Surface Deformation

- Input:
  - Correspondences between a reference and input image.
  - No a priori pose information.
- Output:
  - A mapping $F$ from model to input image.

Challenges

Non-rigid deformation without a priori pose:
- High dimensionality (200+ DOF)
- Large search space
- Wide baseline matching

Real-time requirements:
- Fast optimization scheme
- Fast matching

Deformable Model

Wide Baseline Matching

Regularization Term

$\varepsilon(S) = \varepsilon_C(S) + \lambda_D \varepsilon_D(S)$

$S = (X, Y)$

$\varepsilon_D(S) = \frac{1}{2} (X^T K X + Y^T K Y)$

- penalizes non uniform scaling;
- penalizes excessive bending;
- allows perspective distortion;
- allows smooth surface deformation.
**Correspondence Term**

\[ \varepsilon_C = - \sum_{c \in C} ||c_1 - T_s(c_0)||^2 \]

**Real-Time Augmentation**

**Key Ingredients**

- Classification-based approach to matching.
- Robust minimization scheme.
- Intensity ratios for illumination correction.