Evolutionary Computation: Past, Present and Future

Dr. Carlos A. Coello Coello

Abstract

In this talk we will describe a type of metaheuristics inspired by natural selection, which is generically named evolutionary algorithms. We will begin by providing a historic perspective of the evolutionary algorithms, and will emphasize the origins of the three most representative paradigms of this area: evolution strategies, evolutionary programming and genetic algorithms. Then, we will present the current state of the area and some of the current issues that have captured the attention of researchers of what is now known as Evolutionary Computation. Finally, we will briefly present the future of Evolutionary Computation from the point of view of experts in this area by emphasizing the open research issues highlighting the areas that show the most promise for the next few years.

Experience Scaling Agile Development

Dave Thomas
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Abstract

Agile Development http://agilemanifesto.org/ is a set of best practices for software development which is rapidly being adopted by software developers. Agile focuses predictable delivery and high quality. While initially these practices were applied to individual teams, larger organizations are now adopting Agile seeking to obtain the same benefits.

In this talk we provide a comprehensive view of Agile practices and how they are scaled to meet the needs of large organizations. We provide a fast paced overview of the current state of agile practices for developers and management. We then present the key tools and techniques for development and management agile projects. We explain how Agile fits into a modern software development process. We describe the roles and responsibilities in an agile development organization including analysts, architects, designers, project managers, testers etc. We discuss global development using and the use of offshore and contract development. We provide experiences and lessons learned from very large agile projects in IT Applications and Product Engineering.
An Adaptive Packed-Memory Array
Michael A. Bender
SUNY Stony Brook, USA

Abstract

In this talk we show how to maintain a dynamic set of N elements in sorted order in a O(N)-sized array. The idea is to interspersed O(N) gaps so that only a small number of elements need to be moved on an insert or delete. Because the elements are stored physically in sorted order in memory or on disk, the structure supports extremely efficient range queries in external-memory and cache-oblivious data structures.

We show how to maintain the structure with a small (polylogarithmic) number of element moves even in the worst case. We then present an adaptive structure that performs even better for common insertion patterns. We give theoretical analysis and experimental results.

Spectral Algorithms and Representations
Dr. Santosh Vempala
Georgia Tech, USA

Abstract

The spectrum of a matrix (or a graph) captures many interesting properties in surprising ways. Spectral methods (based on eigenvalues and eigenvectors) are already used for unsupervised learning, image segmentation, to improve precision and recall in databases and broadly for data mining. The common component of these methods is a projection to the space of a few singular vectors of the data. In this talk, we describe this idea and focus on the vital role it plays in efficient algorithms for two problems: (a) clustering object-feature (document-term) matrices and (b) the classical problem of learning a mixture of Gaussians. We also highlight a property that makes these methods particularly attractive for large data sets: any matrix (of any size) contains a "constant-size" submatrix from which an approximate spectral projection can be efficiently computed.