

Introduction to keypoint features

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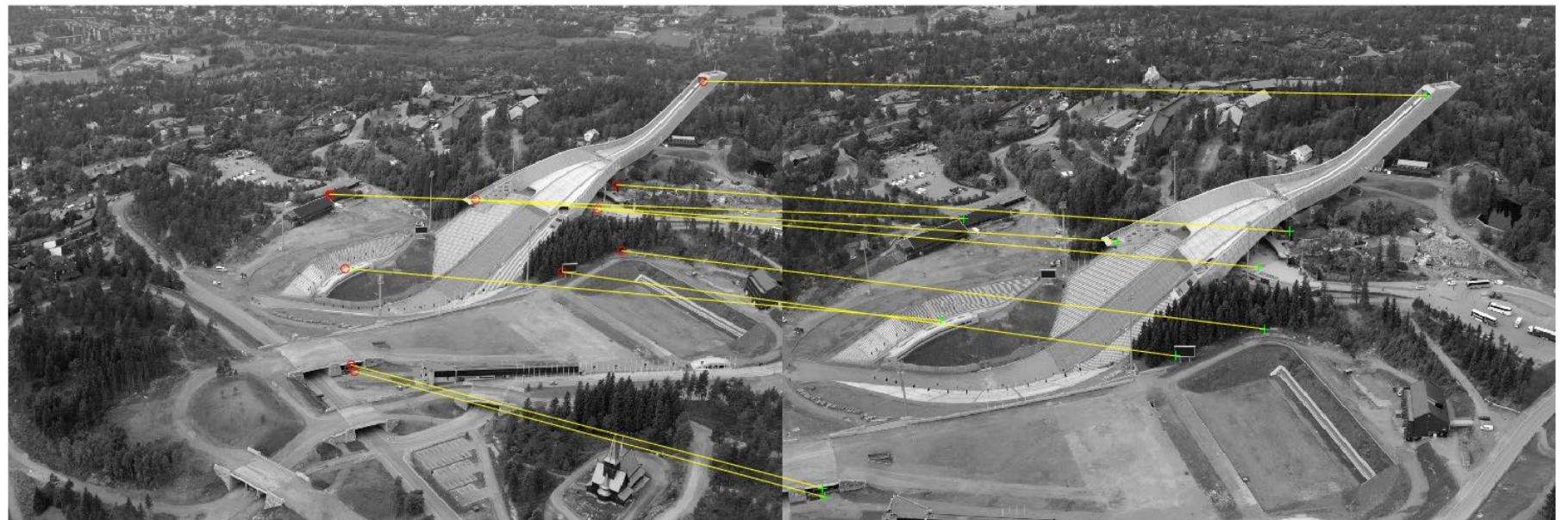
2023



What are *keypoint features*?

Specific locations in an image where we can reliably find *correspondences* with other images

- Interest points
- “Landmarks”
- “Corners”



What are *keypoint features*?

Specific locations in an image where we can reliably find *correspondences* with other images

- Interest points
- “Landmarks”
- “Corners”



Which locations are suited for finding correspondences?





