Optimized high order product quantization for approximate nearest neighbors search

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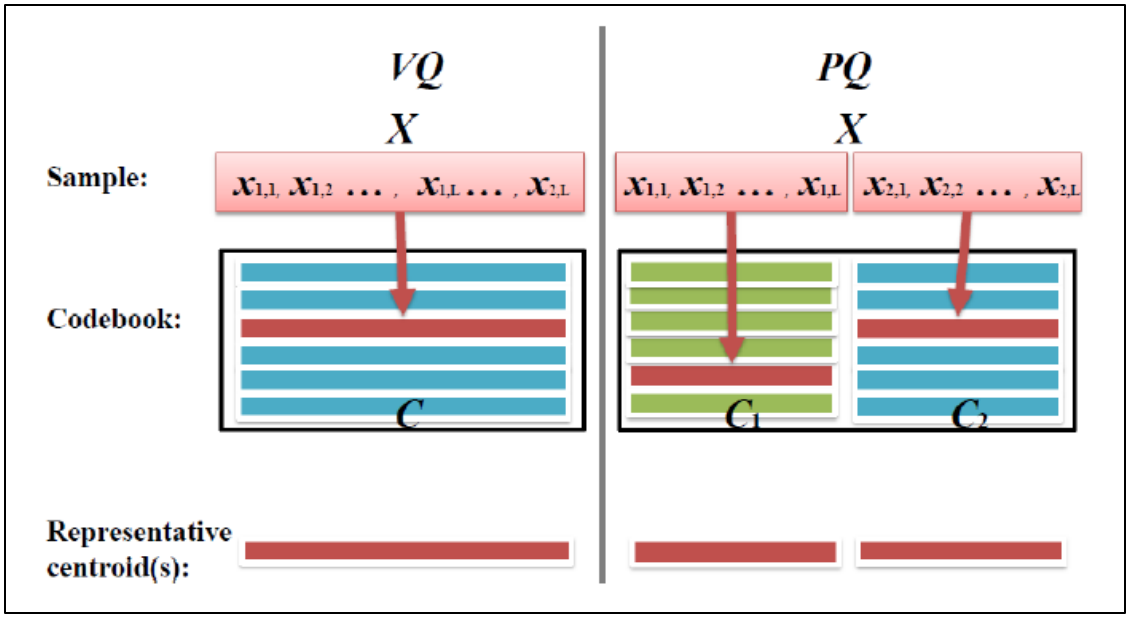
Problem & Idea

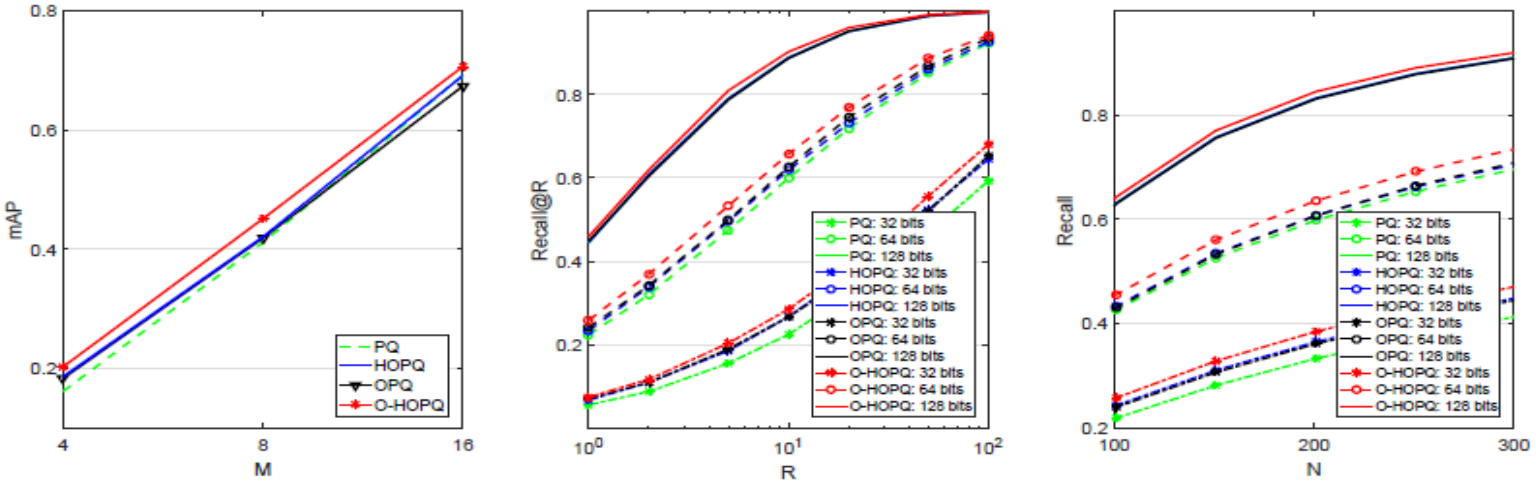
- Problem of fast vector quantization (VQ) in Approximate Nearest Neighbors Search task
  - curse of dimensionality
- Idea: Decompose the data into subspaces and accomplish the quantization in each subspace
  - product quantization (PQ)
  - derivative algorithms of PQ: OPQ, LOPQ, CQ



Main Contributions

In the framework of PQ, we utilize the regional element-correlation that hides in the structure of the data to produce a more effective space partition:

- To obtain more effective codes, we introduce the structure of the high order, which usually contain regional element-correlation information, into the process of space partitioning.
- We explore new ways of concatenating two elements in Cartesian product and then define derivative Cartesian products accordingly.
- Guided by the high order structural information, we set up the framework for high order quantization task (HOPQ), which shows improving quantization performances.
- We combine the framework of HOPQ with the optimization of the codebook (OPQ), and obtain an effective and efficient quantizer (O-HOPQ).



(a) mAP vs. M (b) Recall@R vs. R (c) Recall vs. N