

# Hybrid Ray Launching-Collaborative Filtering Approach for Wireless Propagation in Indoor Environments

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Radio planning tasks for complex scenarios where the main propagation phenomenon is the multipath propagation are usually carried out by simulation techniques based on deterministic methods such as Ray Tracing and Ray Launching. However, the accuracy of the simulation results depends on parameters such as the number of launched rays and the angular resolution. The computational cost of these simulations in High Definition (HD) can be very high for the analysis of big complex environments, while their Low Definition (LD) counterparts provide low quality results. In this work a technique based on Collaborative Filtering (CF) to lessen the poor quality problems of Ray Launching LD simulations while the computational cost remains low is presented. The LD+CF approach provides results very similar to those of HD in much less time. The use of these combined deterministic/Collaborative Filtering techniques allows the estimation of radio propagation in large complex scenarios with a potentially large amount of transceivers, which are expected to be very common scenarios with the rapid evolution of 5G systems and the IoT.

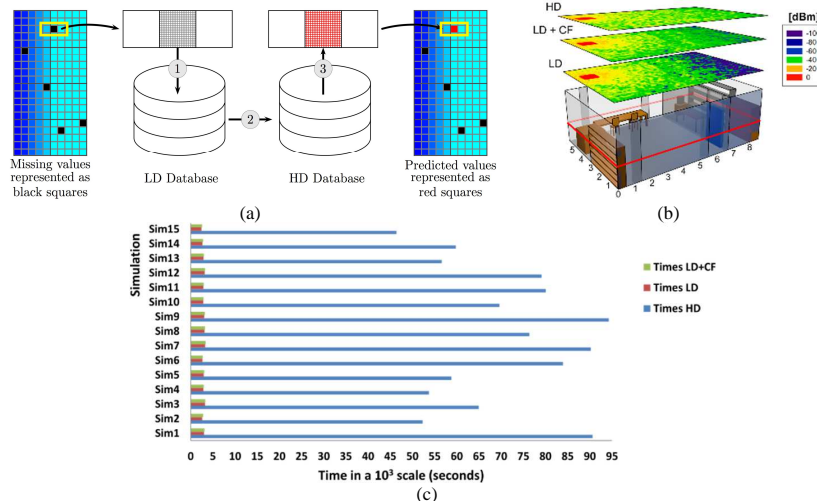


Figure 1. (a) Missing values prediction, (b) RF power level estimation when employing HD (top), LD+CF (middle) and LD (bottom), (c) Required computational time comparison of LD, LD+CF and HD for different simulated scenarios.