Turntable-Based 3D Object Reconstruction

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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.