

3D Reconstruction of Historic Landmarks from Flickr Pictures

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Problem statement:

Given name of a well known landmark, create a textured 3D model with as little human interaction as possible.

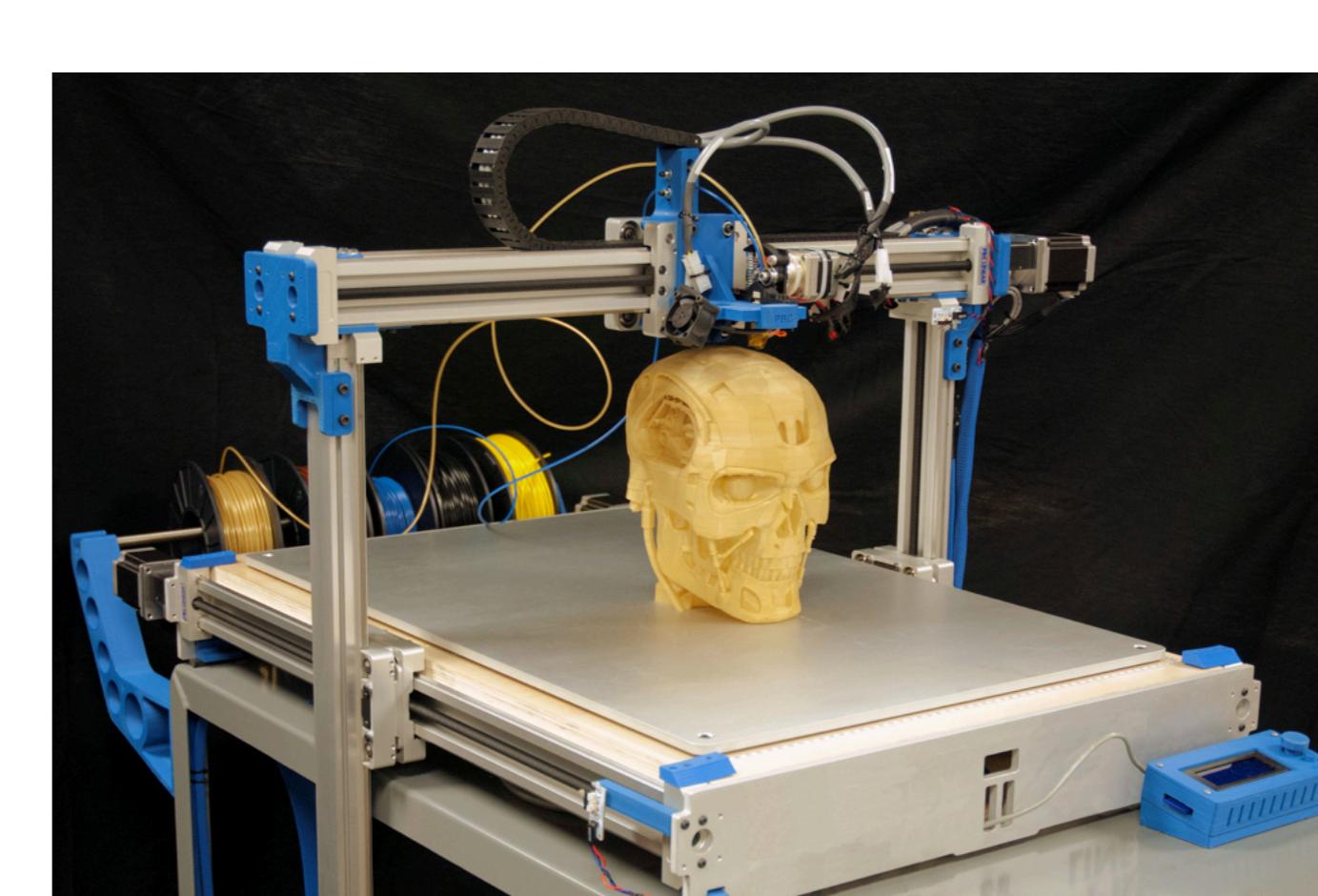
Motivation:



