# Analysis Step of Matching Method

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## 1 2D-3D Matching Method

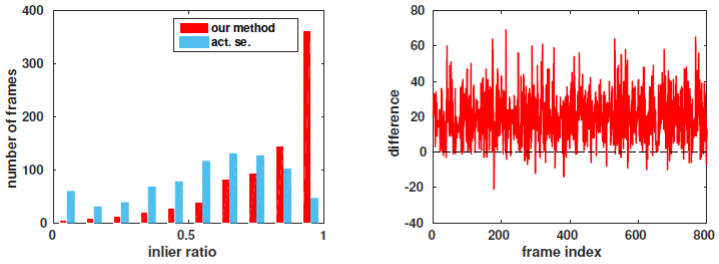
In the last article, I give a brief introduction about a global method that harnesses global contextual information exhibited both within the query image and among all the 3D points in the map, which is presented by Professor Li. And I will learn more about key steps of this method.

First of all, They obtain the co-visibility relationship among 3D points by using the database images. And they assume our 3D map was pre-computed via Structure-from-Motion technique using a large set of database images. Secondly, Professor Li detect a set of 2D feature points along with their view-invariant descriptors and find a set of tentative matches from the 3D graph nodes, by comparing their descriptor similarity via an efficient vocabulary-tree search mechanism. Besides, The team seek a global match between 2D query image and 3D map is to run a Random Walk algorithm on this graph. Finally, they try to recover one-to-one correspondences in order to facilitate camera pose computation.

## 2 To Verify the Global Search Effective

In order to evaluate whether or not the use of global contextua information is effective, Professor Li compare their method with the Active Search method which is considered as the state-of-the-art local search methods. They conducted experiments on the metric version of Dubrovnik dataset with sub-maps with reduced sizes of up to 40, 000 map points [1].

After running both algorithms, They compare the histograms of the obtained inlier ratios. The higher the inlier ratio is, the better the method. Figure. 1 gives the distributions of inlier ratios for the two methods. From this, people can clearly see that global method mentioned aboved statistically outperforms Active Search.




(a) (b)

Figure 1: (a). Compare the two histograms of inlier ratios for the 800 query images of Dubrovnik. Red: histogram by our method; Light-blue: histogram by Active-Search. (b). The absolute improvement in terms of inlier numbers over all query images from Dubrovnik. A positive-valued difference means more inliers are detected by our method. Our method consistently outperforms the local Active-Search method for almost all 800 queries.

# References

[1] Liu Liu, Hongdong Li, and Yuchao Dai. Efficient global 2d-3d matching for camera localization in a large-scale 3d map. In *IEEE International Conference on Computer Vision*, pages 2391–2400, 2017.