TEK5030

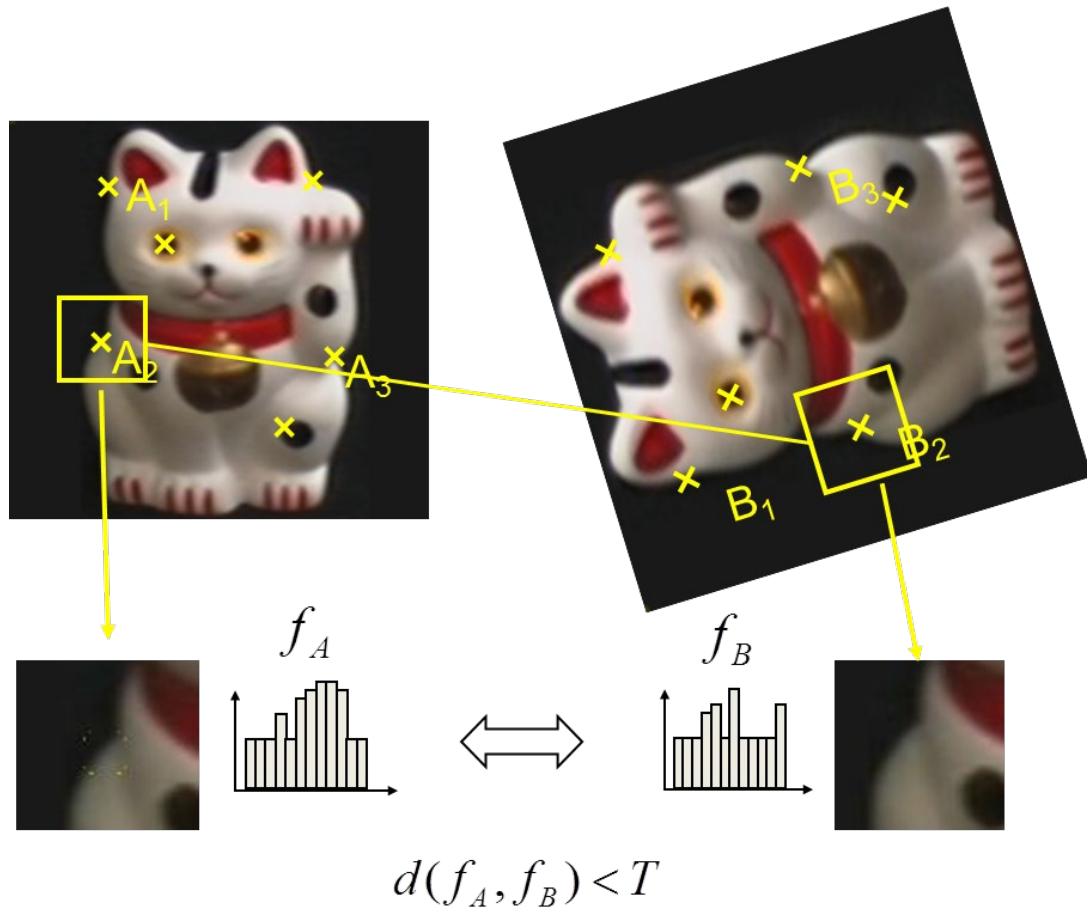


TEK5030



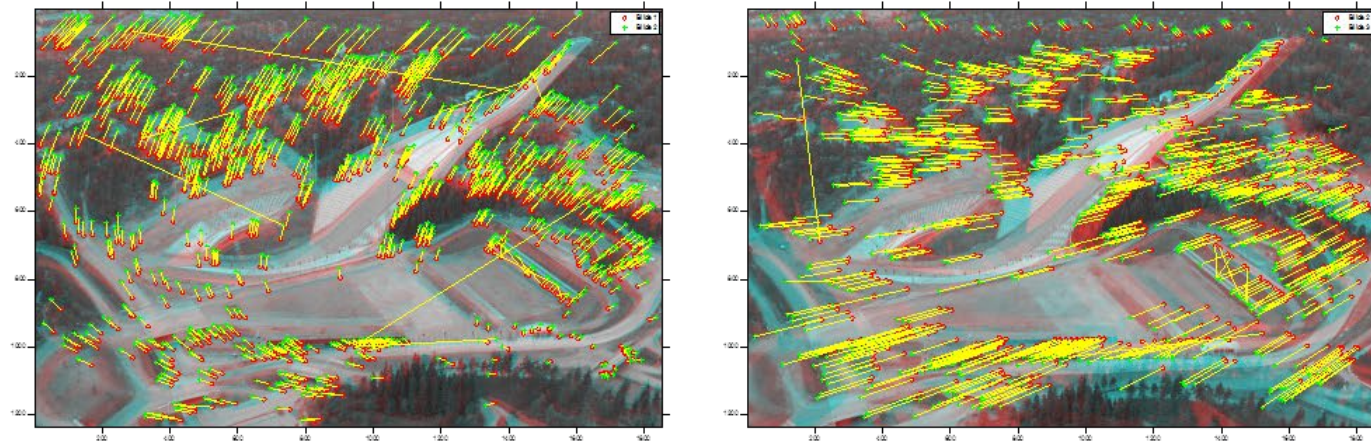
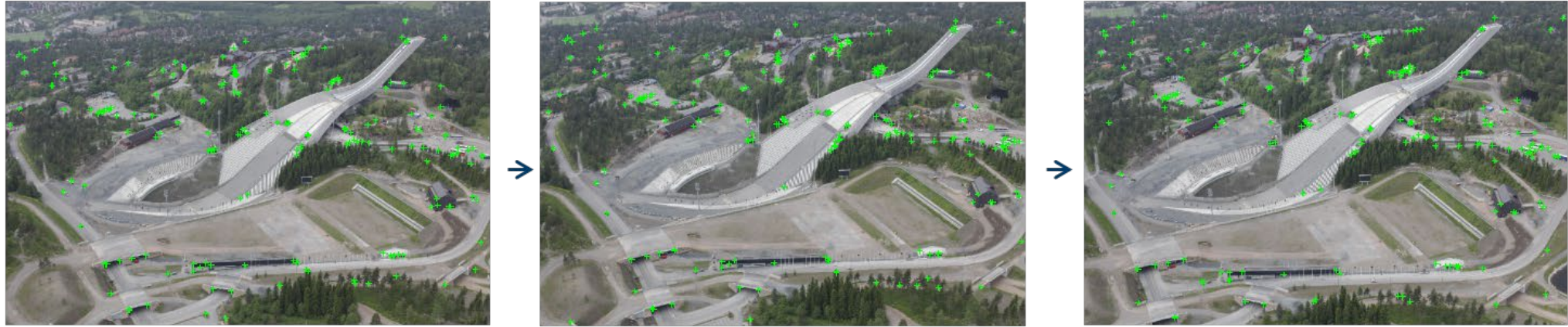
TEK5030