3D maps



Films/visualization



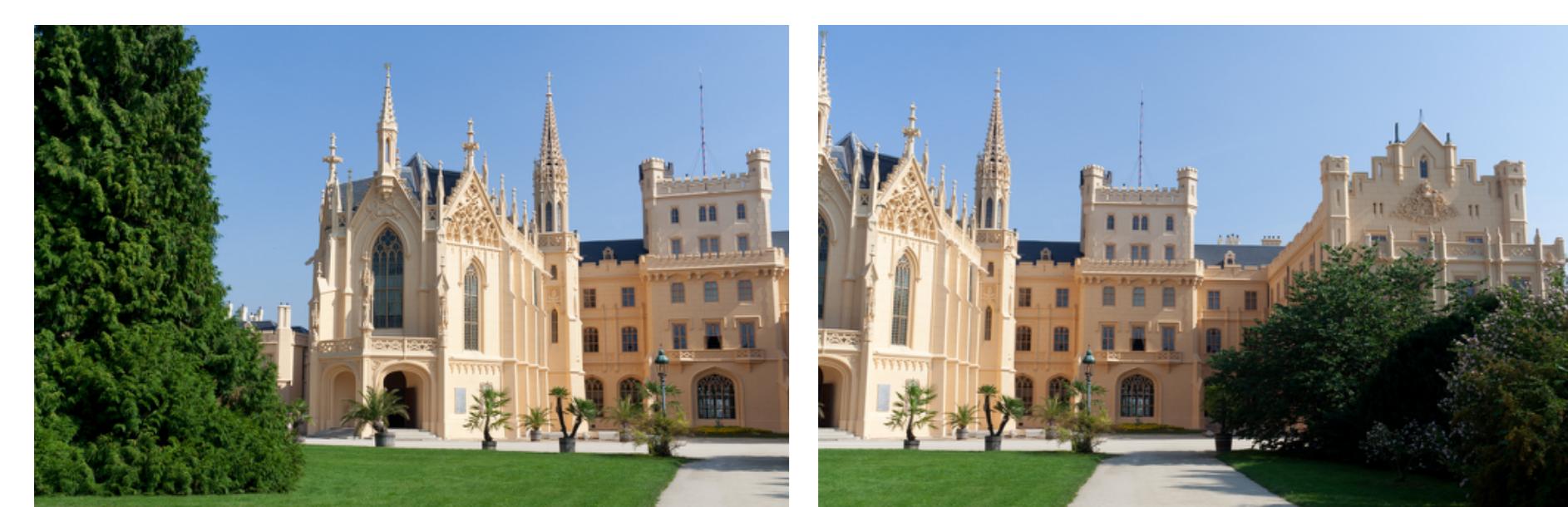
3D printing



City planning

The pipeline:

