

Homework 1: Vector Search

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02.07.2024

1 Faiss

With permission from the course staff, we kept our answers for the original question and not the updated requirements as we finished it prior to the update.

1.1 Running Times

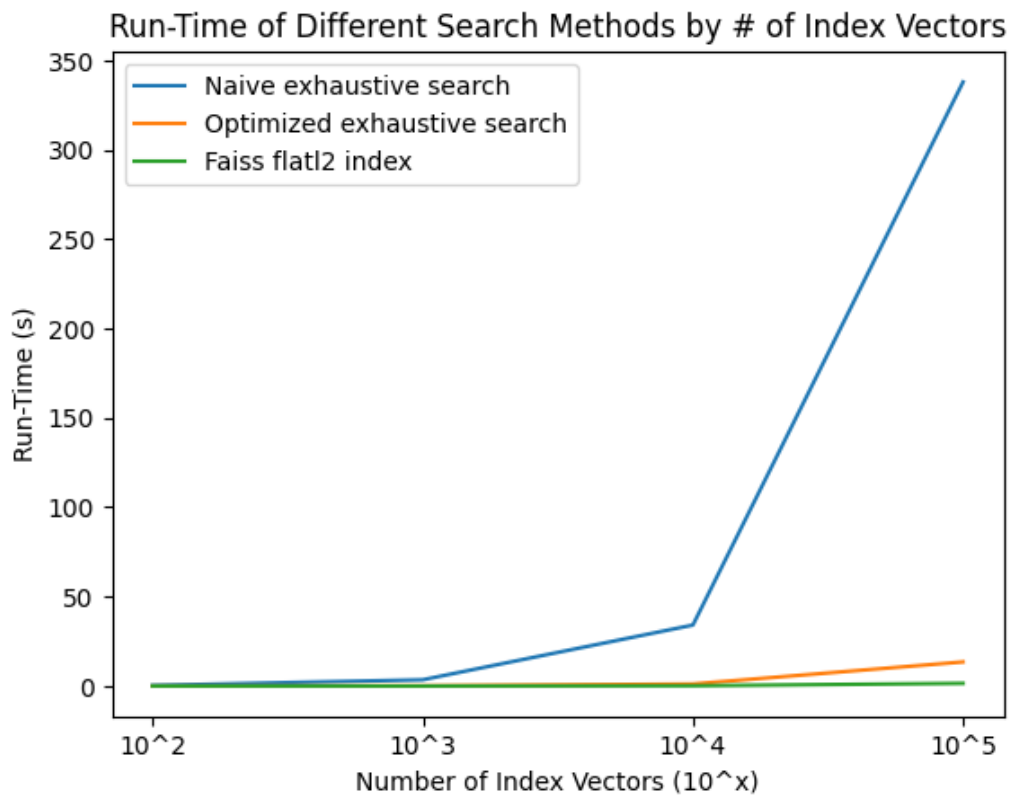


Figure 1.1.1: Running times by Number of Index Vectors

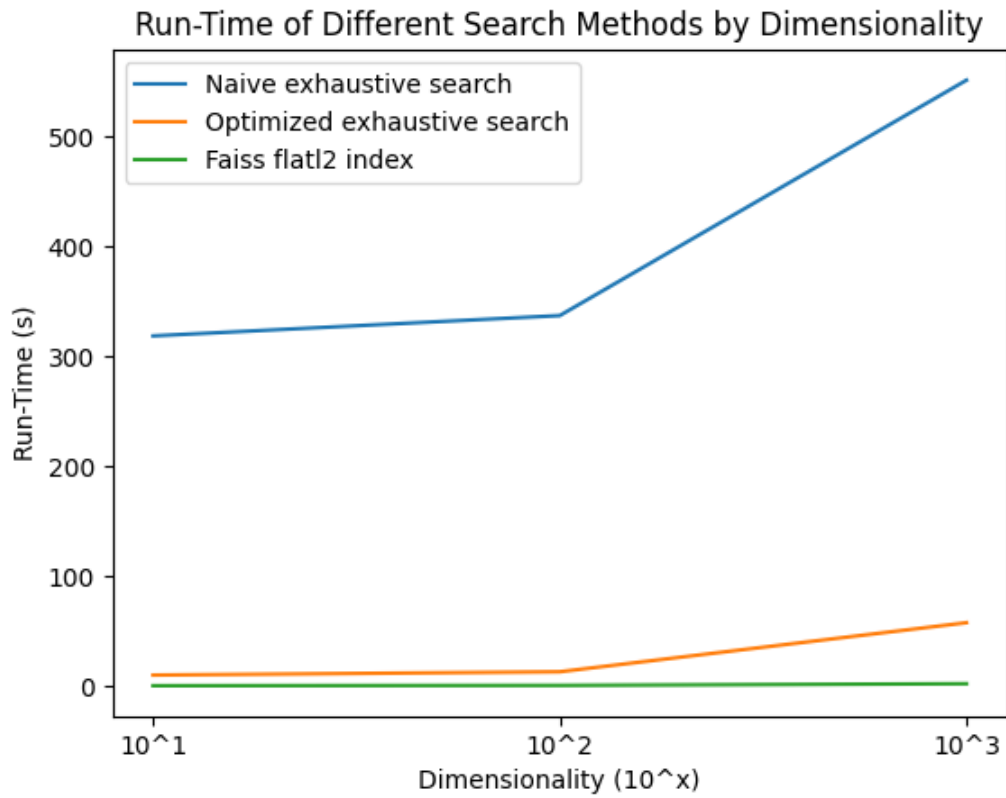


Figure 1.1.2: Running times by Dimentionality

1.2 Faiss LSH

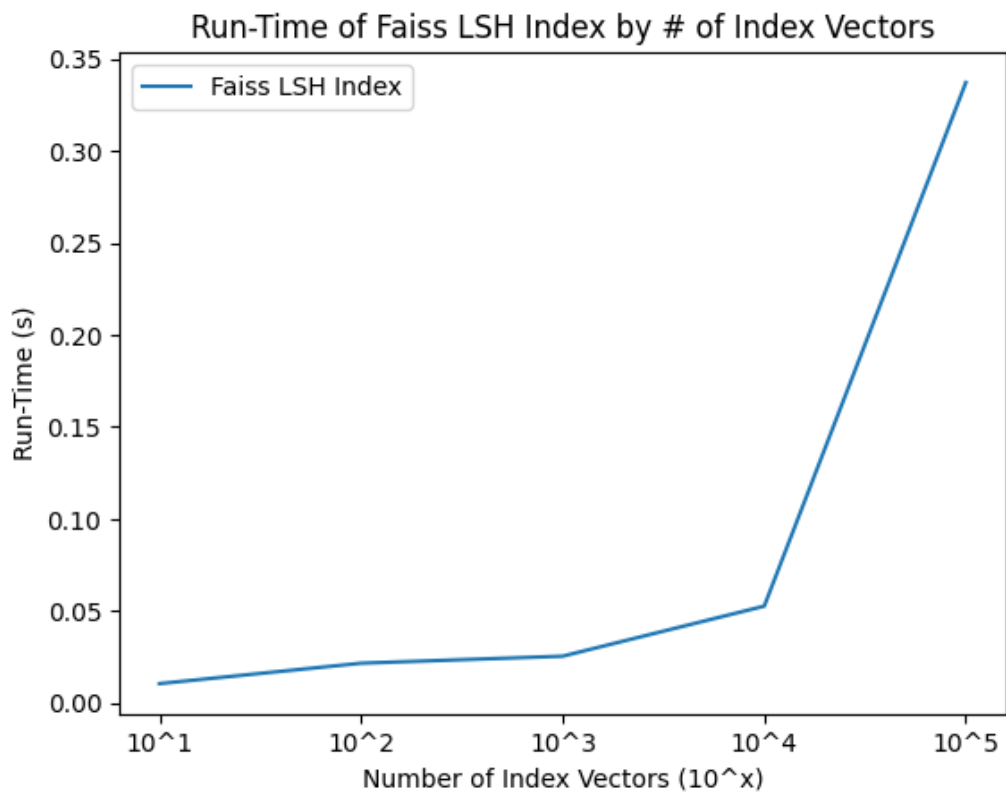


