

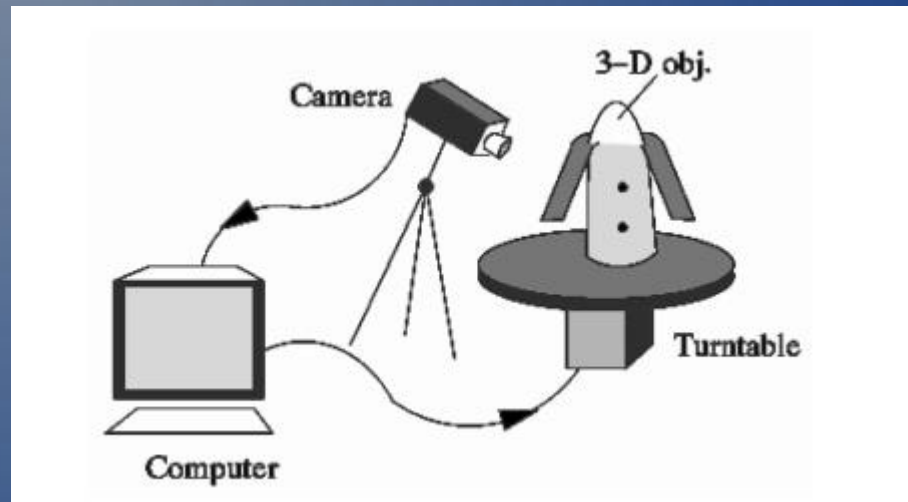
Turntable-Based 3D Object Reconstruction

By Vincent Fremont and Ryad Chellali

Structure from motion

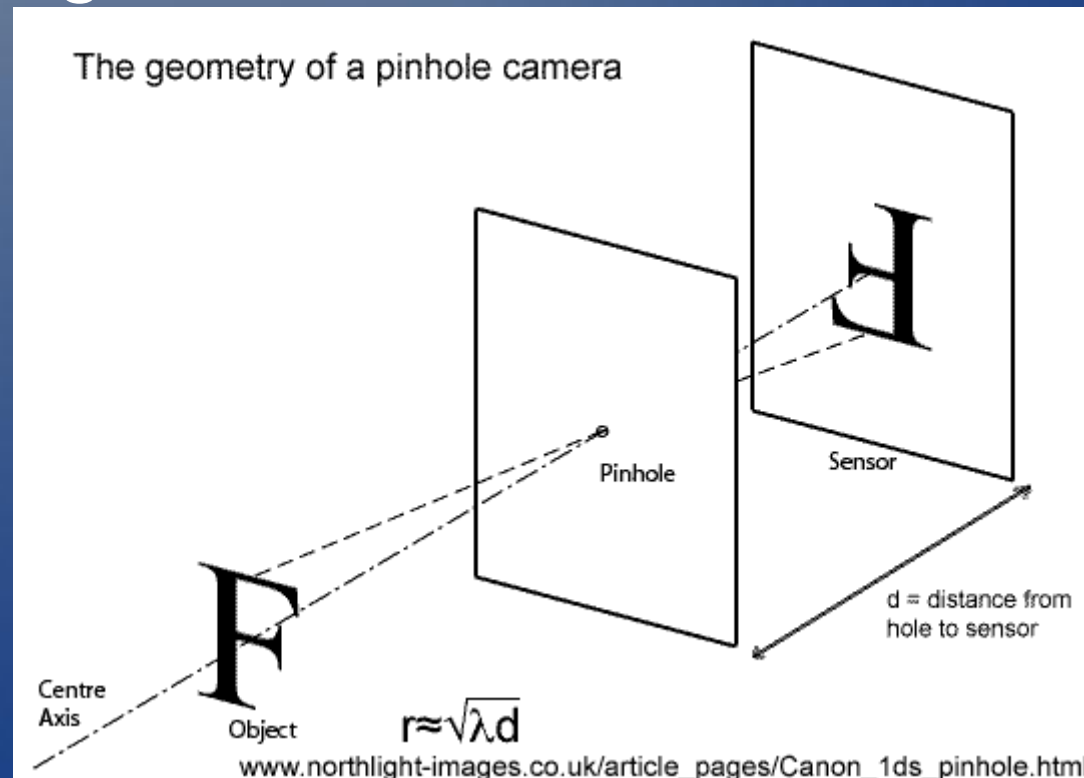
- Generating 3D structure from a series of images.
- Track motion of points from picture to picture
- Triangulate points in 3D