1. Dataset aquisition:



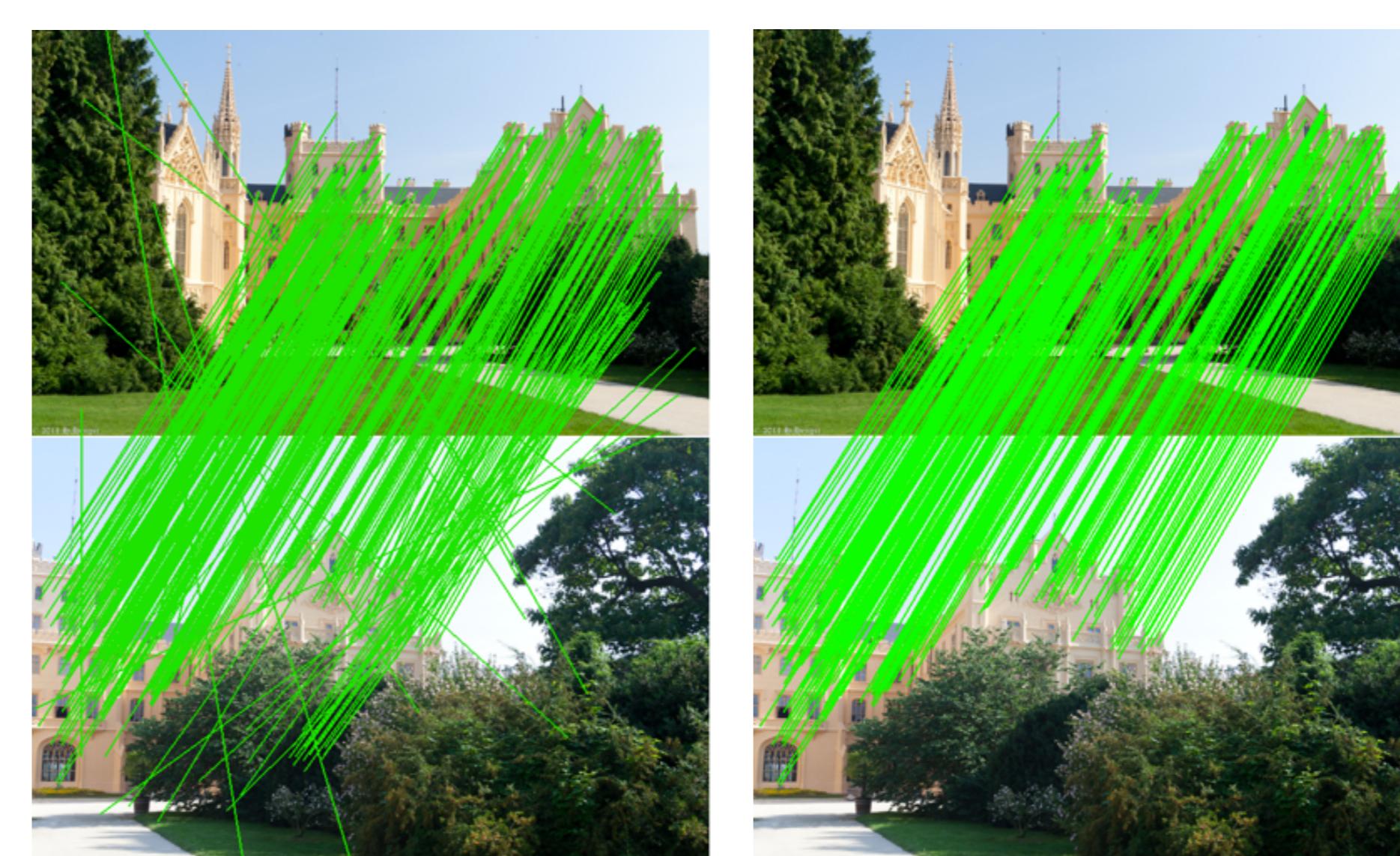
- Automatically from:
Flickr
Google Images
- Manually:
Custom datasets from local images

