

Computer Vision
and Geometry Lab



Computer Vision

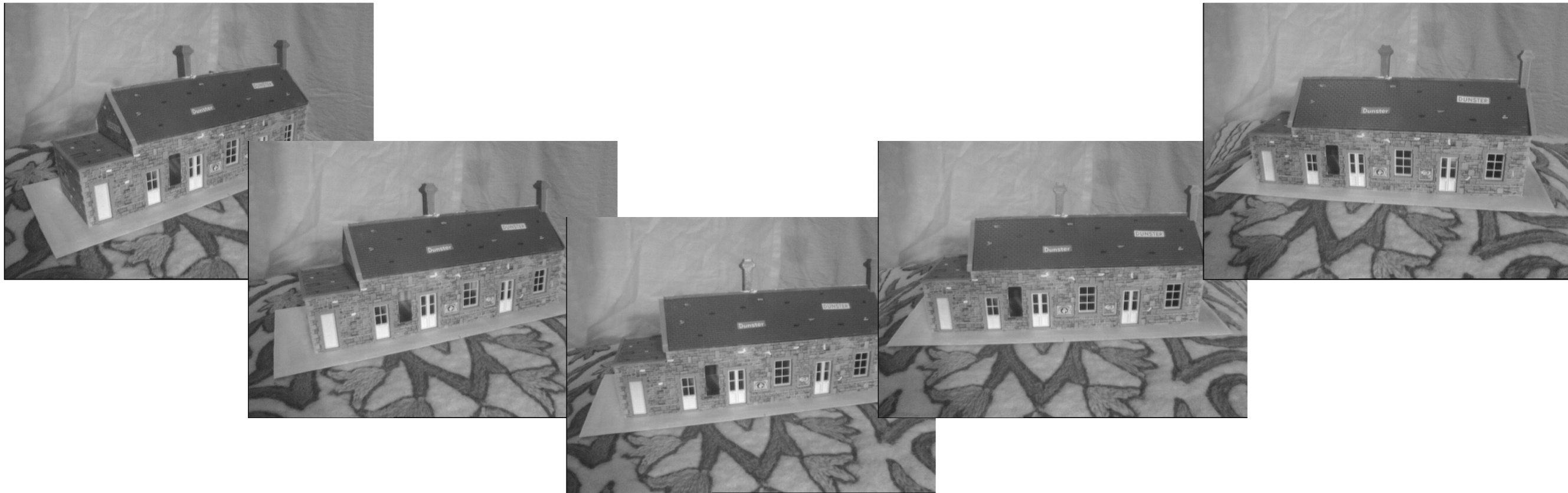
Exercise Session 9 – Structure from Motion

