Corrections, Improvements, Simulations and optiMSTic Algorithms for the Distributed Minimum Spanning Tree Problem

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Abstract

In this document, we present several new techniques for the problem of finding Minimum Spanning Trees in undirected graphs using distributed algorithms. First, we review related algorithms and the techniques they use to increase the efficiency. Some problems were found and corrections were made for an algorithm due to Awerbuch [Awe 87]. We show that as described in his paper, the algorithm does not work properly. We then present several new techniques that are based on distributing summary information about the fragment among its nodes. We discuss the impact of our techniques on the performance. In addition, we offer an overview and a grouping of all techniques with respect to optimal performance. The discussion concludes in a pattern for creating optimal algorithms. Simulations prove the feasibility of our techniques and demonstrate the trade-off between time and communication complexity. The results show an increase in efficiency that exceeded our expectations.