# A Unified Framework for Answering k Closest Pairs Queries and Variants

## Abstract:

Given a scoring function that computes the score of a pair of objects, a top-k pairs query returns k pairs with the smallest scores. In this paper, we present a unified framework for answering generic top-k pairs queries including k-closest pairs queries, k- furthest pairs queries and their variants. Note that k-closest pairs query is a special case of top-k pairs queries where the scoring function is the distance between the two objects in a pair. We are the first to present a unified framework to efficiently answer a broad class of top-k queries including the queries mentioned above.We present efficient algorithms and provide a detailed theoretical analysis that demonstrates that the expected performance of our proposed algorithms is optimal for two dimensional data sets. Furthermore, our framework does not require pre-built indexes, uses limited main memory and is easy to implement. We also extend our techniques to support top-k pairs queries on multi-valued (or uncertain) objects. We also demonstrate that our framework can handle exclusive top-k pairs queries. Our extensive experimental study demonstrates effectiveness and efficiency of our proposed techniques.