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 9

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

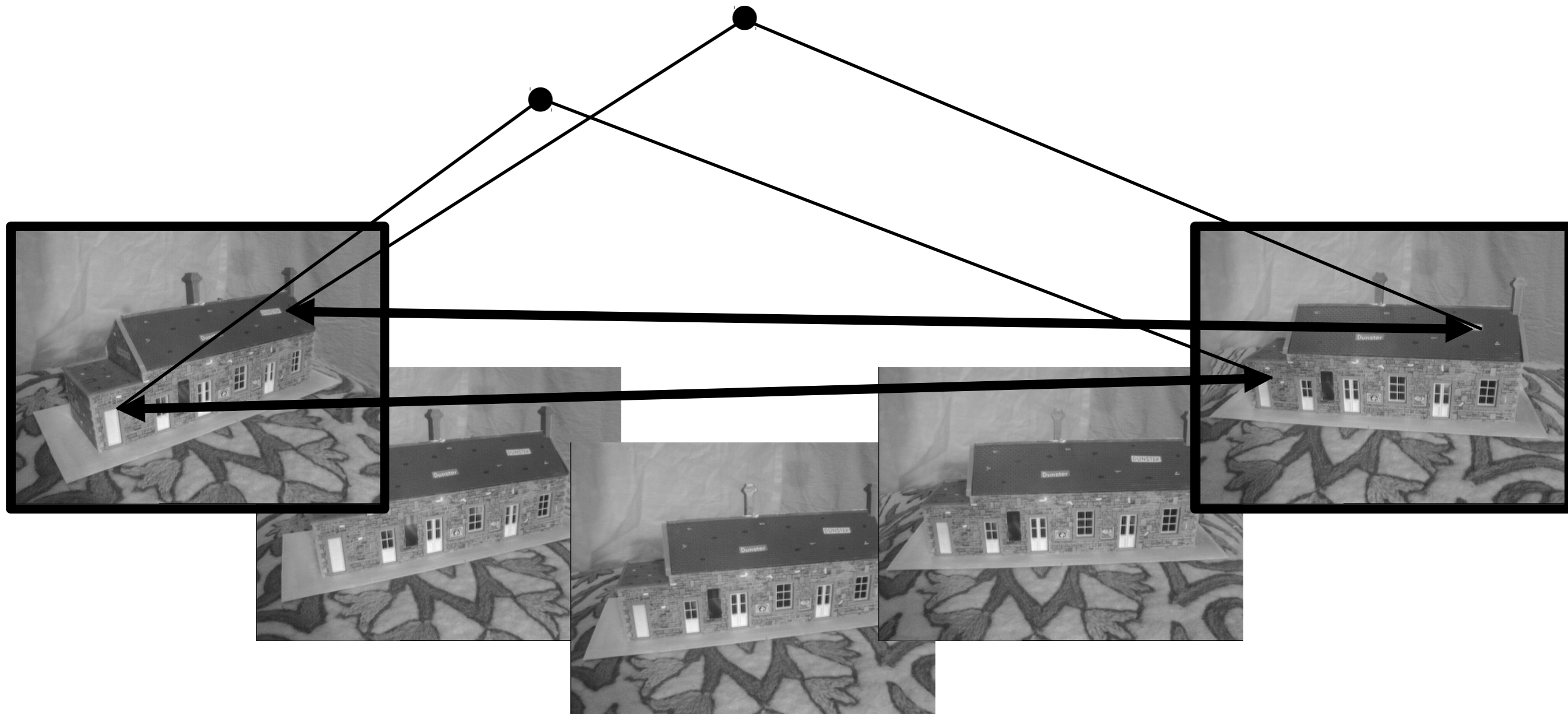


Exercise 9

