

Generic run-time measurement for DisCSPs search algorithms¹

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Abstract. The efficiency of Distributed Constraints satisfaction algorithms must be measured by concurrent performance measures. In Previous studies we have proposed the count of non concurrent logical steps as an asynchronous measure. This measure is independent of the specific implementation and is not affected by the level of concurrency of the performing algorithm. The method of counting non-concurrent constraints-checks (NCCCs) was later extended to the case of systems with message delays. The method inherently assumes that each message received by an agent triggers some computation. In some DisCSP algorithms, such as AWC and ABT DO, agents receive assignment messages from lower priority agents which do not cause a computation. The present paper proposes a generalization of the method of counting non-concurrent logical steps as run-time measure for distributed search algorithms. Logical time counters carried by messages do not immediately update the receiving agent's logical counter. Instead, the agent stores the data carried by the message and tags it with the logical time carried by the message. Only when the agent uses the stored information for the first time, the logical counter of the delivering message is considered. The proposed method ensures that the reported solution does not include logical computation steps that could have been performed concurrently. The proposed general method is presented in detail, demonstrated on the relevant DisCSP algorithms and its correctness is proven.

Key words: Distributed Constraint Satisfaction, Search, Distributed AI.