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MADALGO seminars by Konstantinos Tsichlas, Aristotle University of Thessaloniki

Some Complex Problems without Complexities

Abstract:

There are a lot of problems that have solutions that seems to "work" but have no guarantees with respect to the efficiency metrics related to the programming model used (or model of computation). In this talk, I am going to report such problems, such as top- k dominating queries, outlier detection and core decomposition in graphs. In particular, anomaly detection is considered an important task aiming at discovering elements (known as outliers) that show significant diversion from the expected case. It is a very general problem and has been attacked by making use of statistical methods, neural networks, machine learning etc. We will look at this problem from the streaming perspective and report on recent results and open problems.

Core decomposition in graphs is yet another decomposition method for graphs which due to its efficiency has been used by researchers in (social) network analysis, network visualization, protein prediction etc. The main advantage of core decomposition is that there exists simple and efficient algorithms for computing the k -cores whereas other similar in concept decompositions, such as k -cliques and k -plexes, are algorithmically difficult in the sense that they are either NP-hard or at least quadratic. We are going to discuss the problem, report on some recent advances and state some interesting open problems.