Computer Vision
and Geometry Lab

Computer Vision

Exercise Session 8 – Structure from Motion

Structure from Motion

- Arc3D **www.arc3d.be**
  - http://www.youtube.com/watch?v=0tzW8dm71ec
- Acute3D (123D Catch **www.123dapp.com/catch**)
  - http://www.youtube.com/watch?v=UwBd1RbKljk
- 2D3 boujou
  - http://www.youtube.com/watch?v=qrszsSbStoQ
- etc...

Exercise 8

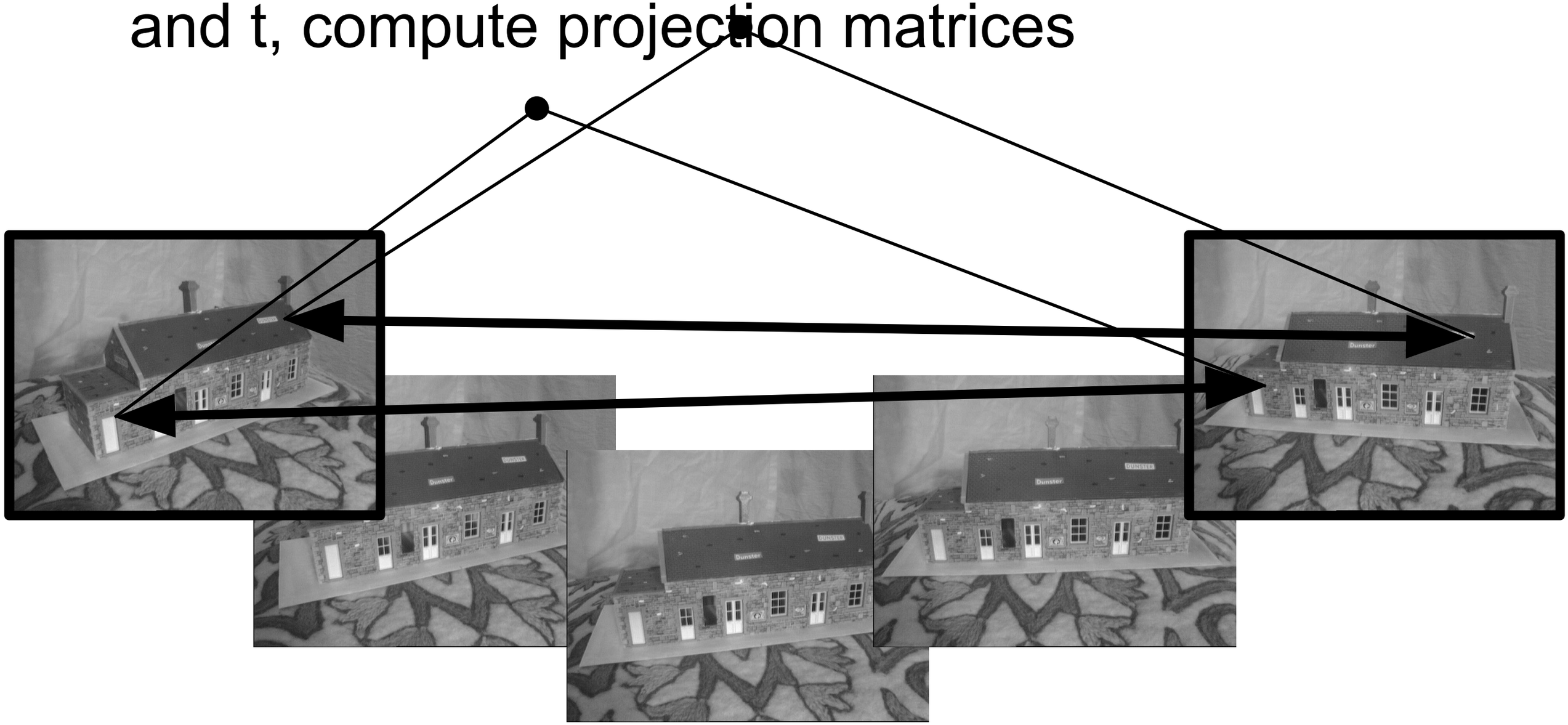
- 5 Images of a house on a turn table
- Background is static = at infinity

Exercise 8

- 4 Tasks:
  - Initialization with epipolar geometry
    - Do 8-point RANSAC and triangulate
  - Add more views
    - Do 6-point RANSAC and triangulate
  - Plot everything
  - Dense Reconstruction
    - Stereo matching and depth map plot

