

# Abstract

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## **A Coherent Performance for Noncoherent Wireless Systems Using AdaBoost Technique**

Boosting is a machine learning approach built upon the idea of producing a highly precise prediction rule by combining many relatively weak and imprecise rules. The Adaptive Boosting (AdaBoost) algorithm was the first practical boosting algorithm. It remains one of the most broadly used and studied, with applications in many fields. In this paper, the AdaBoost algorithm is utilized to improve the bit error rate (BER) of different modulation techniques. By feeding the noisy received signal into the AdaBoost algorithm, it is able to recover the transmitted data from the noisy signal. Consequently, it reconstructs the constellation diagram of the modulation technique. This is done by removing the noise that affects and changes the signal space of the data. As a result, AdaBoost shows an improvement in the BER of coherently detected binary phase shift keying (BPSK) and quadrature phase shift keying (QPSK). The AdaBoost is next used to improve the BER of the noncoherent detection of the used modulation techniques. The improvement appears in the form of better results of the noncoherent simulated BER in comparison to that of the theoretical noncoherent BER. Therefore, the AdaBoost algorithm is able to achieve a coherent performance for the noncoherent system. The AdaBoost is simulated for several techniques in additive white Gaussian noise (AWGN) and Rayleigh fading channels so, as to verify the improving effect of the AdaBoost algorithm.