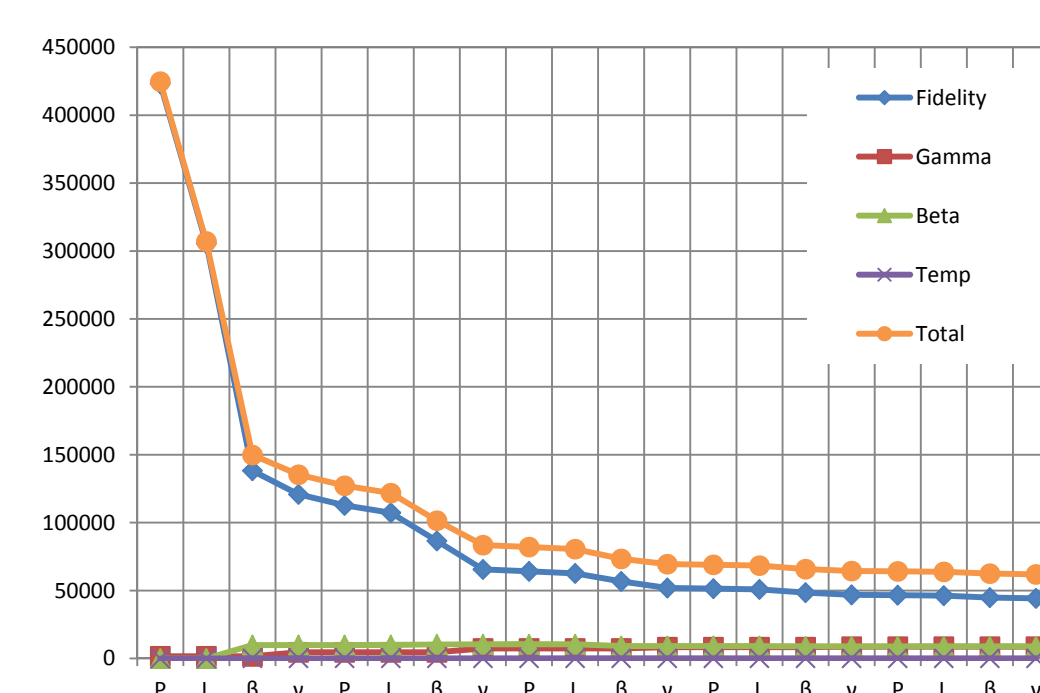
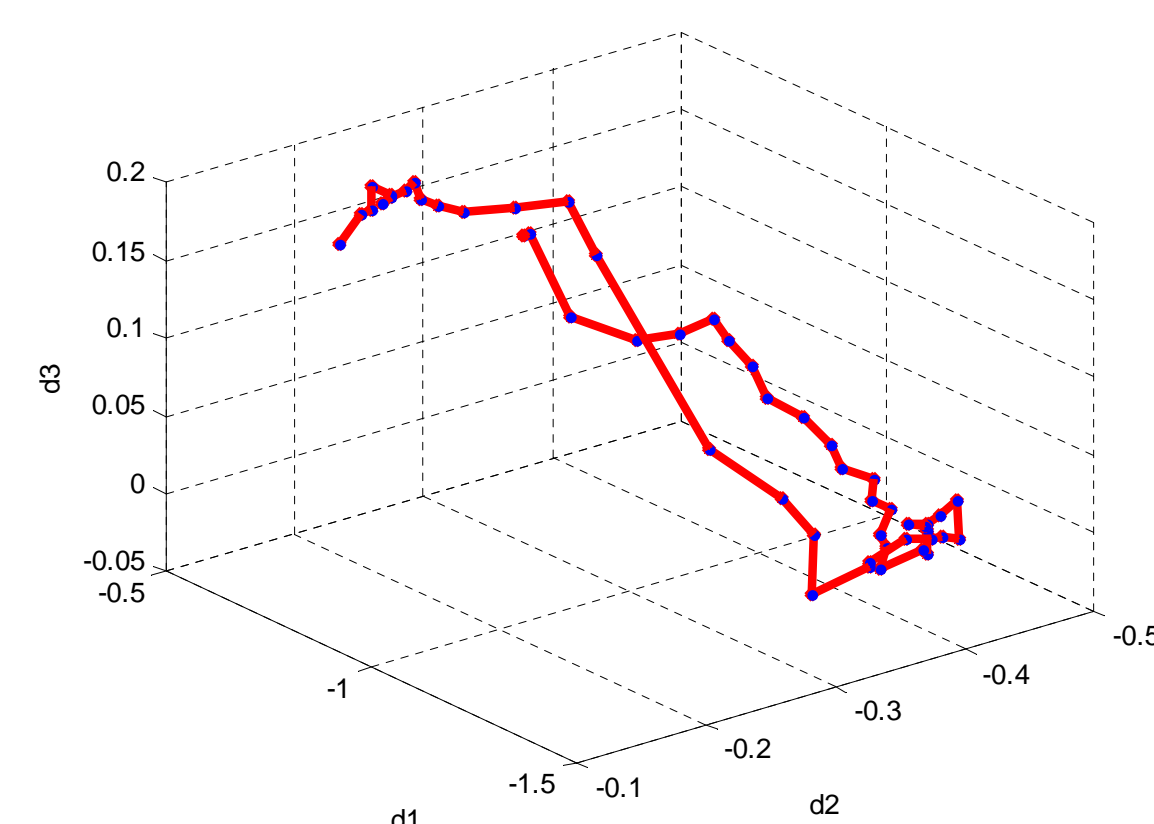
