|  |  |  |  |
| --- | --- | --- | --- |
| No. of words | Geometric verification | Jaccard Score | Optimal Threshold |
| 1k | No | 0.1866 | 0.26 |
| Yes | 0.2373 | 0.08 |
| 5k | No | 0.2392 | 0.11 |
| Yes | 0.2490 | 0.07 |
| 10k | No | 0.2576 | 0.08 |
| Yes | 0.2591 | 0.06 |
| 100k | No | 0.1369 | 0.10 |
| Yes | 0.2204 | 0.03 |

For each No. of words, use Geometric verification will get a higher Jaccard Score than does not use Geometric verification. This shows that Geometric verification works. Because using Geometric verification will give us the inliers, and the inliers are actually the meaningful information, many trivial outliers will be ignored by Geometric verification. So it will makes the result more accurate which is a higher Jaccard Score (The range of Jaccard Score is from 0 to 1, 0 means the result is totally different from the ground truth and 1 means the result is exactly same as the ground truth.)

For each No. of words, use Geometric verification will make a lower optimal threshold than does not use Geometric verification. The denominator of computing match\_fraction is unchanged for use or does not use geometric verification. But the numerator will become small if use geometric verification (Geometric verification will get inliers, the number of inliers must be less than or equal to the original points before geometric verification) so the match\_fraction will be smaller, so the threshold will be smaller when use geometric verification.

For 1k,5k and 10k No. of words, the vocabulary are all made from the loop closure data set. As the No. of words increase, the Jaccard Score also increases. This is because more words represent more detailly devision so each descriptor of image can find the appropriate word to represent. And this will increase the accurate.

But for 100k No. of words, the Jaccard Score is smaller than 10k. This is because for 1k,5k and 10k No. of words, the vocabulary are all made from the loop closure data set, so these vocab are the most appropriate use on the loop closure data set. But the 100k vocabulary is from another place, although the number of words is big, the vocabulary is not good to use on the loop closure data set. So the Jaccard Score is smaller than 10k No. of words.