Abstract

Nowadays, the need to techniques, approaches, and algorithms to search on data is increased due to improvements in computer science and increasing amount of information. This ever increasing information volume has led to time and computation complexity. Recently, different methods to solve such problems are proposed. Among the others, nearest neighbor search is one of the best techniques to this end which is focused by many researchers. Different techniques are used for nearest neighbor search. In addition to put an end to some complexities, variety of these techniques has made them suitable for different applications such as pattern recognition, searching in multimedia data, information retrieval, databases, data mining, and computational geometry to name but a few. In this paper, by opening a new view to this problem, a comprehensive evaluation on structures, techniques and different algorithms in this field is done and a new categorization of techniques in NNS is presented. This categorization is consists of seven groups: Weighted, Reductional, Additive, Reverse, Continuous, Principal Axis and Other techniques which are studied, evaluated and compared in this paper. Complexity of used structures, techniques and their algorithms are discussed, as well.
References

- A. Andoni and P. Indyk, Near-Optimal Hashing Algorithms for Approximate Nearest
A Survey on Nearest Neighbor Search Methods


- J. L. Bentley, Multidimensional binary search trees Used for Associative Searching, Communications of the ACM. 18(9), 1975, pp. 509-517.


- S. Berchtold, D. A. Keim, and H. P. Kriegel, The X Tree: An Index Structure for High
A Survey on Nearest Neighbor Search Methods

Dimensional Data, in 22th International Conference on Very Large Data Bases, San Francisco, California, USA, 1996, pp. 28-39.
- D. A. White and R. Jain, Similarity Indexing with the SS Tree, in 12th International Conference on Data Engineering, New Orleans, Los Angeles, USA, 1996, pp. 516-523.
- K. Hechenbichler and K. Schliep, Weighted k-Nearest-Neighbor Techniques and Ordinal Classification, Collaborative Research Center, LMU University, Munich, Germany, Tech, 2006.
A Survey on Nearest Neighbor Search Methods

Machine Intelligence. 22(11), 2000, pp. 1335-1339.
- Y. Zhou, C. Zhang, and J. Wang, Tunable Nearest Neighbor Classifier, in 26th DAGM Symposium on Artificial Intelligence, Tubingen, Germany, 2004, pp. 204-211.
- F. Korn and S. M. ukrishnan, Influence Sets Based on Reverse Nearest Neighbor Queries, ACM SIGMOD Record. 29(2), 2000, pp. 201-212.
- Y. Tao, M. L. Yiu, and N. Mamoulis, Reverse Nearest Neighbor Search in Metric Spaces, IEEE Transactions on Knowledge and Data Engineering. 18(9), 2006, pp. 1239-1252.


- M. L. Yiu, N. Mamoulis, and D. Papadias, Aggregate Nearest Neighbor Queries in Road Networks, IEEE Transactions on Knowledge and Data Engineering. 17(6), 2005, pp. 820-833.


Index Terms

Computer Science  Applied Mathematics

Keywords

Data Structure    kNN Algorithm    Nearest Neighbor Search    Query Processing