Universally decodable matrices for distributed matrix-vector multiplication

Pascal Vontobel

Chinese University of Hong Kong

Abstract: Coded computation is an emerging research area that leverages concepts from erasure coding to mitigate the effect of stragglers (slow nodes) in distributed computation clusters, especially for matrix computation problems. In this work, we present a class of distributed matrix-vector multiplication schemes that are based on codes in the Rosenbloom-Tsfasman metric and universally decodable matrices. Our schemes take into account the inherent computation order within a worker node. In particular, they allow us to effectively leverage partial computations performed by stragglers (a feature that many prior works lack). An additional main contribution of our work is a companion-matrix-based embedding of these codes that allows us to obtain sparse and numerically stable schemes for the problem at hand. Experimental results confirm the effectiveness of our techniques.

(Based on joint work with Aditya Ramamoorthy and Li Tang.)