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# Road Data Enrichment Framework Based on Heterogeneous Data Fusion for ITS

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### Abstract:

In this work, we propose the Road Data Enrichment (RoDE), a framework that fuses data from heterogeneous data sources to enhance Intelligent Transportation System (ITS) services, such as vehicle routing and traffic event detection. We describe RoDE through two services: (i) Route service, and (ii) Event service. For the first service, we present the Twitter MAPS (T-MAPS), a low-cost spatiotemporal model to improve the description of traffic conditions through Location-Based Social Media (LBSM) data. As a case study, we explain how T-MAPS is able to enhance routing and trajectory descriptions by using tweets. Our experiments compare T-MAPS' routes against Google Maps' routes, showing up to 62% of route similarity, even though T-MAPS uses fewer and coarse-grained data. We then propose three applications, Route Sentiment (RS), Route Information (RI), and Area Tags (AT), to enrich T-MAPS' suggested routes. For the second service, we present the Twitter Incident (T-Incident), a low-cost learning-based road incident detection and enrichment approach built using heterogeneous data fusion. Our approach uses a learning-based model to identify patterns on social media data which is then used to describe a class of events, aiming to detect different types of events. Our model to detect events achieved scores above 90%, thus allowing incident detection and description as

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a RoDE application. As a result, the enriched event description allows ITS to better understand the LBSM user's viewpoint about traffic events (e.g., jams) and points of interest (e.g., restaurants, theaters, stadiums).

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