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QUANTILE REGRESSION FOR DELIVERY PROMISE OPTIMIZATION

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ABSTRACT

Quantile regression has emerged as a valuable tool in delivery promise optimization, providing a more flexible and robust framework than traditional mean-based regression models In the context of logistics and supply chain management, accurately predicting delivery times is crucial for enhancing customer satisfaction and operational efficiency. Unlike conventional models, which focus on minimizing average prediction errors, quantile regression estimates conditional quantiles of the delivery time distribution. This allows businesses to set delivery promises that are tailored to different levels of risk tolerance, such as a 90th percentile promise to ensure that 90% of deliveries are on time. By incorporating various factors, such as traffic conditions, weather patterns, and historical delivery performance, quantile regression can yield more nuanced predictions, enabling companies to optimize their delivery windows more effectively. Moreover, it addresses the challenges of skewed and heterogeneous data, which are common in logistics, by providing a robust method that handles outliers and varying distributions. The flexibility of quantile regression allows for its application across different industries and delivery contexts, from e-commerce to last-mile logistics. As businesses increasingly prioritize precise and reliable delivery promises, quantile regression offers a powerful statistical approach to meet this demand, improving both customer trust and operational planning. This paper explores the key benefits and practical applications of quantile regression in delivery promise optimization, highlighting its potential to revolutionize delivery time predictions and enhance the overall supply chain performance.

KEYWORDS: *Quantile Regression, Delivery Promise Optimization, Logistics, Supply Chain Management, Predictive Modelling, Delivery Time Prediction, Risk Tolerance, Operational Efficiency, Customer Satisfaction, Outliers, Last-Mile Logistics*

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