Overview



Camera model

- Pin-hole model
- Calibration matrix
- Focal length

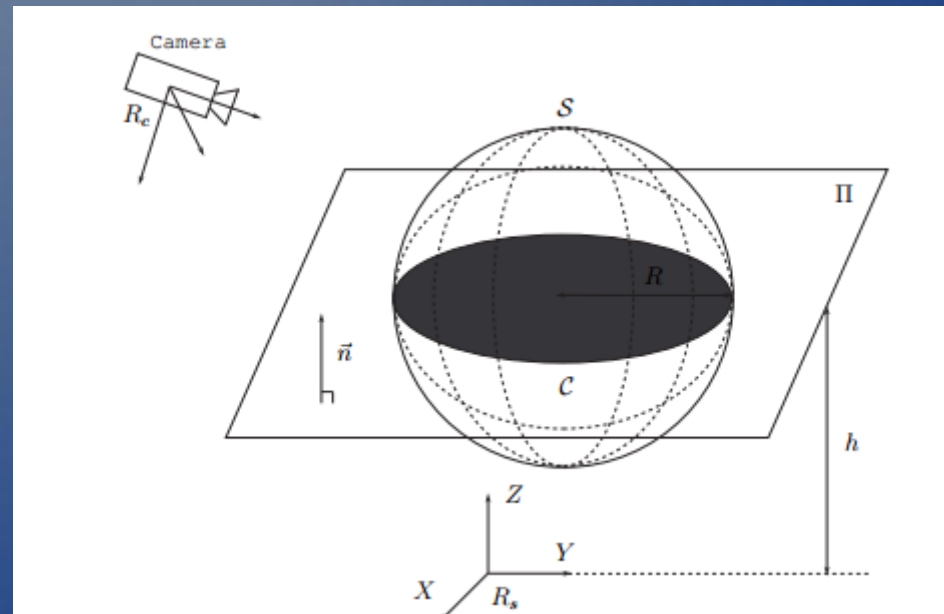


Points of interest



Projection

- 3D world coordinates map to 2D image
- 2D image is an ellipse