2. Keypoint detection:



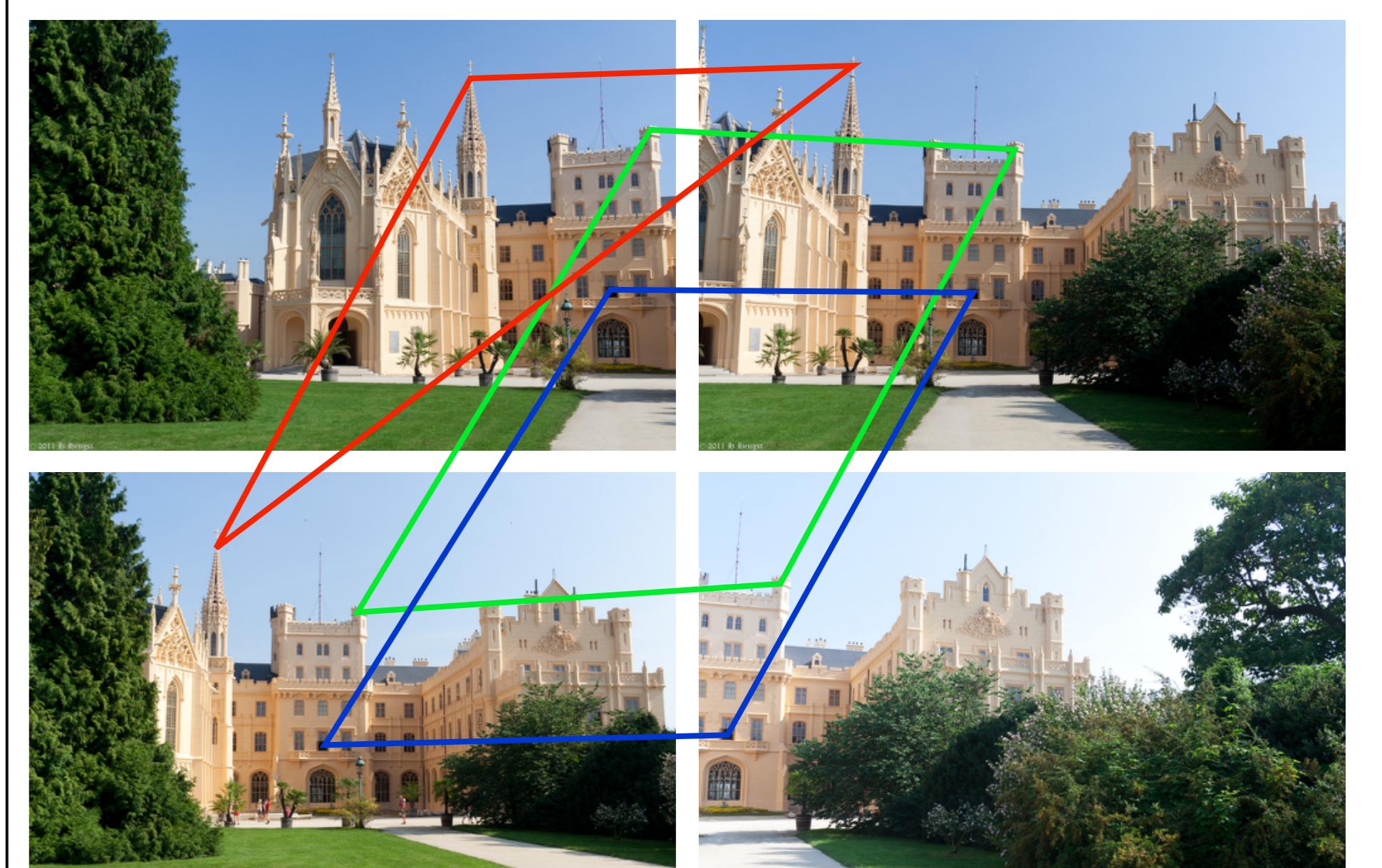
- Offers all widely used keypoint detectors
- Easily customizable

3. Matching:



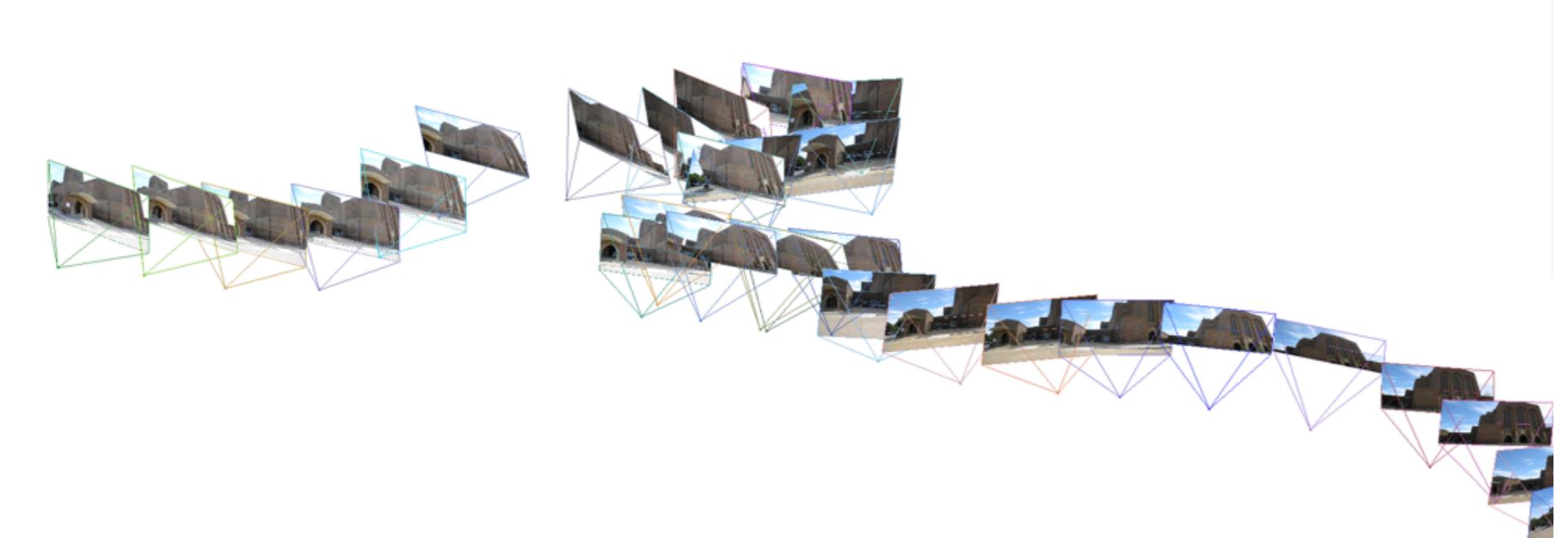
- Creates 2D keypoint correspondences
- Filters them using epipolar constrain

