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FINE: A Framework for Distributed Learning on Incomplete Observations for Heterogeneous Crowdsensing Networks

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Abstract: *Numerous crowdsensing applications have been developed recently in mobile social networks and vehicle networks. How to implement an accurate distributed learning process to estimate parameters of an unknown model in crowdsensing is a significant issue because centralised learning methods produce unreliable data gathering, expensive central servers, and privacy concerns. Due to this, we propose FINE, a distributed learning framework for imperfect data and non-smooth estimation, along with its design, analysis, and assessment. Our design, which is focused on creating a workable framework for learning parameters in crowdsensing networks accurately and efficiently, generalises earlier learning techniques by supporting heterogeneous dimensions of data records observed by various nodes as well as minimization based on non-smooth error functions.In particular, FINE makes use of a distributed dual average technique that efficiently minimises non-smooth error functions and a novel distributed record completion algorithm that enables each node to get the global consensus through effective communication with neighbours. All of these algorithms converge, as shown by our analysis, and the convergence rates are also obtained to support their efficacy. Through experiments on synthetic and actual networks, we assess how well our framework performs.*

Keywords: Crowdsensing, Distributed Learning, Incomplete data and performace evaluation

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