The feature correspondence matching process

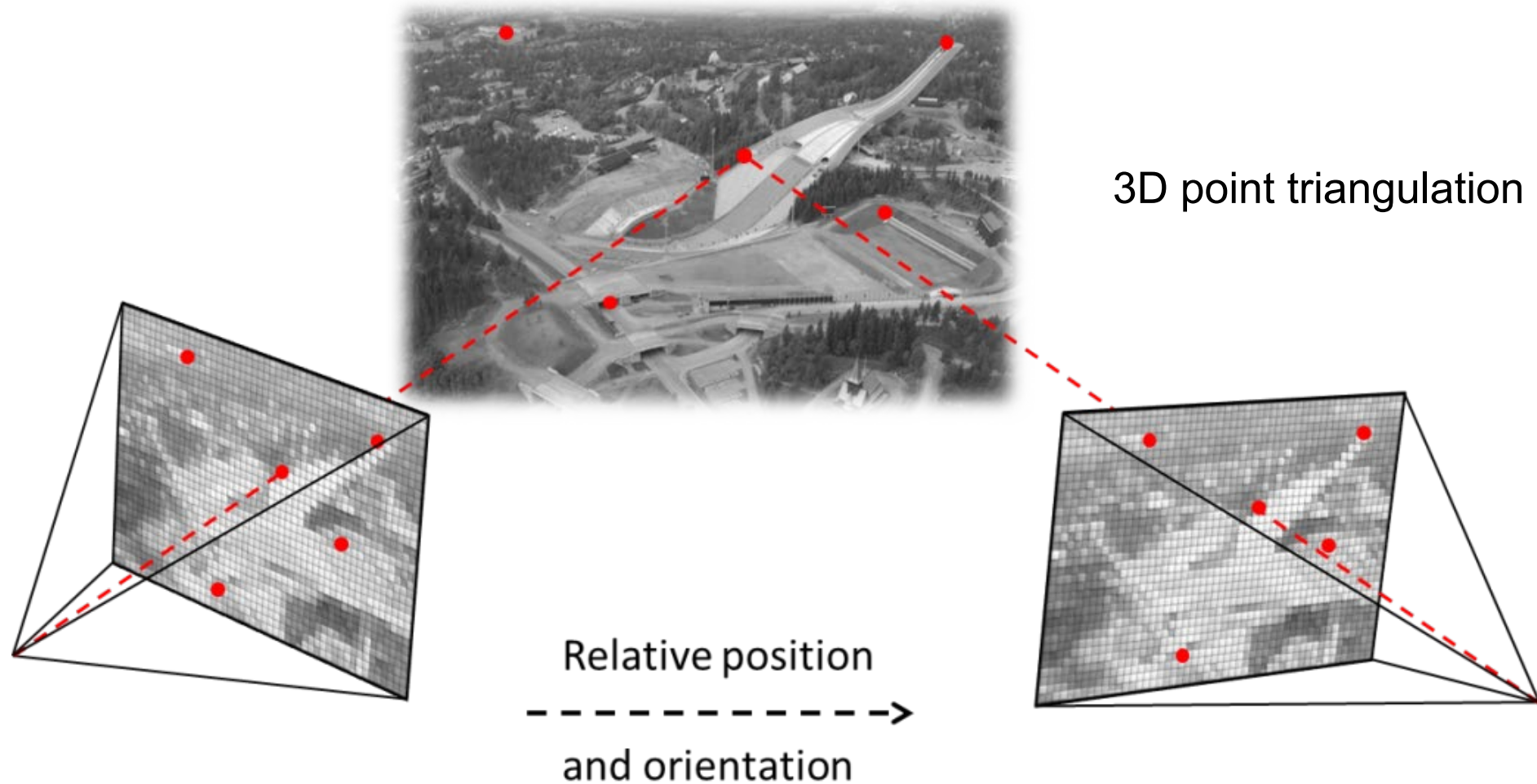


1. Detect a set of distinct feature points
2. Define a patch around each point
3. Extract and normalize the patch
4. Compute a local descriptor
5. Match local descriptors