4. Building feature tracks:



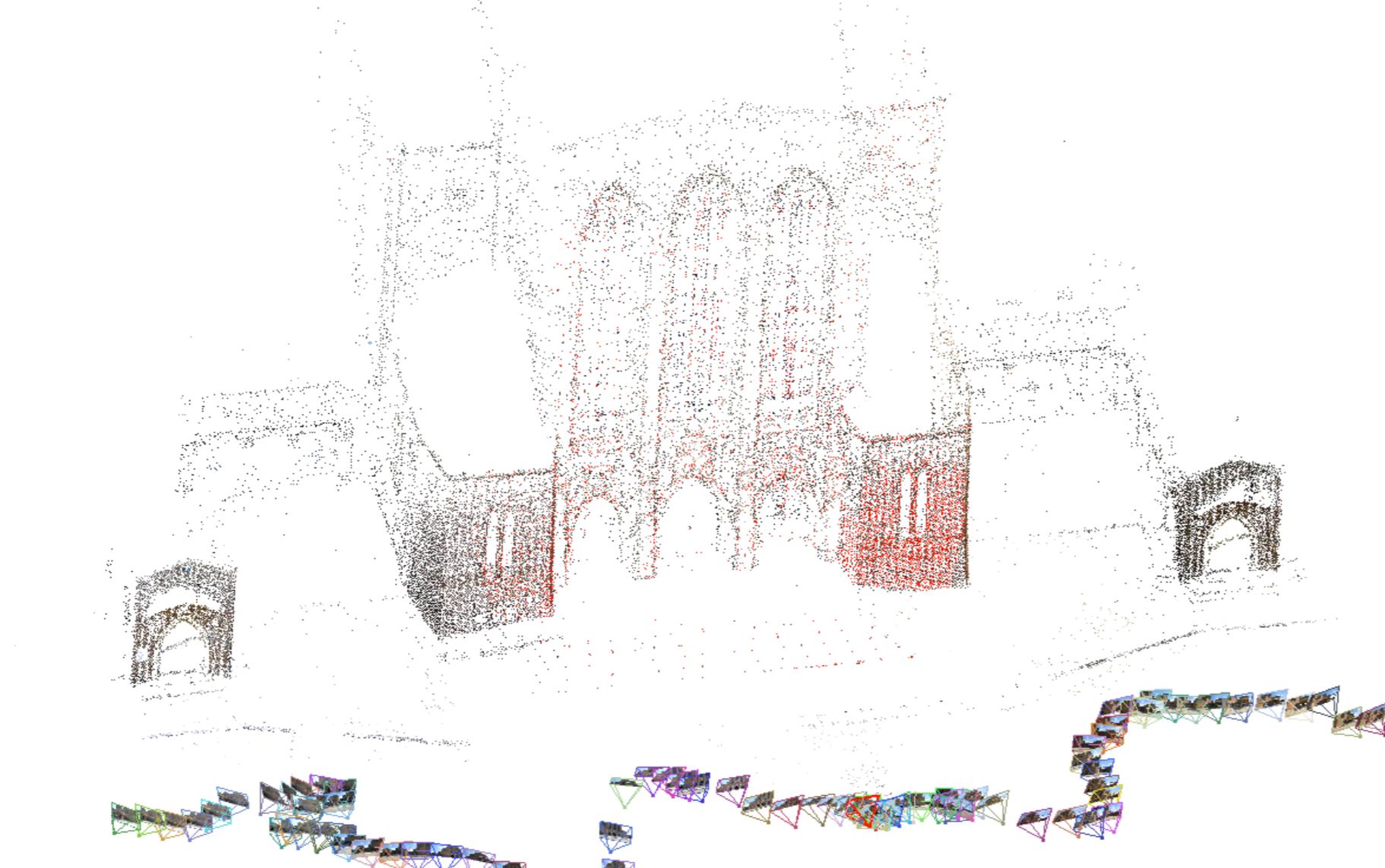
- Tracks feature visible in multiple images (same 3D point)

