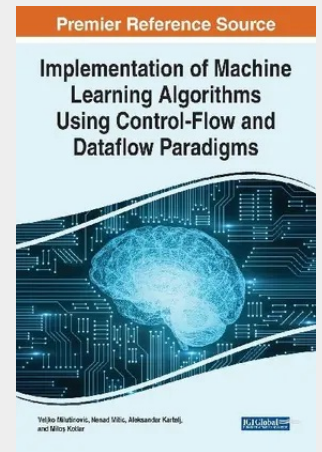


Implementation of Machine Learning Algorithms Using Control-Flow and Dataflow Paradigms

This book treats well-known algorithms in a novel way, completely different from the traditional ways, so that their implementation in the dataflow paradigm could be made more effective, as far as speed and power. This book presents four widely used data-mining algorithms and treats four different aspects thereof: a basic introduction with issues of importance, advantages and disadvantages of these algorithms, a part on relevant algorithmic details related to the mathematical treatment of the selected four groups of algorithms, a part on possible applications of selected algorithms with special attention dedicated to data mining and a part on fast and energy efficient implementations using ? dataflow technology, comparatively with control-flow technology. There is also advanced implementation details of these four algorithms on a selected control-flow clusters and on a selected dataflow accelerators. This book will serve as reference book for professionals who would like to advance their research of energy efficient accelerators for machine learning algorithms like data mining and to switch from the existing control-flow paradigm to energy efficient dataflow paradigm. This book could be used by advanced individuals in the field of artificial intelligence in general and in the field of supercomputing. This book will provide the essential details of energy efficient implementations of machine learning algorithms primarily used in data mining tasks. Specific implementations are based on the Maxeler technology, for the following reasons: it proves to be both fast and energy-efficient, it is available via Amazon AWS, it is/was used by giants in the business of finances and it is/was used in a large number of other applications, in Science, GeoPhysics, Security, and Machine Learning.

Based on current literature and cutting-edge advances in the machine learning field, there are four algorithms whose usage in new application domains must be explored: neural networks, rule induction algorithms, tree-based algorithms, and density-based algorithms. A number of machine learning related algorithms have been derived from these four algorithms. Consequently, they represent excellent underlying methods for extracting hidden knowledge from unstructured data, as essential data mining tasks. Implementation of Machine Learning Algorithms Using Control-Flow and Dataflow Paradigms presents widely used data-mining algorithms and explains their advantages and disadvantages, their mathematical treatment, applications, energy efficient implementations, and more. It presents research of energy efficient accelerators for machine learning algorithms. Covering topics such as control-flow implementation, approximate computing, and decision tree algorithms, this book is an essential resource for computer scientists, engineers, students and educators of higher education, researchers, and academicians.



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