

**CHENNAI – PONDICHERRY**

**ORDINAL CONSTRAINT BINARY CODING FOR APPROXIMATE NEAREST NEIGHBOR SEARCH**

**ABSTRACT:**

Binary code learning, a.k.a. hashing, has been successfully applied to the approximate nearest neighbor search in largescale image collections. The key challenge lies in reducing the quantization error from the original real-valued feature space to a discrete Hamming space. Recent advances in unsupervised hashing advocate the preservation of ranking information, which is achieved by constraining the binary code learning to be correlated with pairwise similarity. However, few unsupervised methods consider the preservation of ordinal relations in the learning process, which serves as a more basic cue to learn optimal binary codes. In this paper, we propose a novel hashing scheme, termed Ordinal Constraint Hashing (OCH), which embeds the ordinal relation among data points to preserve ranking into binary codes. The core idea is to construct an ordinal graph via tensor product, and then train the hash function over this graph to preserve the permutation relations among data points in the Hamming space. Subsequently, an in-depth acceleration scheme, termed Ordinal Constraint Projection (OCP), is introduced, which approximates the n-pair ordinal graph by L-pair anchor-based ordinal graph, and reduce the corresponding complexity from O(n4)toO(L3)(L<<n) Finally, to make the optimization tractable, we further relax the discrete constrains and design a customized stochastic gradient decent algorithm on the Stiefel manifold. Experimental results on serval large-scale benchmarks demonstrate that the proposed OCH method can achieve superior performance over the state-of-the-art approaches.