

Indexing and Searching Techniques in Databases - Web course

COURSE OUTLINE

We are witnessing an unprecedented growth in the amount of data, starting from protein sequences and structures to biomedical images, sensor readings and chemical data. With the improvement in data acquiring technologies, digital databases are becoming a necessity for every scientific discipline.

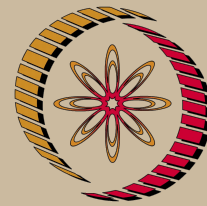
In order to render the databases more useful than just a digital data storage structure, the ability to search for data objects similar to a query must be supported.

This course will cover the well known searching and indexing techniques used in databases, including the recent state-of-the-art methods.

Since the complexity of these techniques grow exponentially with the number of dimensions in the data, special emphasis will be on highdimensional databases, e.g., multimedia databases.

COURSE DETAIL

Module	Topics	No.of Hours
Basics and background	Database queries and errors in query retrieval algorithms	2
	Memory and disk accesses	1
	Vector and metric spaces	1
Distances	Distance functions	2
Index structures	Hashing techniques	2
	One-dimensional orderings	1
	Binary search trees, B-trees and B+-trees	2
	Low-dimensional memory-based index structures	5
	Disk-based index structures	8
	Analysis of high-dimensional index structures	1



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Computer Science and Engineering

Pre-requisites:

1. Linear Algebra basics.
2. Probability and Statistics basics.
3. Data Structures and Algorithms.

Additional Reading:

1. Computational Geometry by de Berg, Cheong, van Krefeld, Overmars. Springer.
2. Linear Algebra and its Applications by Strang. Thomson Bookstore.
3. Introduction to Algorithms by Cormen, Leiserson, Rivest, Stein. Prentice Hall.

Coordinators:

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	File-based techniques	1
Dimensionality reduction	Dimensionality reduction techniques	4
Miscellaneous topics	Data representation techniques	3
	Multi-attribute retrieval techniques	2
	Joins, skyline queries, XML queries, spatio-temporal queries	4
	Case studies	1
	Total	40

References:

1. "Foundations of Multidimensional and Metric Data Structures" by Hanan Samet, Morgan Kaufmann Publishers, 2005.
2. Different articles from journals and conference proceedings.