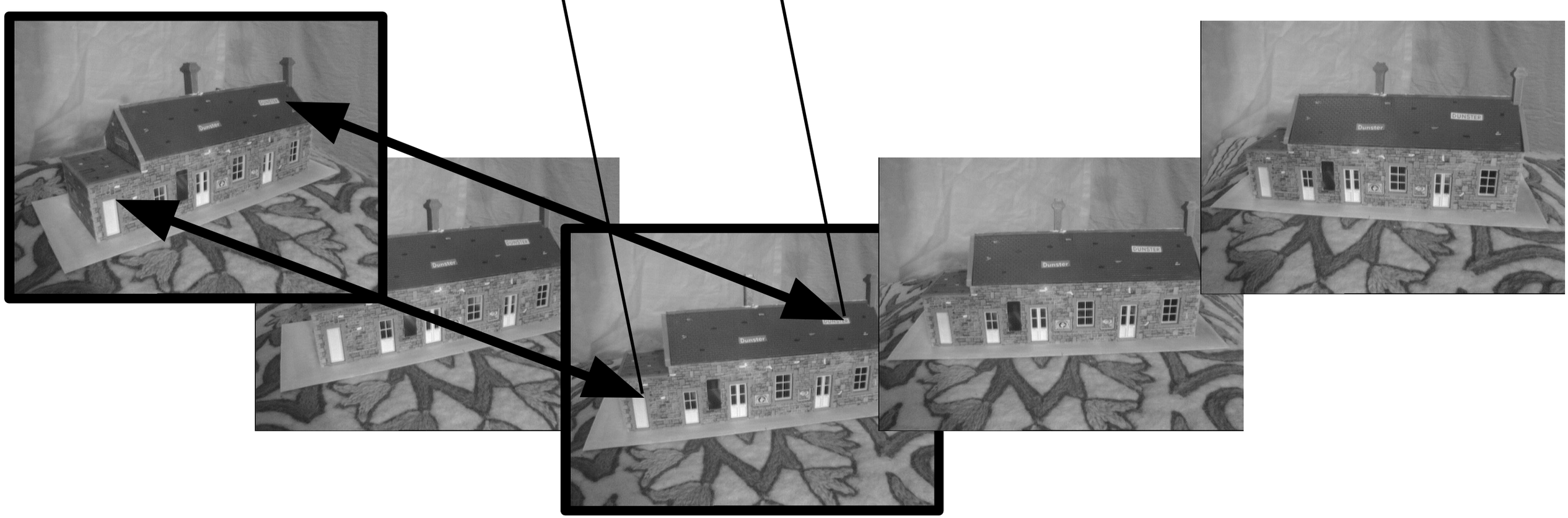
Initialization

- Compute essential matrix, decompose into R and t, compute projection matrices



Adding more views

- Feature matches define 3D-2D point correspondences