5. Camera pose estimation:



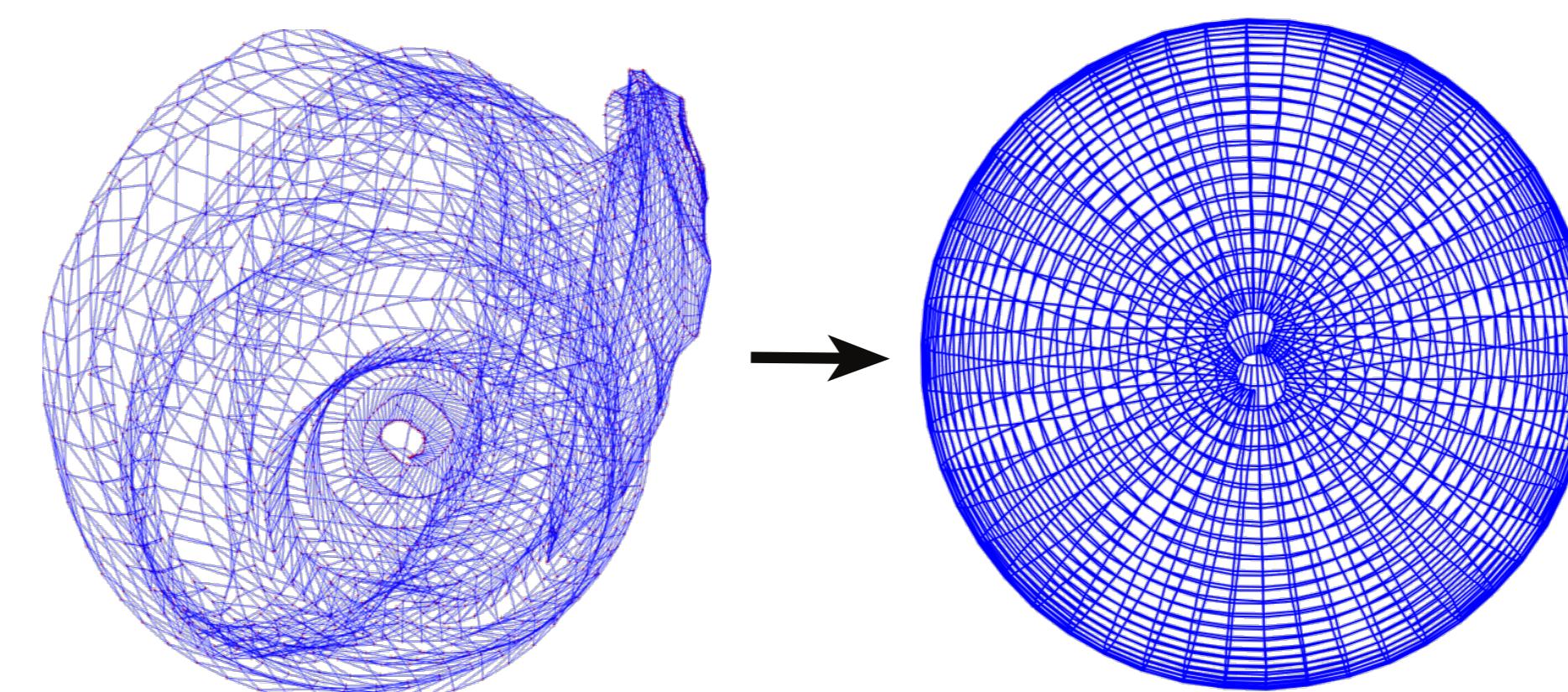
- Estimates camera position in 3D space from:
 - 2D-2D correspondences (initialization phase)
 - 2D-3D correspondences