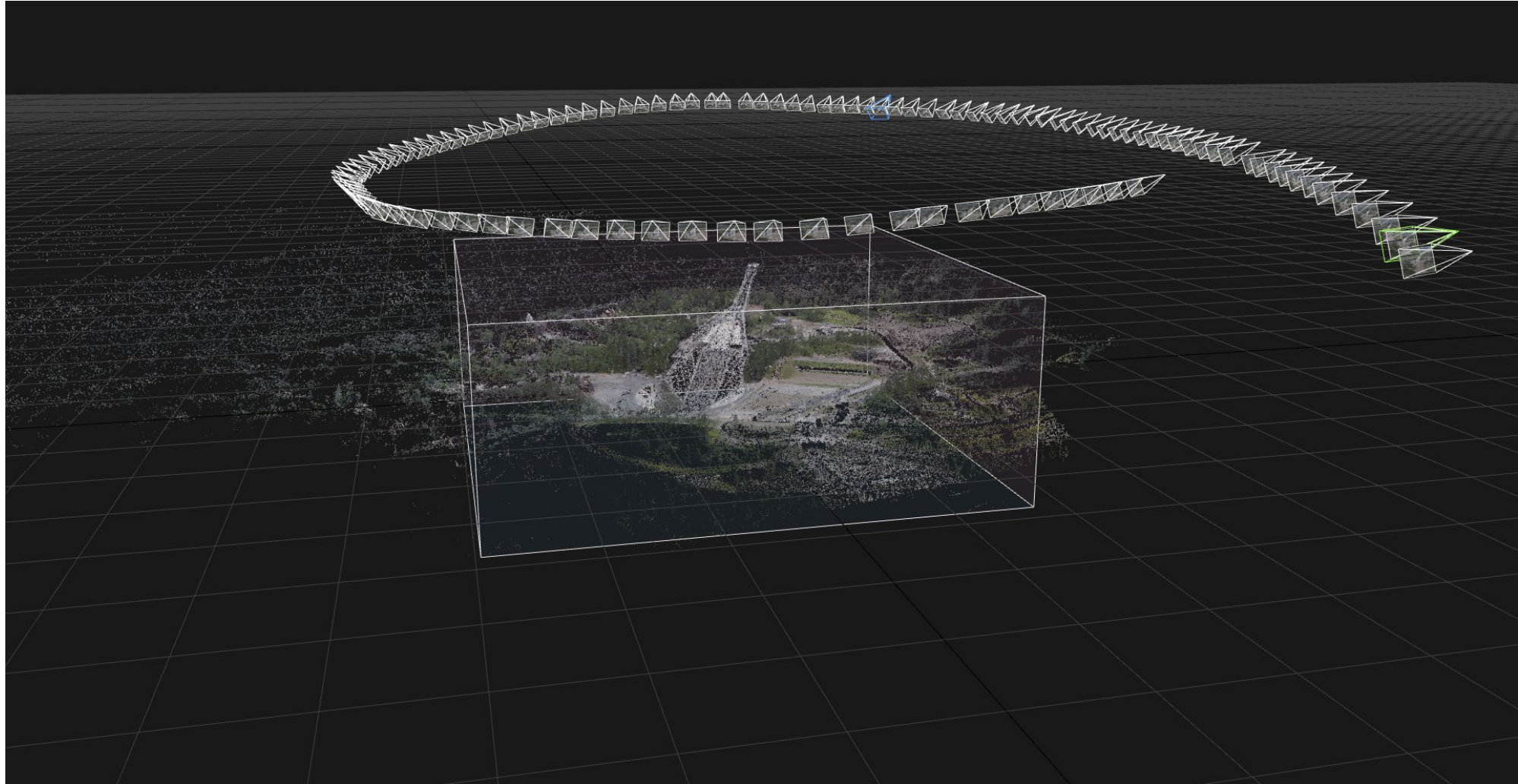
Feature correspondence matching



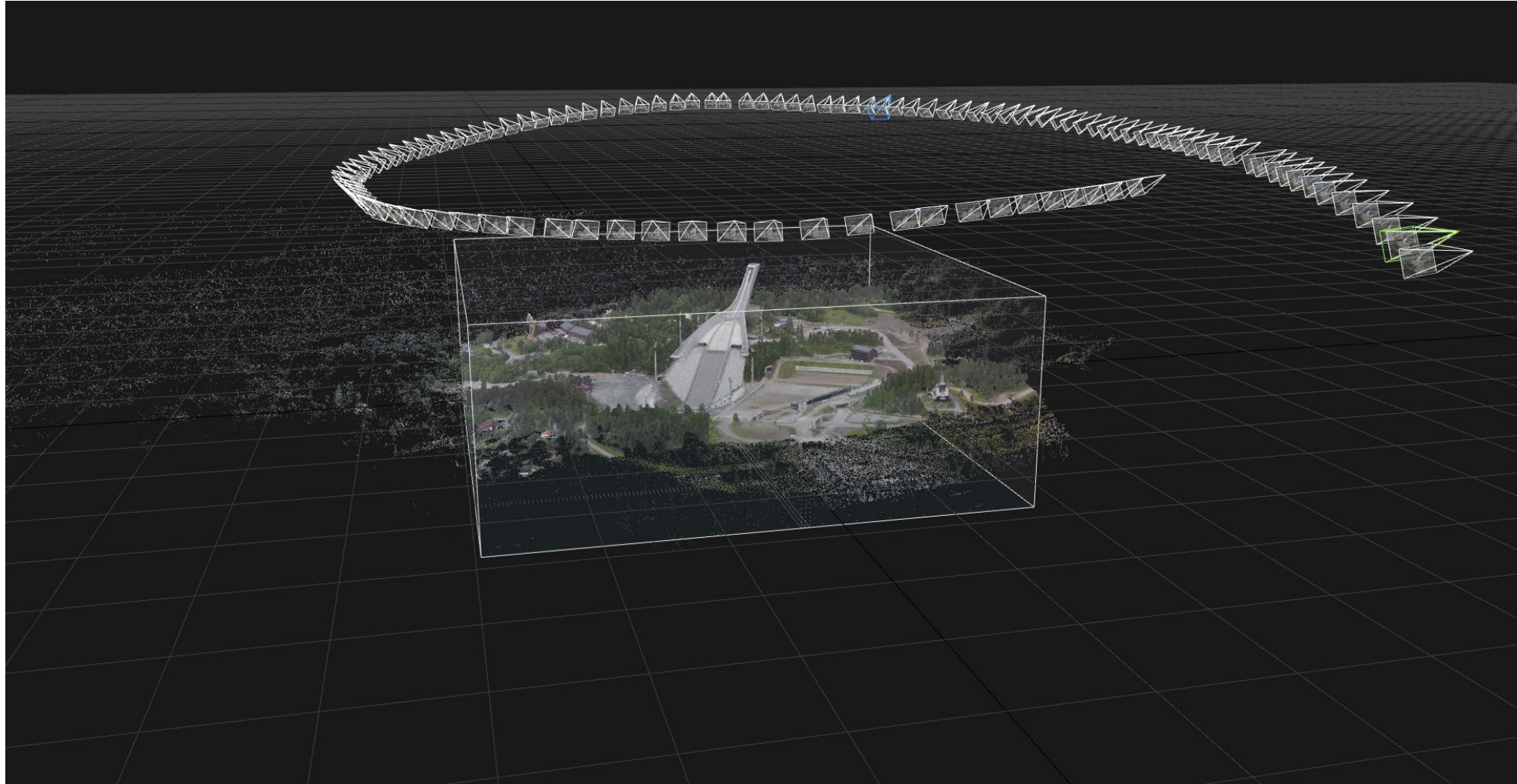
Extracting geometric information from images



