Title: Efficient Dispersion on an Anonymous Ring in the Presence of Weak Byzantine Robots

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Abstract: The problem of dispersion of mobile robots on a graph asks that n robots initially placed arbitrarily on the nodes of an n-node anonymous graph, autonomously move to reach a final configuration where exactly each node has at most one robot on it. This problem has been relatively well-studied when robots are non-faulty. In this paper, we introduce the notion of Byzantine faults to this problem, i.e., we formalize the problem of dispersion in the presence of up to f Byzantine robots. We then study the problem on a ring while simultaneously optimizing the time complexity of algorithms and the memory requirement per robot. Specifically, we design deterministic algorithms that attempt to match the time lower bound ($\Omega(n)$ rounds) and memory lower bound ($\Omega(\log n)$ bits per robot).

Our main result is a deterministic algorithm that is both time and memory optimal, i.e., $O(n)$ rounds and $O(\log n)$ bits of memory required per robot, subject to certain constraints. We subsequently provide results that require less assumptions but are either only time or memory optimal but not both. We also provide a primitive that takes robots initially gathered at a node of the ring and disperses them in a time and memory optimal manner without additional assumptions required.