

A Comparative Study of Machine Learning-Driven Feedback-Free Adaptive Modulation and Coding for Massive MIMO

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Abstract: Adaptive Modulation and Coding Scheme (AMC) is a critical component in modern wireless systems to optimize spectral efficiency under varying channel conditions. Traditional AMC relies on user feedback such as Channel Quality Indicators (CQI), introducing latency and overhead, particularly in dense massive MIMO deployments. This paper surveys recent advancements in feedback-free AMC using machine learning (ML), focusing on the base paper by An et al., which uses CNN-LSTM architectures to infer optimal MCS from channel state information (CSI) without CQI feedback. We extend this by comparing other ML paradigms such as Deep Reinforcement Learning (DRL), Graph Neural Networks (GNNs), and Transformers, highlighting their potential and limitations. Experimental benchmarks, architecture insights, proposed methodology, and future research directions are also discussed.

Keywords: Adaptive Modulation, Machine Learning, Wireless Communication, Massive MIMO