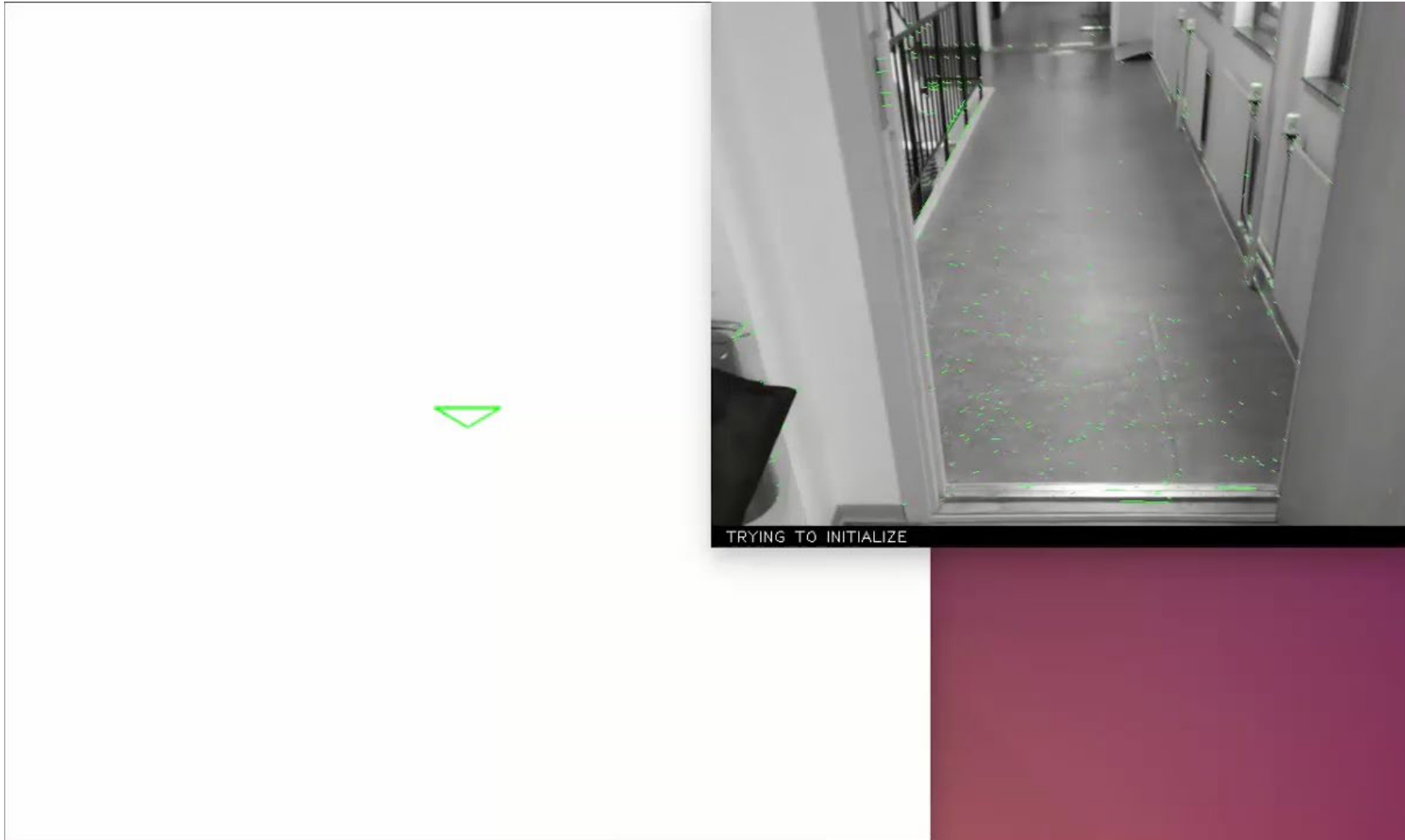
Structure from motion



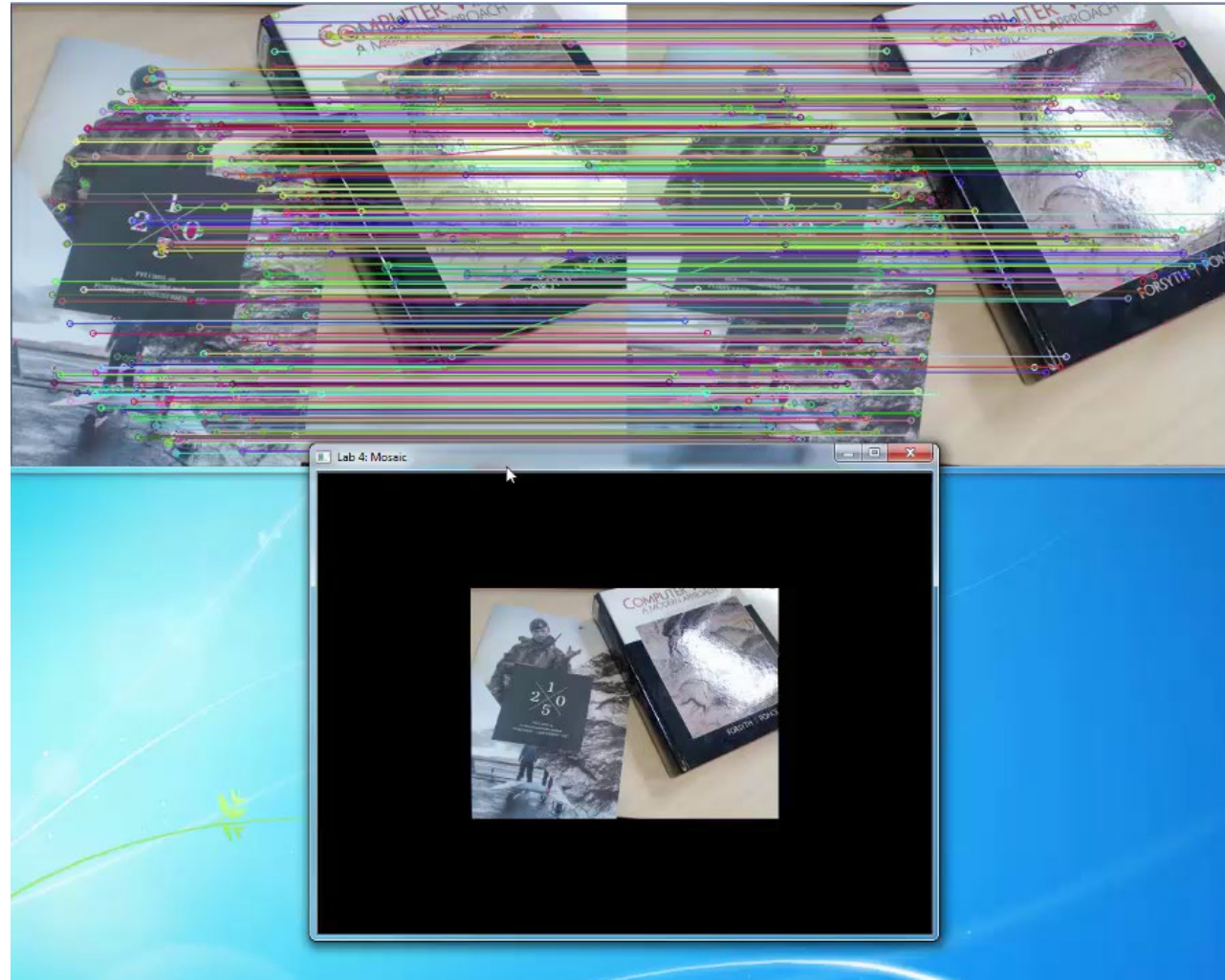
Structure from motion and dense 3D reconstruction