- 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

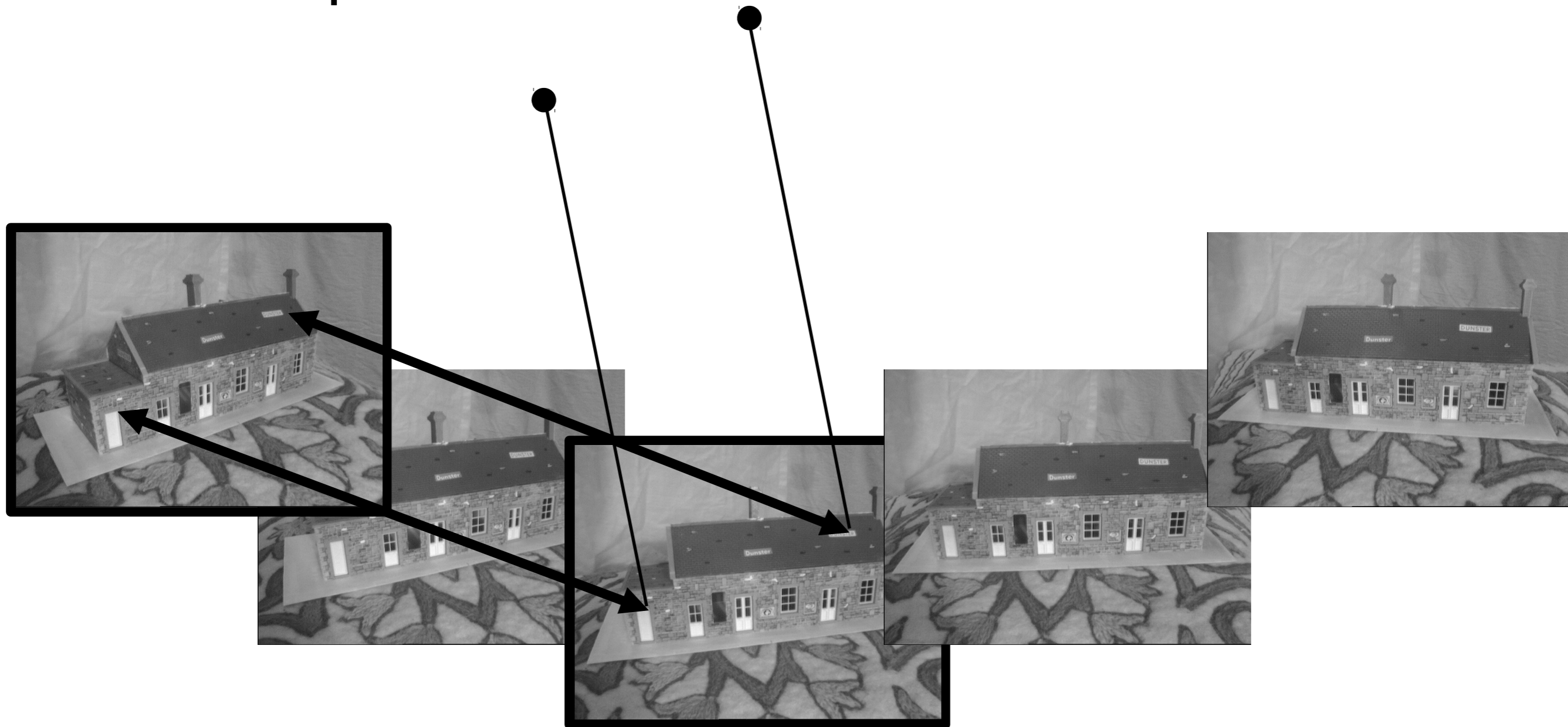
Initialization

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