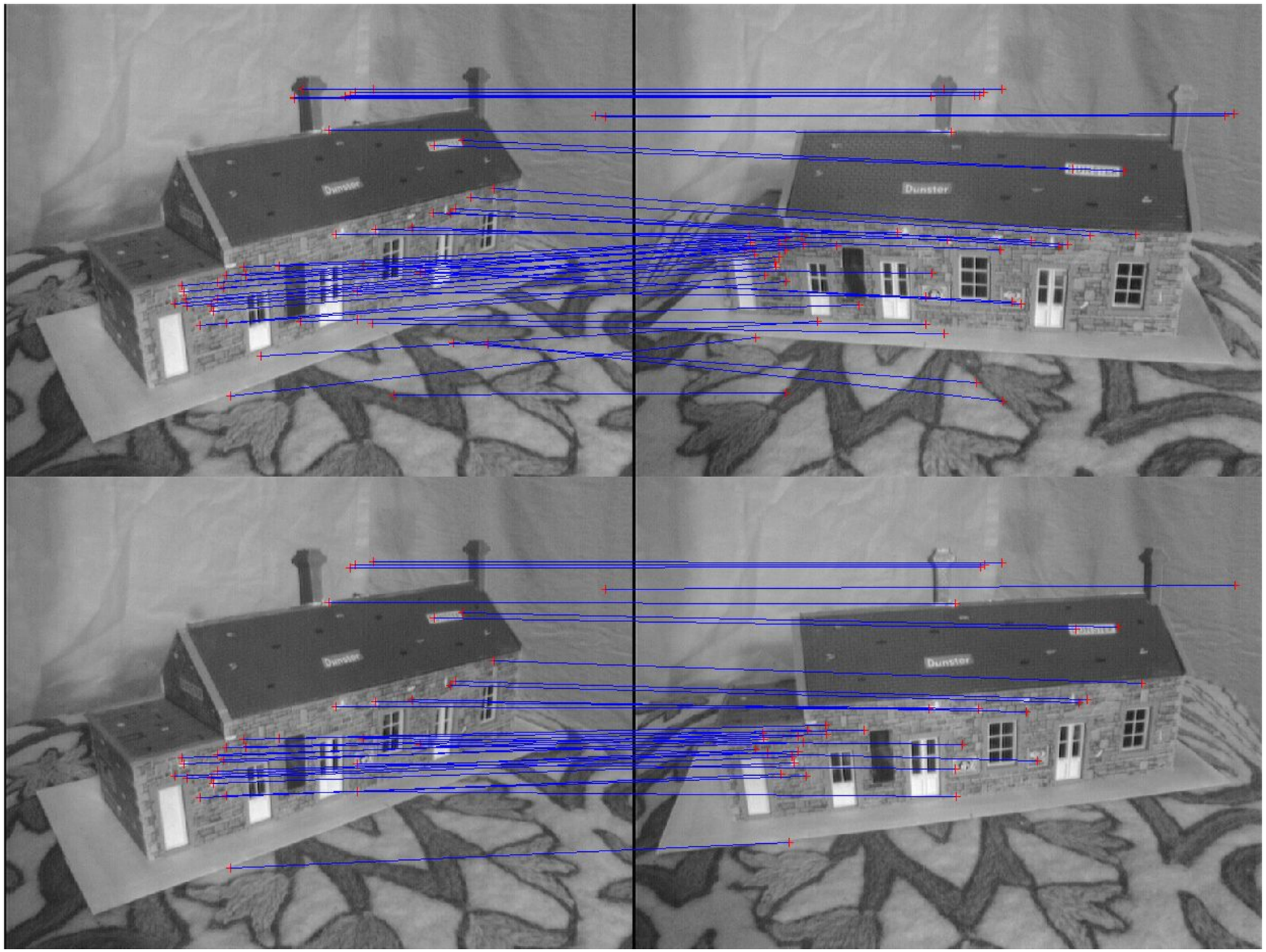
6-Point Algorithm

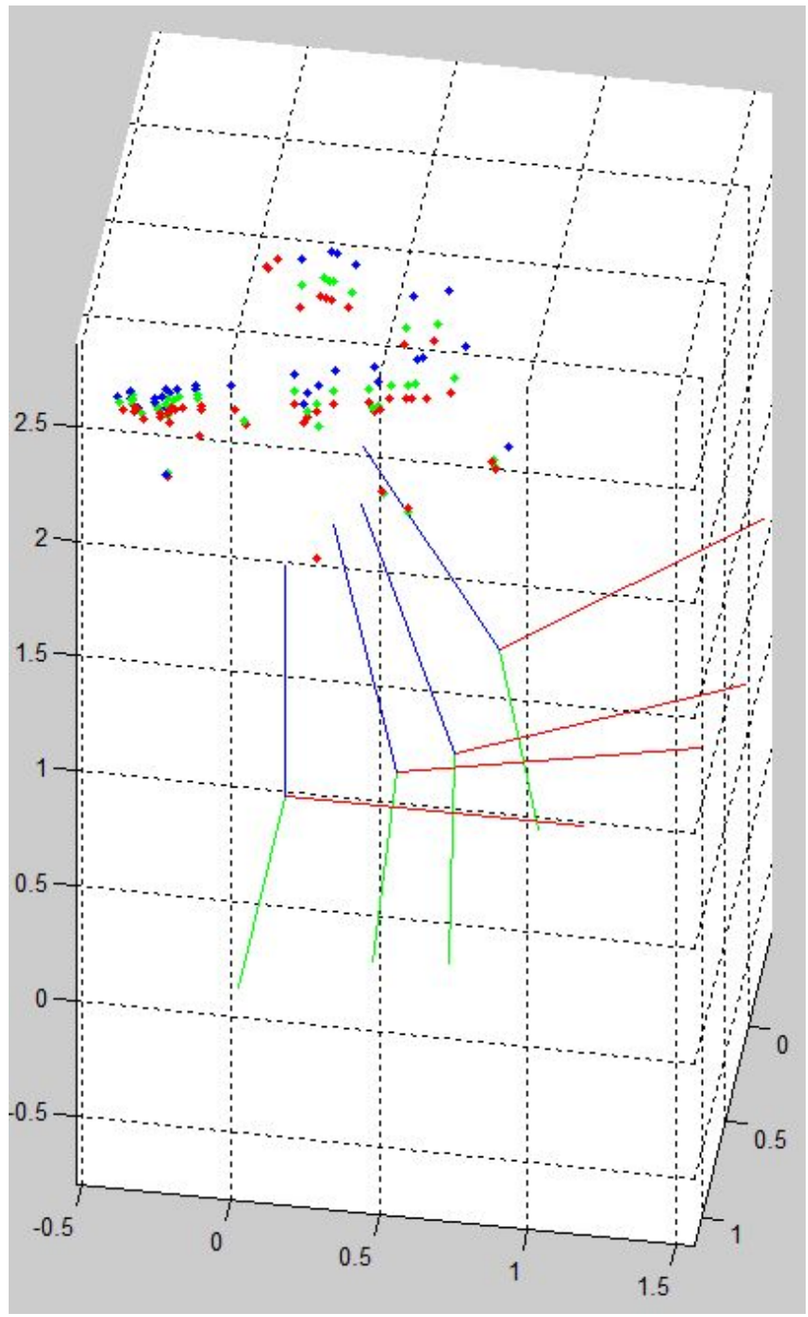
- The 6-point algorithm that was used for the camera calibration can be used to compute the projection matrix relative to the scene