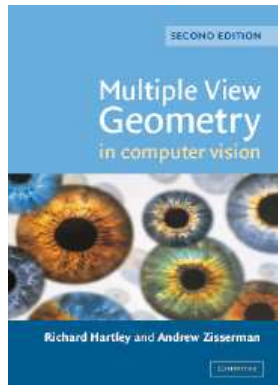
Visual navigation



Aligning images



Object recognition



Characteristics of good features



Characteristics of good features



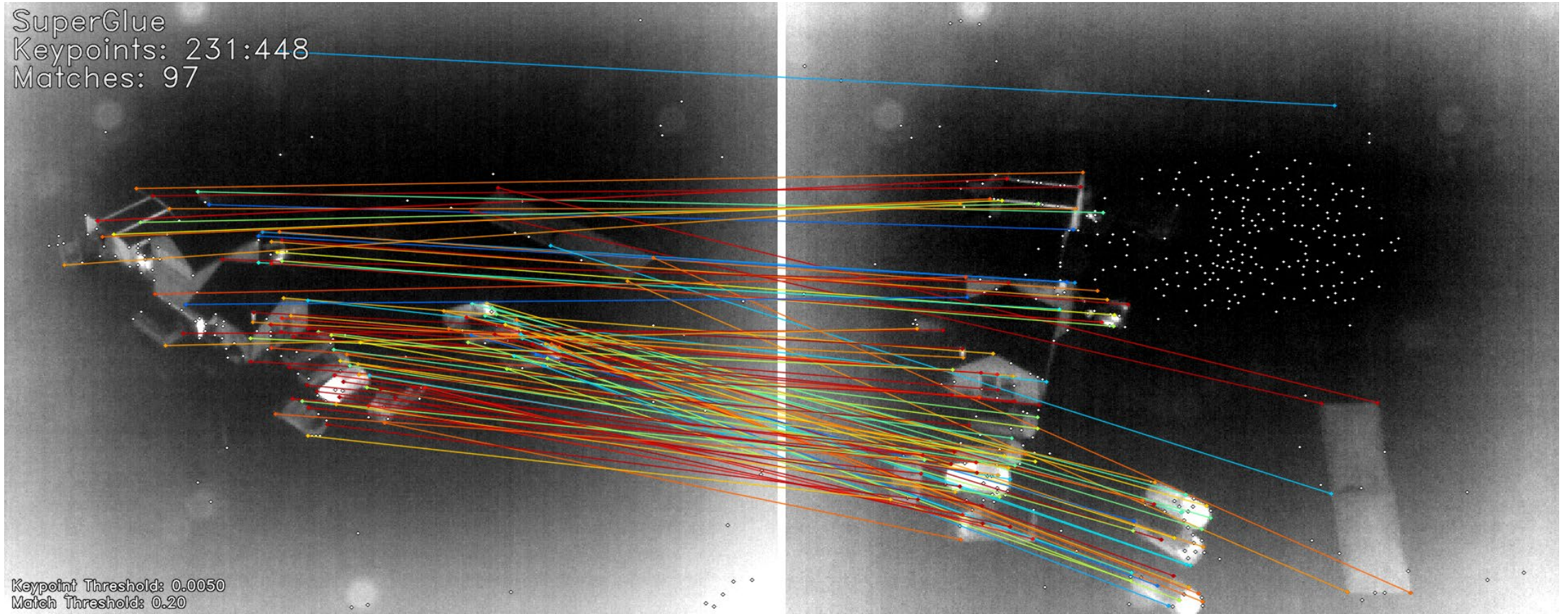
- Repeatability

Characteristics of good features



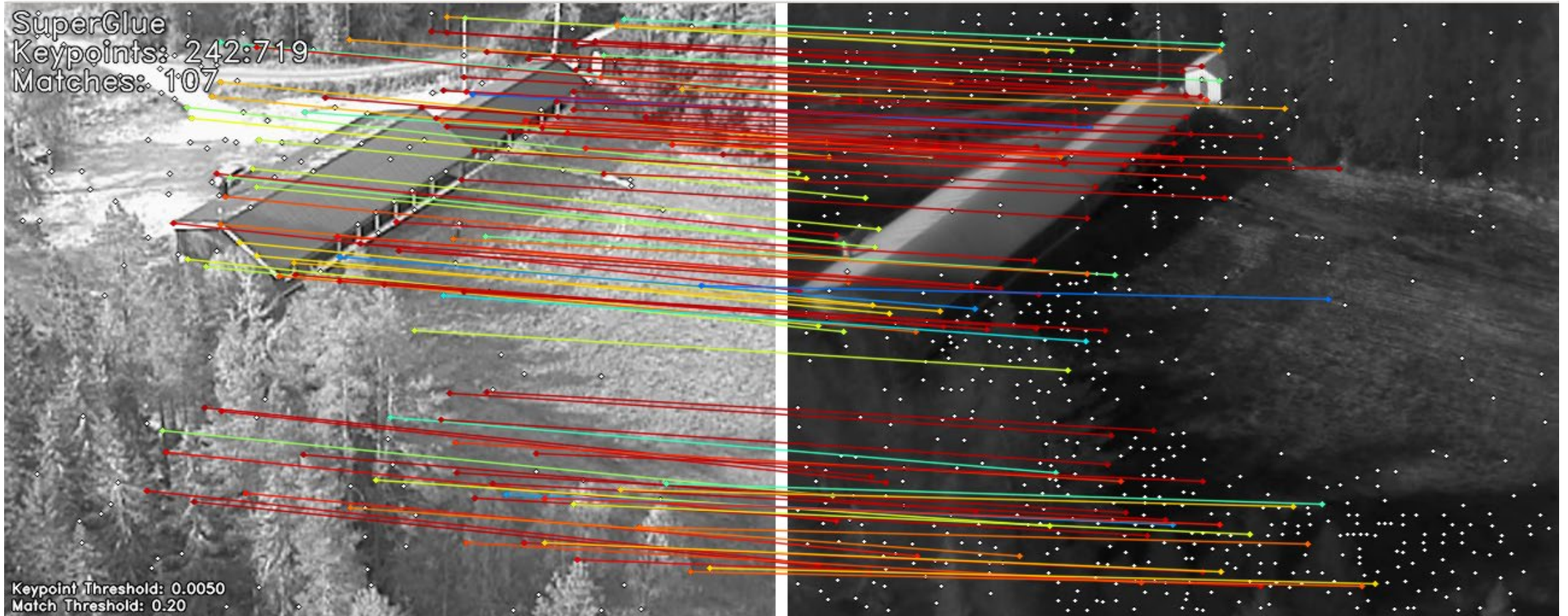
- Repeatability

Characteristics of good features



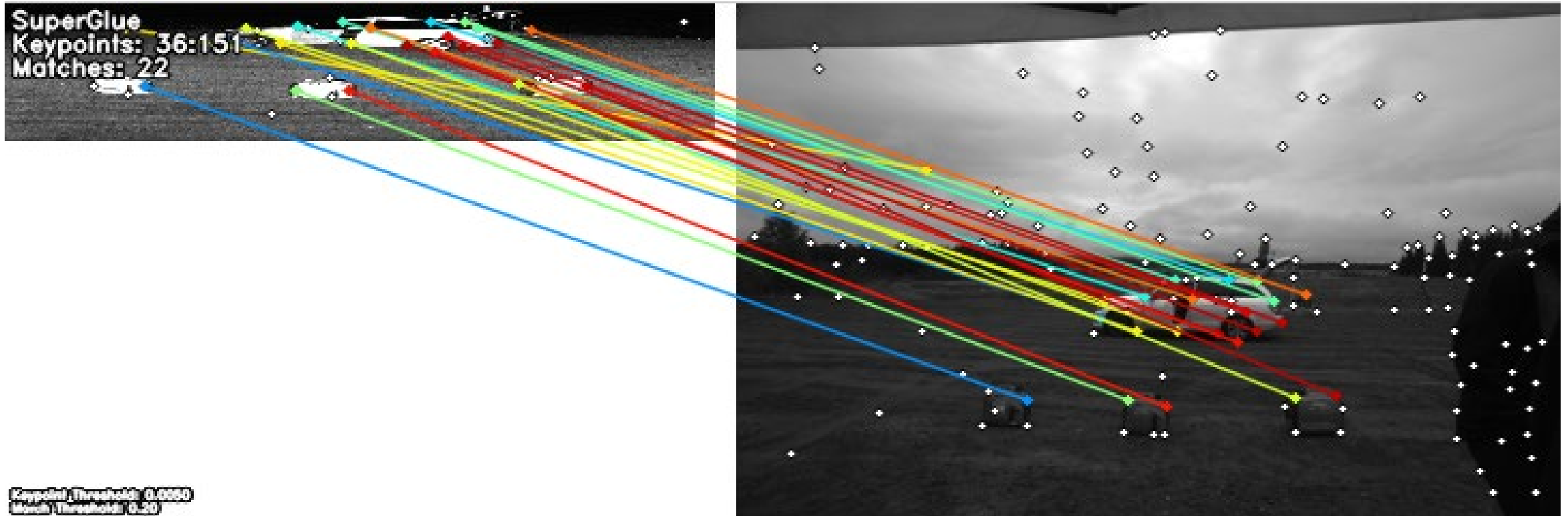
- Repeatability

Characteristics of good features



- Repeatability

Characteristics of good features



- Repeatability

Characteristics of good features



- Repeatability
- Distinctiveness

