A SIMPLE PRIOR FREE MODEL FOR NON-RIGID STRUCTURE FROM MOTION

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History

- **Tomasi - Kanade problem:**

  Given a orthographic camera and point correspondences across multiple views

  recover camera motion and 3D coordinates for feature points.

- **Bregler's work:**

  Non rigid factorization – Hard problem?? This method assumes non-rigid shape is

  linear combination of some basis shapes.

  No prior models or multiple views or 3D inputs.

  Problem: Given a 2-D tracking data matrix W we can estimate corresponding non-rigid 3-D shape matrix and

  camera rotation and configuration weights for each time frame.

  Ambiguity ??? – no unique solution

About Paper

- This paper argues that though ambiguity in shape basis is inherent , 3-D shape can be recovered uniquely.

- Proposes a optimization solution for SFM factorization .

- No prior constraints about camera motion , non-rigid scenes , non-rigid shape bases

- The problem is to find gram matrix Q^k such that $Avec(Q^k) = 0$ and minimize $rank(Q^k)$ such that Q^k is positive semi-definite matrix.

- This is a SDP problem of small and fixed size and can be solved easily.

- Once Q^k is found then G^k and then rotation and shape matrix are found using cholesky or other standard techniques.
- This method found to outperform other traditional methods in estimation errors.

THANK YOU