Studying the Effects of Instance Structure in Algorithm Performance

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Abstract

Classical computational complexity studies the asymptotic relationship between instance size and the amount of resources consumed in the worst case. However, it has become evident that the instance size by itself is an insufficient measure and that the worst-case scenario is often uninformative in practice. As a complementary analysis, we propose the examination of structural properties present in the instances and the effects they have on algorithm performance; our goal is to characterize complexity in terms of instance structure. We propose a framework for identifying and characterizing hard instances based on algorithm behaviour as well as a case study applying the framework on the graph coloring problem.

Keywords: Instance Structure, Algorithm Performance

Biographies

Tania Turrubiates-López was born in Tampico, Mexico, in 1979. She received her D.Eng. degree from the Faculty of Mechanical and Electrical Engineering (FIME) of the Universidad Autónoma de Nuevo León, Mexico in 2012. She is presently a professor at the Computer System Engineering Department of the Instituto Tecnológico Superior de Alamo Temapache in México. Her research interests are optimization, computational complexity, and complex networks.

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