Characteristics of good features



- Repeatability
- Distinctiveness

Characteristics of good features



- Repeatability
- Distinctiveness

Characteristics of good features



- Repeatability
- Distinctiveness

Characteristics of good features



- Repeatability
- Distinctiveness

- Efficiency

Characteristics of good features



- Repeatability
- Distinctiveness

- Efficiency
- Locality

Characteristics of good features



- Repeatability
- Distinctiveness



- Efficiency
- Locality

Characteristics of good features

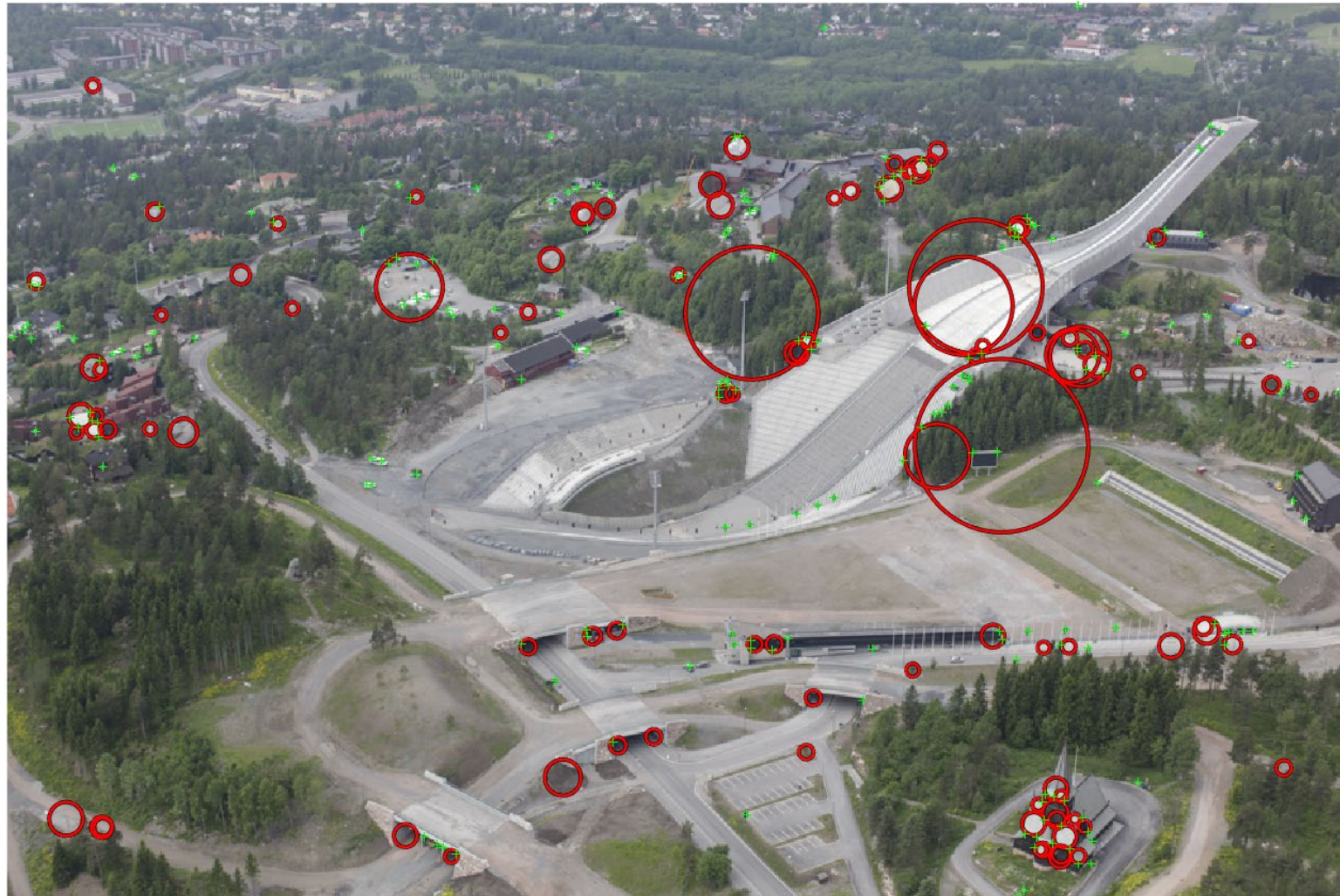


- Repeatability
- Distinctiveness

