Comparison of Trilateration and Supervised Learning Techniques for BLE Based Indoor Localization

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Location-based service is one of the primary services with high demand on the Internet of Things (IoT) applications. However, indoor position estimation is challenging due to interference and the inability to use GPS in indoor environments. Among few feasible solutions for this problem are Received Signal Strength Indicator (RSSI)-based indoor position estimation, one of the emerging best contenders. This research conducts a comparative study on trilateration techniques versus supervised learning models for estimating the position of a mobile node in an indoor environment. For the experiment, an existing dataset available publicly is used. The experiment testbed consists of three beacon sensor nodes designed using Bluetooth Low Energy (BLE) wireless technology and one mobile node. The RSSI readings at the mobile node from three stationary beacon wireless access nodes are used. Three popular regression models, namely, Decision Tree Regression (DTR), Random Forest Regression (RFR), and Support Vector Regression (SVR) algorithms were trained using the dataset. Also, trilateration techniques were performed to obtain the estimated location. The Mean Square Error (MSE) was utilized to analyse the model performance. Out of the three regression models and Trilateration tested, RFR showed better position estimation in indoor environments.

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