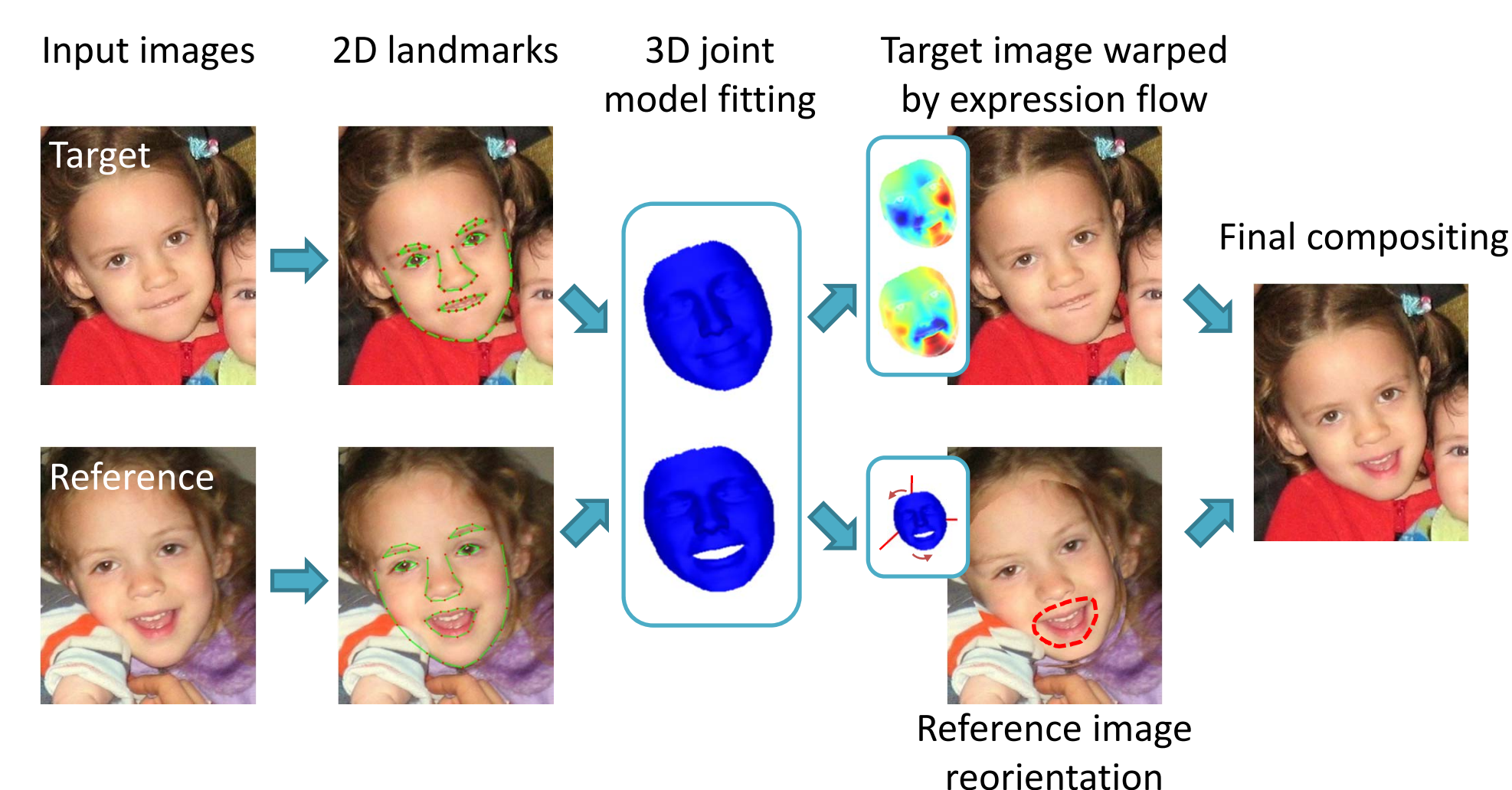