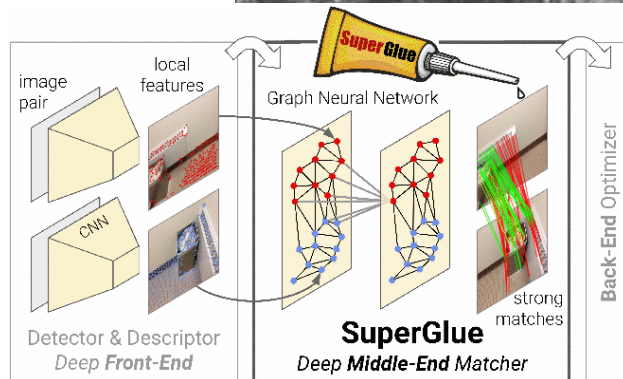
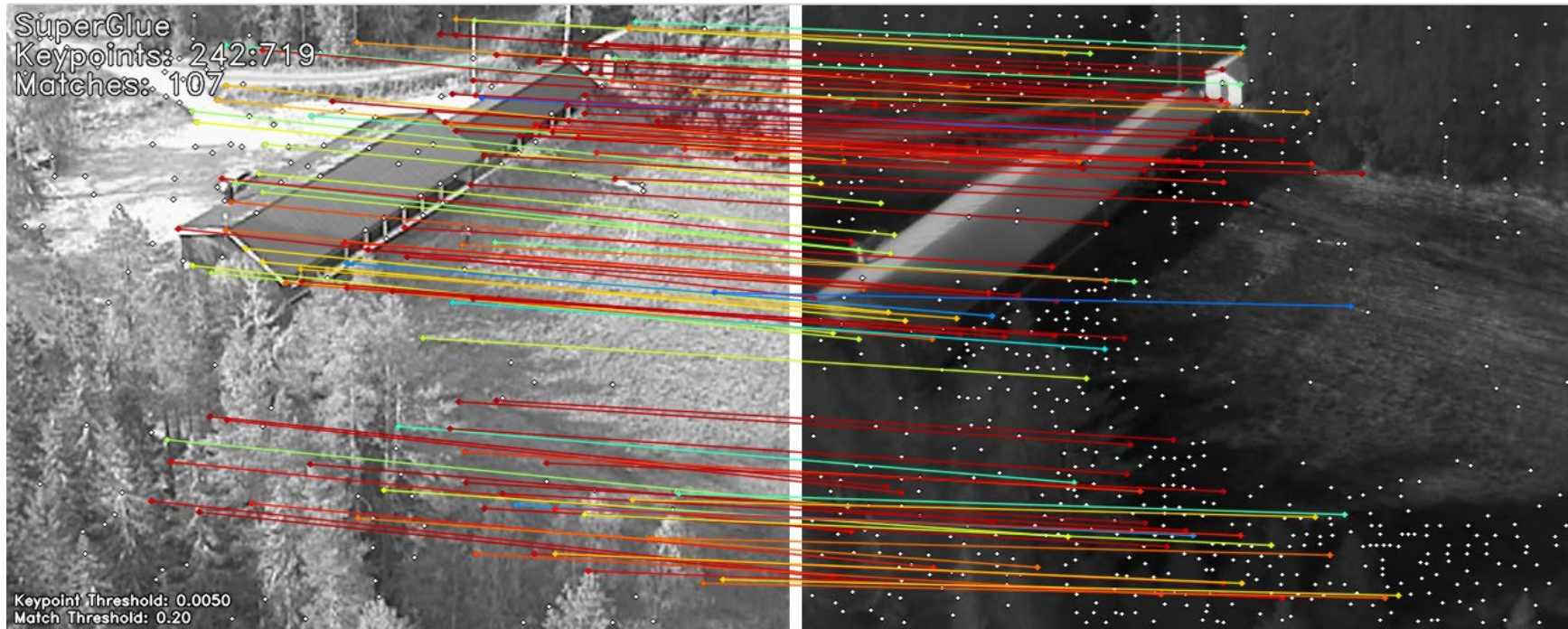


- Efficiency
- Locality

Corner and blob features



Learning-based features



Sarlin, P. E., Detone, D., Malisiewicz, T., & Rabinovich, A. (2020).
SuperGlue: Learning Feature Matching with Graph Neural Networks.
Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 4937–4946.

<https://psarlin.com/superglue/>

Keypoint features

This week:

- Corner features
- Blob features

Next week:

- Feature descriptors
- Feature matching and tracking
- Homography estimation from correspondences

Recommended reading:

- Szeliski 7.1.1