- Do RANSAC to filter out wrong matches

- It does not work well on planar scenes – make sure you have 3D points distributed all around

Plotting

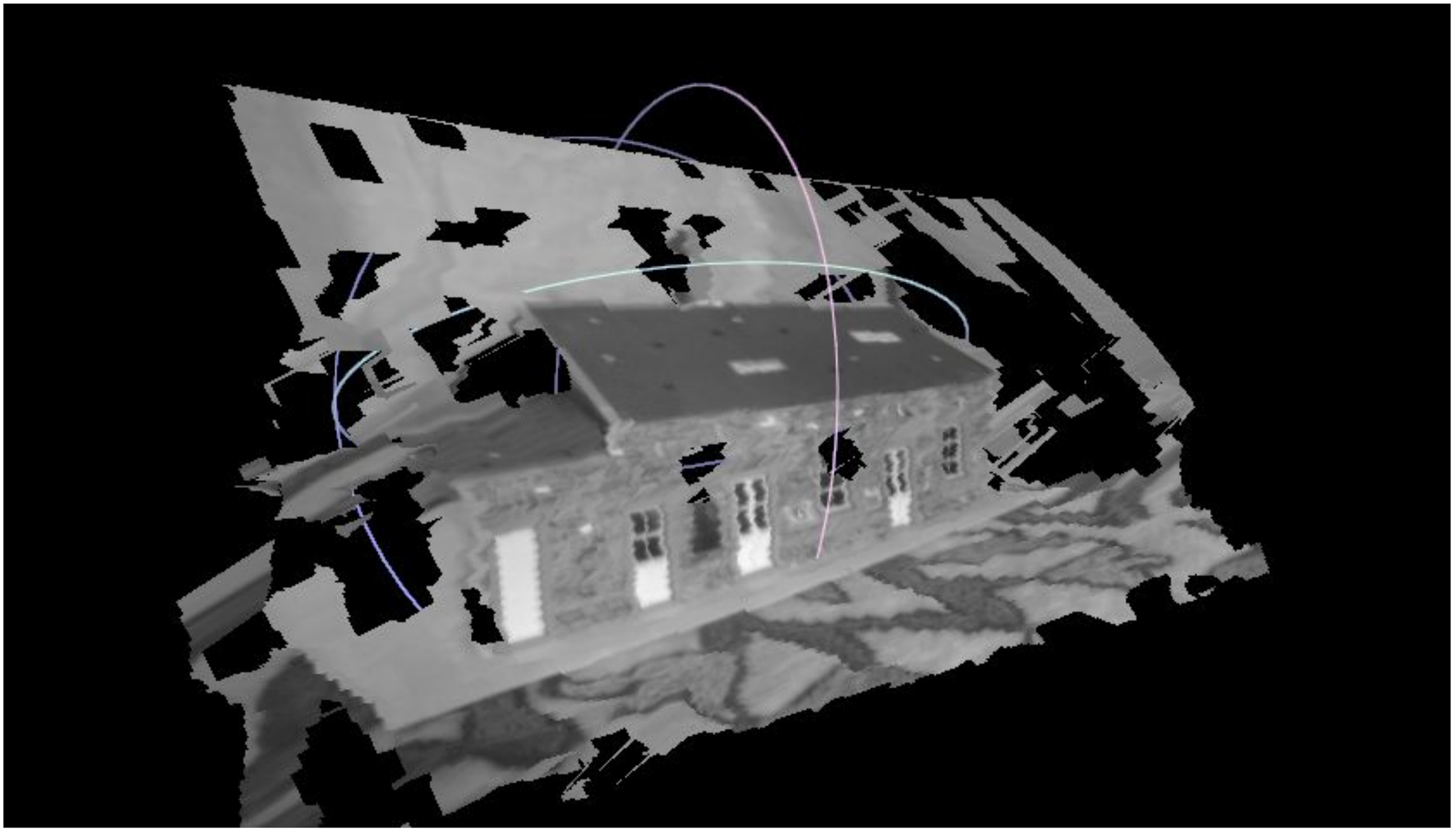




Hand-in

- Report should include:
  - Images with visualized inlier and outlier matches
  - Epipolar geometry of the initialization images
  - Sparse reconstruction with inlier 3D-points and cameras
- Source code

Bonus: Dense Reconstruction



Hand-in

By **1pm** on **Friday 1st December 2017**

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