Estimation of h and R

- Due to occlusions, ellipse is not complete
- Estimate best fit



Triangulate

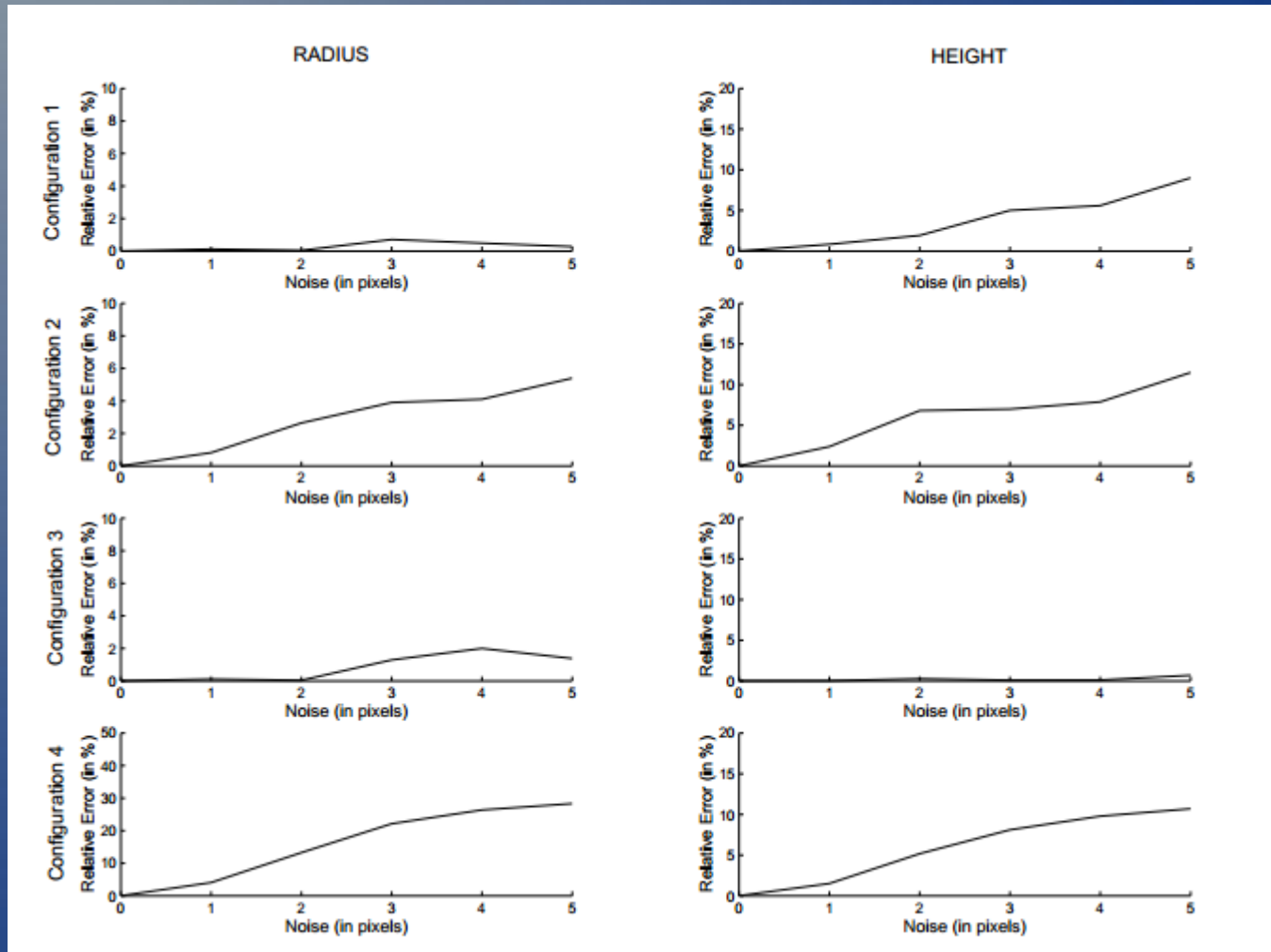
- Use estimated ellipse to calculate 3D points.
- Easier to do with projection matrix