Figure 1.2.1: Running times by Number of Index Vectors



Figure 1.2.2: Running times by Number of Bits

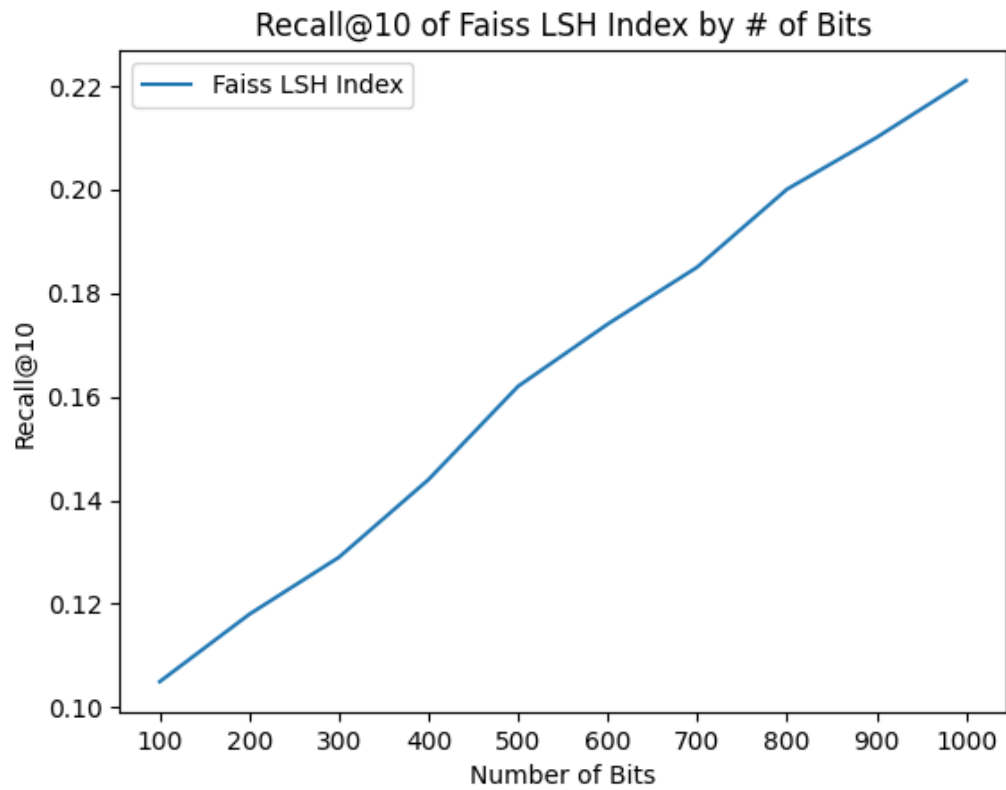


Figure 1.2.3: *Recall@10* by Number of Bits

2 Implementing an Index

2.1 LSH vs. Native Exhaustive Search

1. Running time of the `semi_optimized_exhaustive_search` function was: **4.14 seconds**.
2. Running time of building the LSH index was: **0.62 seconds**.
3. Running time of LSH search over query vectors was: **0.13 seconds**.
4. *Recall@10* for the LSH index was: **0.138**.

2.2 Custom Indexing Algorithm