6. Structure computation:



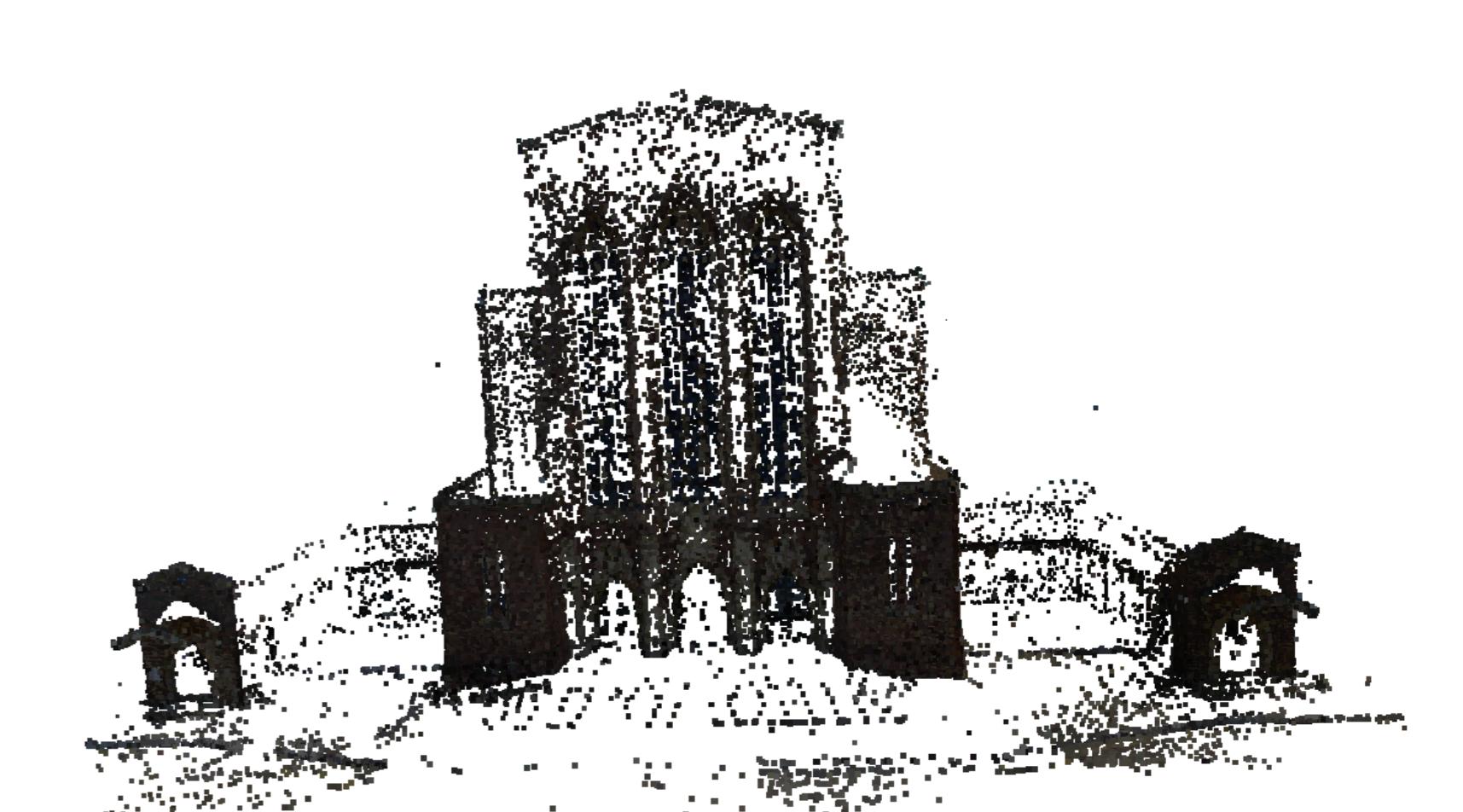
- Triangulates feature tracks to create sparse point cloud

7. Structure refinement



- Refines camera poses and structure using non linear least square solver
- Goal is to minimize reprojection error

8. Further processing:



- Not part of the solution:
 - Dense reconstruction
 - Surface reconstruction
 - Texturing/filtering

Output of the program:

