

Improved Wi-Fi AP position estimation using regression based approach

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ABSTRACT

This paper describes the improved Wi-Fi AP position estimation method for building more accurate Wi-Fi AP position DB in complex indoor signal propagation environment.

One of our project's goals is to produce the estimated position DB of Wi-Fi AP by using indoor survey for higher Wi-Fi AP position accuracy.

Our contribution focuses on the Wi-Fi AP position estimated method. In previous works, there are several methods for Wi-Fi AP position estimation such as weighted centroid, lateration using traditional model etc. In case of weighted centroid, the estimated Wi-Fi AP position depends on the number and location of collected points so that the Wi-Fi AP position accuracy can be poor in low DoP collecting environment, like corner or edge of a building. Lateration can be more efficient than weighted centroid in case of low DoP scenario but its method using traditional path loss model is vulnerable to complex indoor signal propagation where lots of attenuation, reflection and refraction exist.

To enhance Wi-Fi AP position accuracy in case of low DoP collecting environment, the lateration using regression model is proposed.

First, linear regression based Wi-Fi AP signal propagation model is estimated in small-scale indoor test-bed. Then, the criterion to select collecting points for minimizing the error of suggested model is designed and the lateration using regression model is suggested.

Next, the comparison of Wi-Fi AP position accuracy by using several methods is described.

From test result, we will show that the positioning accuracy of the lateration using regression model will be greater than other methods in real world field tests. Furthermore it will be shown that the lateration using regression model is more effective in low DoP collecting environment. Also the criterion to select collecting points for minimizing the error of suggested model will be evaluated from real data.

KEYWORDS: Wi-Fi, AP, regression, position, estimation