# MACHINE LEARNING APPLIED TO FULL DUPLEX COMMUNICATIONS

João Rafael Barbosa de Araujo, NULL, Francisco Rafael Marques Lima

Full duplex is one of the candidates to solve some of the challenges for the next telecommunication generations that once more thrives towards faster and more reliable data transfer. However, using full duplex comes with its own set of challenges, since more interference is introduced by transmitting uplink and downlink information at the same transmission time interval (TTI) and the same channels. This interference might be mitigated by properly selecting the user pairs that are transmitting simultaneously. The user selection isn't straight forward since the interference caused between terminals isn't known by the base station and that causes the complexity to rapidly increases with more users. Existing techniques can achieve suboptimal allocation, however they don't scale well for large networks in real-world scenarios due to computational complexity and instantaneous cross-cell channel state information (CSI) requirement. To tackle this problem, we propose using a Machine Learning technique, where a Q-learning approach has been used to choose the user pair communicating for each time interval. The algorithm will explore the different combinations and choose a good pair of users for different scenarios. In addition, our proposed algorithm sets a balance between throughput and QoS by adjusting the reward perceived by the Q-learning agent. This can be understood as the balance between throughput and fairness, where the algorithm adapts accordingly. The results show that our approach has great potential for improving the state of the art for full duplex applications

Palavras-chave: full duplex, machine learning, wireless communications.