Computer Vision Approximate Nearest Neighbors Algorithms Usage of GPU

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faiss

In this report, we cover results of our experiments with faiss¹ library [1] for the nearest neighbors search. The report includes the following:

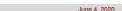
- Timing comparison for the k-means task on SIFT2M data evaluated before;
- k-NN graph construction with various indices from faiss and evaluation of timings and precision on Oxford105K data set.
- Implementation of the shortest path algorithm within the k-NN graph based on (12) of [1]. Oxford105K data was utilized.

Technical Details

The respective implementation is available on our GitHub page.

¹We utilize Fair Al Similarity Search (faiss) library with fixed parameters of the index: nlist= 256, m = 16, nbits= 8, and nprobe= 32 of IVFPQ index.





Description

Once again we perform naive k-means iterations on the SIFT2M data set with k=32000. However, this time only exact nearest neighbors are searched for. Moreover, the search is done by means of GPU. As expected, the flat index from faiss on a GPU-enabled machine performs the search of nearest cluster centers more than a thousand times faster (recall that it took approx. 9K seconds before). Cluster assignment still takes relatively long, as it was not optimized for GPU by us.

Title	(AVG. STD.) NN time, [s]	(AVG. STD.) assignment time, [s]
Exhaustive NN search	2.58 0.37	136.56 18.36



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Appendix







J. Johnson, M. Douze, and H. Jégou. Billion-scale similarity search with gpus. IEEE Transactions on Big Data, pages 1–1, 2019.