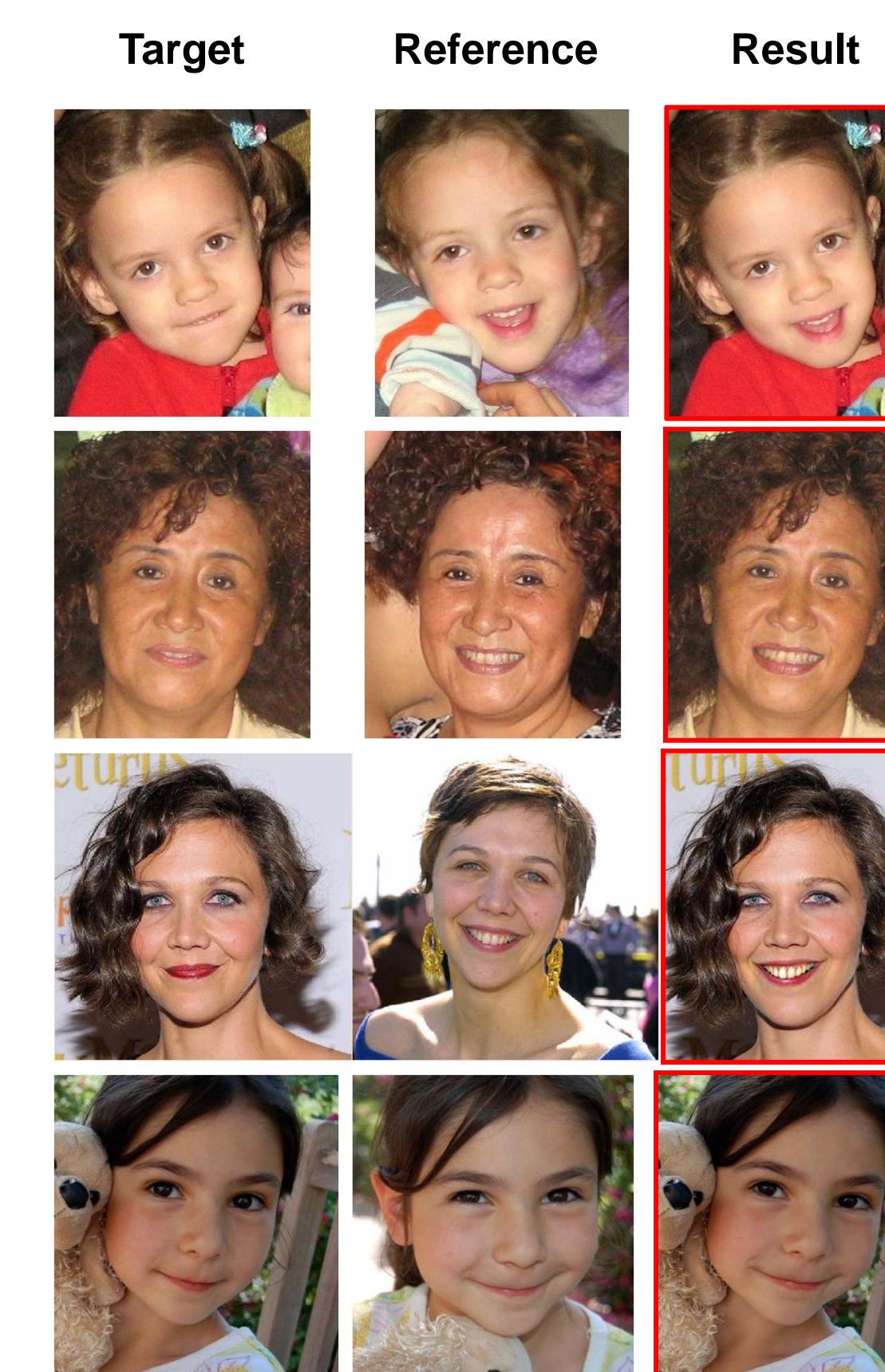
Photo Compositing

System Overview



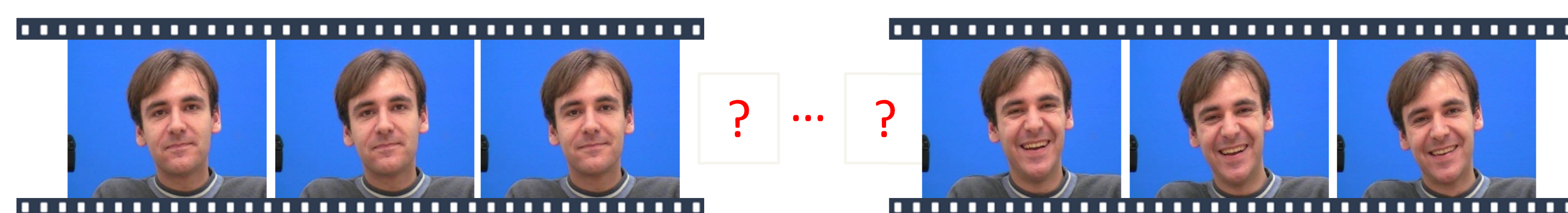
- Replace bad features on face
- Warp shape of face globally
- Make the face shape compatible with the new face component

