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MANAGEMENT
DATA SCIENCE AND
ANALYTICS
DEPARTMENT

DEPARTMENTAL
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Dr. Tuğrul Cabir Hakyemez

GiniDispatch : A Gini-Regularized Reinforcement Learning for Joint Earnings and Workload Equity in Taxi Dispatch

ABSTRACT: Ride-hailing platforms typically optimize dispatch decisions for passenger waiting time and platform revenue, yet these objectives often produce persistent inequalities in driver income and workload. This study introduces GiniDispatch, a fairness-aware taxi dispatch algorithm designed to improve driver welfare while preserving operational performance. The framework integrates three components: fairness-prioritized ordering of ride requests, equity-driven driver-request matching, and a reward structure that penalizes income and workload inequality using Gini-based measures. GiniDispatch is implemented with two reinforcement learning approaches—Spatiotemporal Graph Convolutional Reinforcement Learning (STGCRL) and tabular Q-learning—and evaluated under varying demand conditions and fairness-weighting settings using New York City taxi trip data. Results indicate that GiniDispatch reduces income inequality by up to 34.3% and workload inequality by up to 40.1% compared to fairness-unaware baselines. These improvements are achieved with minimal impact on passenger waiting time and overall system reward.

SHORT BIO: Dr. Tuğrul Cabir Hakyemez received his PhD in Management Information Systems from Boğaziçi University in 2022 and was a visiting researcher at Toronto Metropolitan University's Data Science Lab (2020–2021). He holds a BSc in Industrial Engineering and an MSc in Management Information Systems from Sakarya University. His research focuses on AI, data science, machine learning, urban analytics, entrepreneurship, and employability. His work has been published in leading international journals and is characterized by an interdisciplinary, practice-oriented approach.