Adding more views

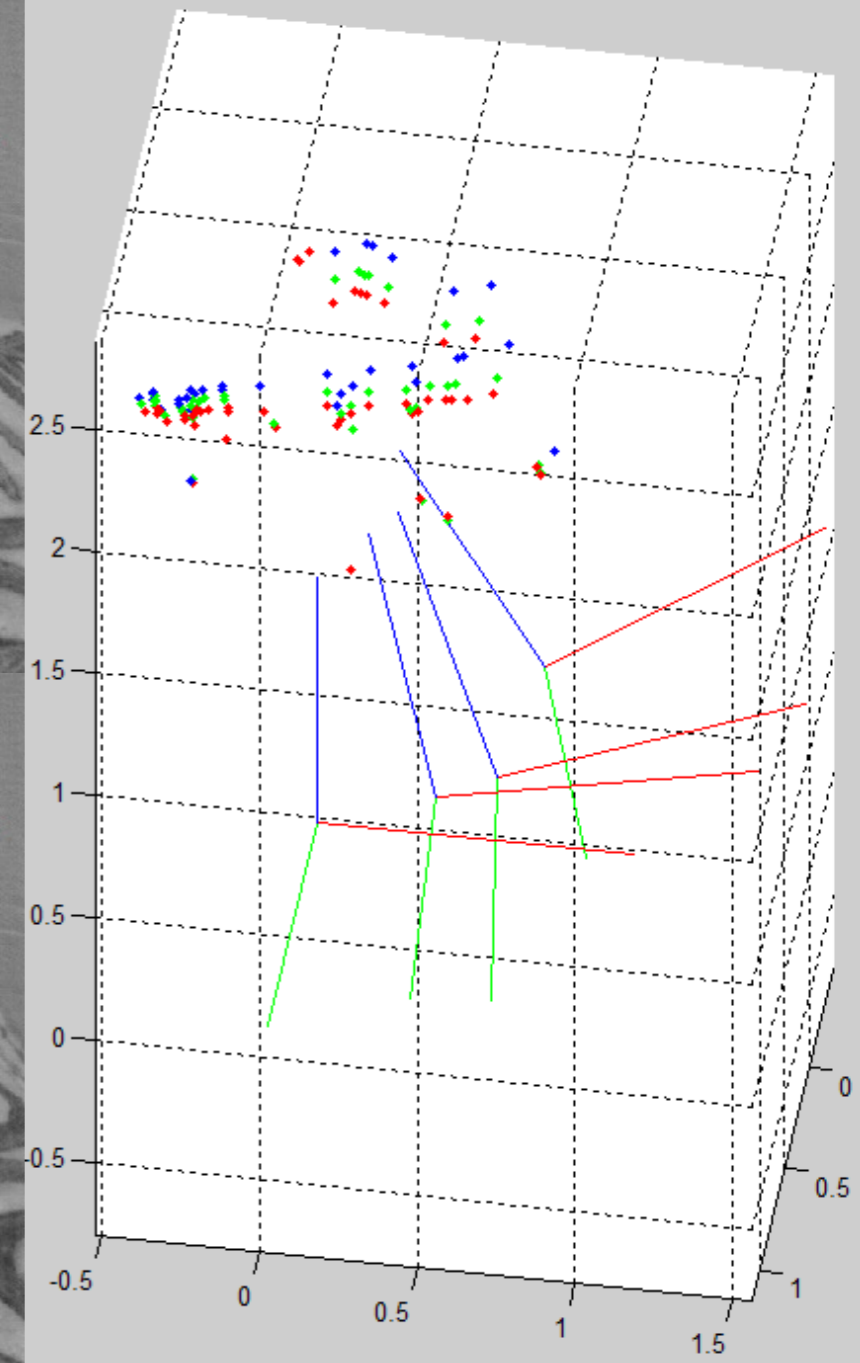
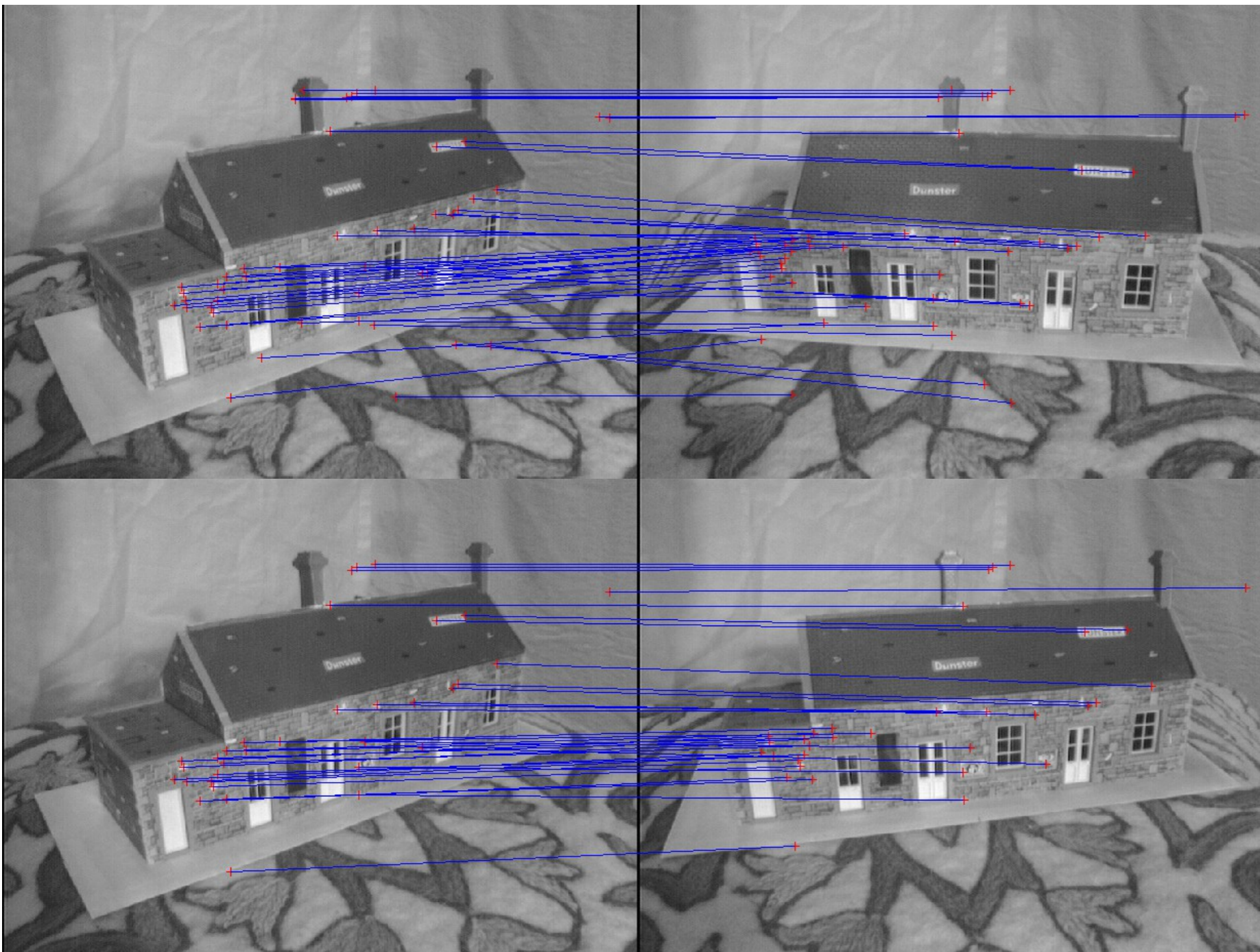
- Feature matches define 3D-2D point correspondences