Results



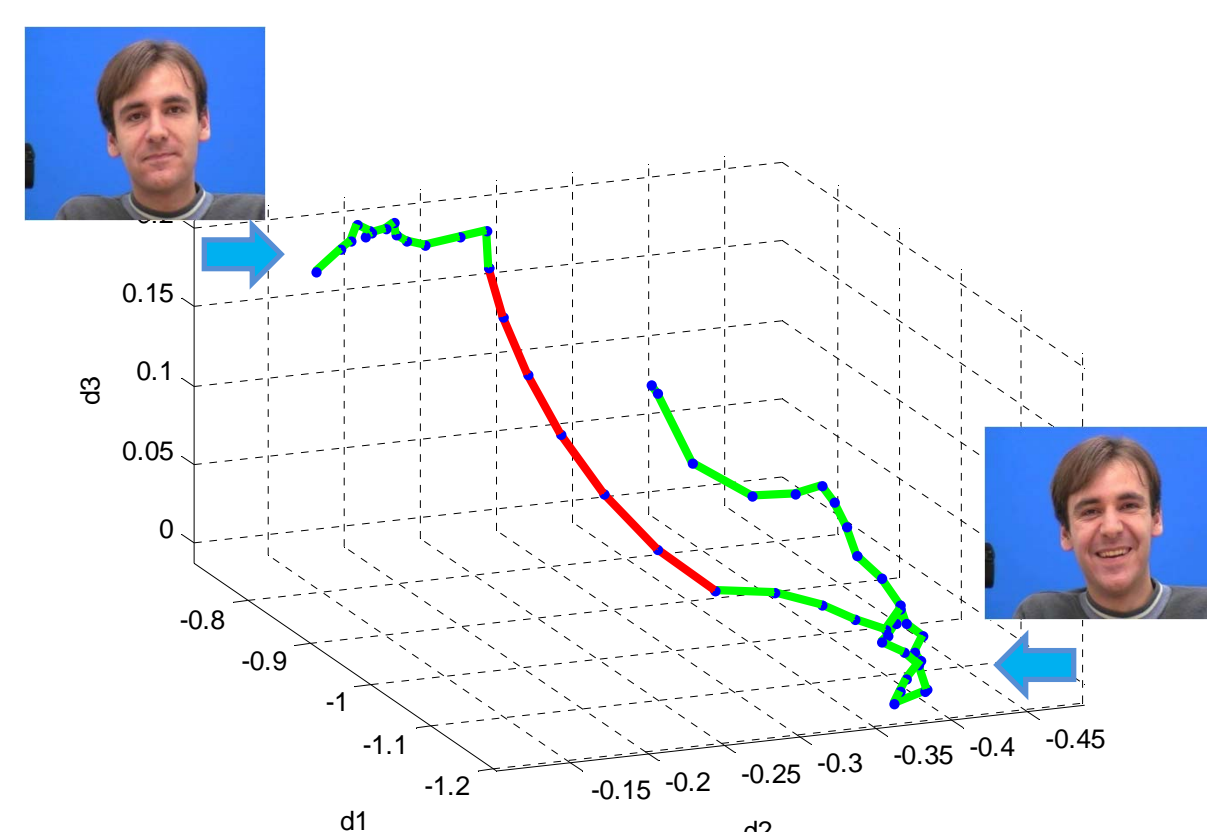
Video Stitching

Recover missing frames



Generate smooth transition of

- 3D geometries
- Face pose
- Face position
- Face appearance



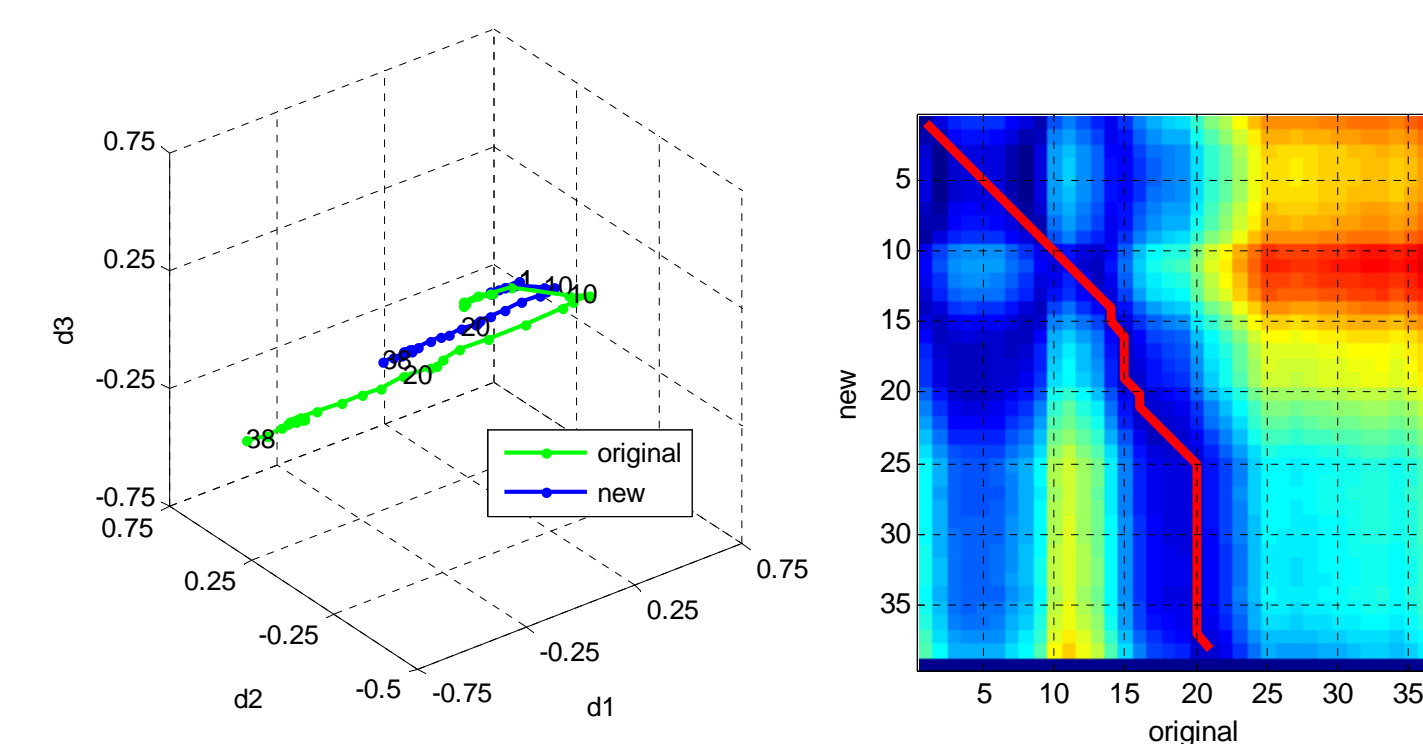
Expression Editing

Change expression coefficient

$$\beta_t' = \beta_t + \alpha * (\beta_t - \beta_1)$$

Mapping the sequence

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



Results

