

Prospect of Quantum Inspired Algorithms for Optimum Feature Subset Selection in Machine Learning

Basabi Chakraborty

Dean, School of Computing, Madanapalle Institute of Science & Technology, Andhra Pradesh, India,

Distinguished & Emeritus Professor, Iwate Prefectural University, Japan,

E-mail: basabi@iwate-pu.ac.jp

Abstract:

The performance of any machine learning algorithm greatly depends on the efficient selection of the features from the high dimensional data set. Retention of discriminatory features and removal of redundant and irrelevant ones are the basic objective of optimal feature subset selection process, an important prerequisite for any classification or regression problem. Though a lot of feature subset selection algorithms are currently available, recent rapid increase of high dimensional data in various domains has created high computational challenges and the need of stable, scalable and interpretable feature subset selection algorithm with reduced computational cost is ever demanding. Quantum computing is known to possess high processing capability by exploiting inherent parallelism and potentially provides significant speed up compared to classical computing. Though full scale quantum computers are yet to develop, various possibilities of their applications are now becoming research topics of interest. Integration of quantum computing concepts with machine learning algorithms leading to Quantum Machine Learning are emerging as new potential research field. In this tutorial, I would like to present our studies on the development of quantum inspired feature subset selection algorithms and how these algorithms affect the performance. We have proposed quantum enhanced approaches to classical feature evaluation tools for feature ranking and selection and simulated on classical machines using benchmark data sets to judge their effectiveness. We have also proposed a novel quantum inspired metaheuristic feature subset selection framework and examined its performance with simulation experiments on quantum simulator for high dimensional data sets. I would like to share the conclusion of our study regarding the merits and demerits of using quantum inspired machine learning algorithms in the area of Machine Learning