Algorithm

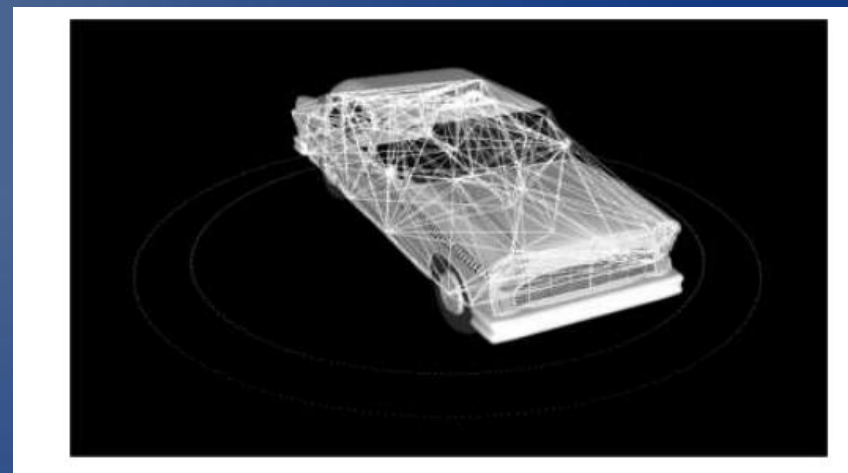
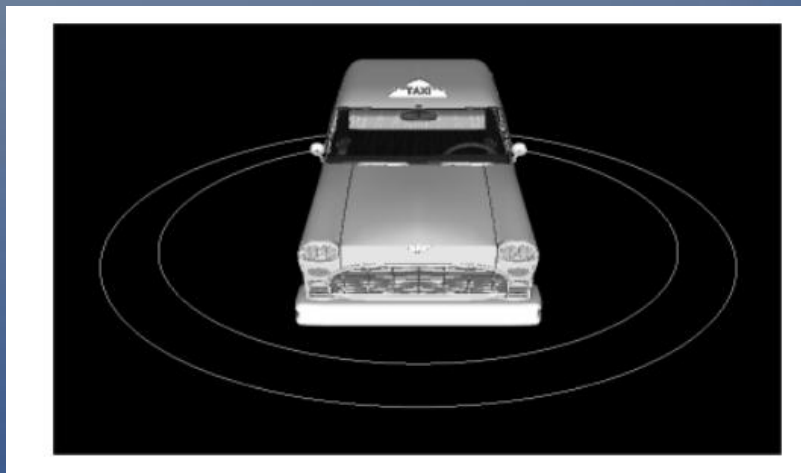
- Obtain camera calibration
- For each point:
 1. Estimate R and h
 2. Triangulate points in 3D
- Use points to create model



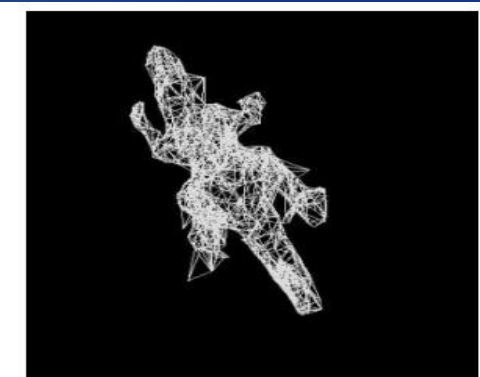
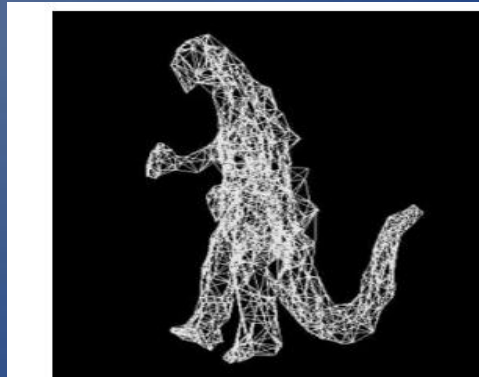
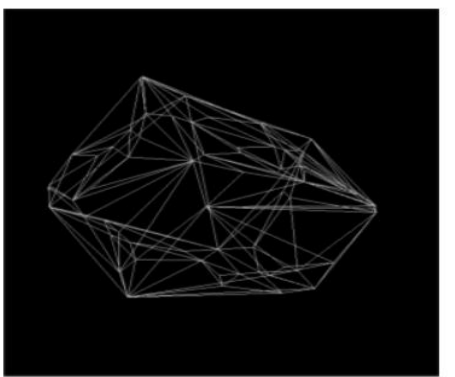
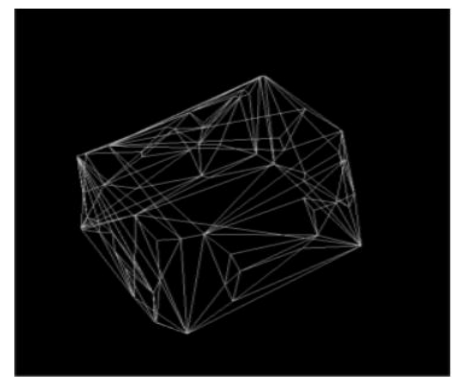
Noise robustness



Synthetic images



Real images



Summary

- Algorithm uses angles and images to recreate 3D model.
- Works better with little noise and many points to track