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

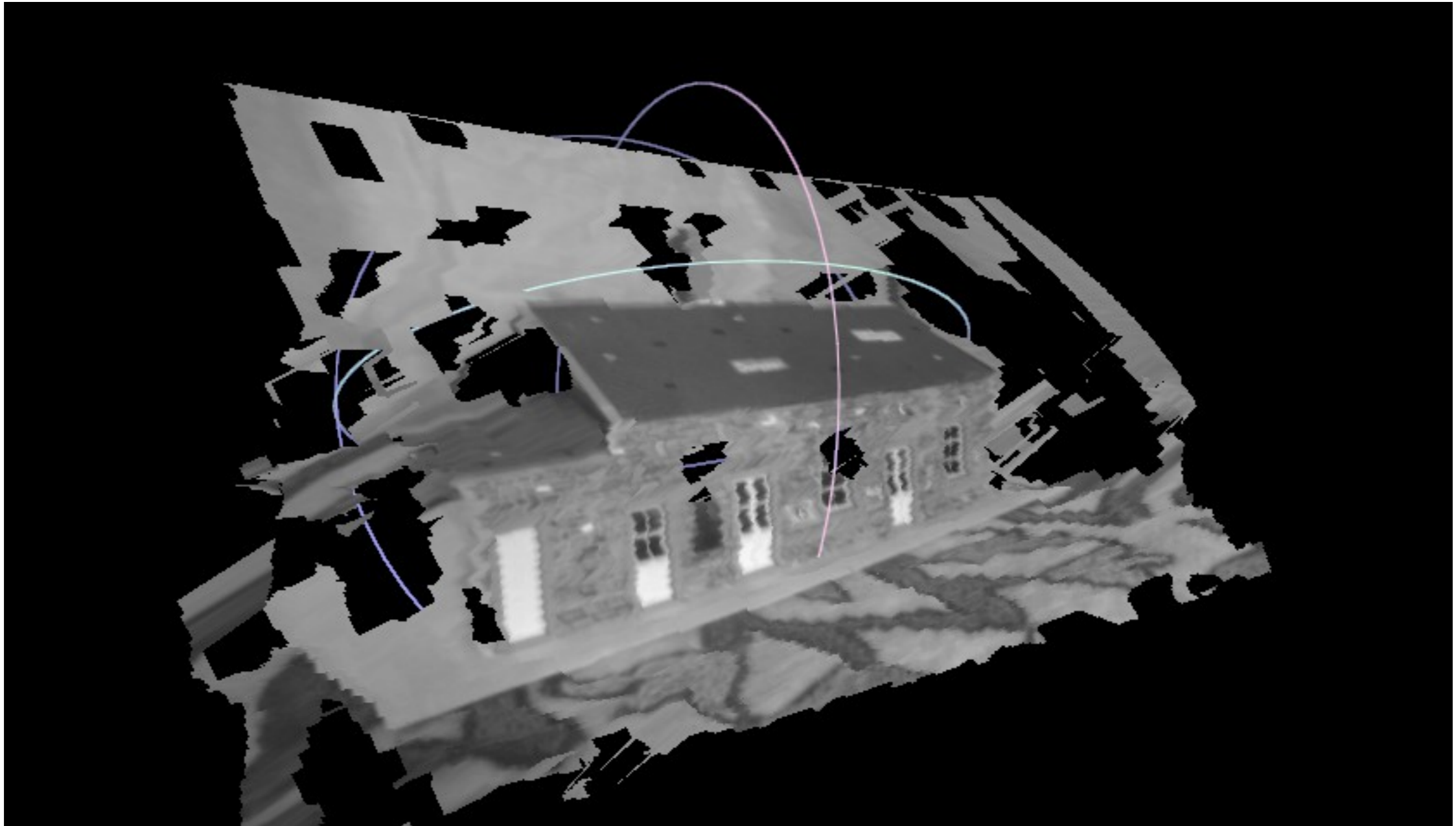
Plotting



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

Send to **yuhua.chen@vision.ee.ethz.ch**

By **1pm on Thursday 17th Dec 2015**