

Deep Learning to Improve the 5G NR Uplink Control Channel

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Abstract : The wireless communications system (5G) will provide more diverse applications and higher quality services for users compared to the long-term evolution 4G (LTE). 5G uses a higher carrier frequency, which suffers from information loss in 5G coverage. Most 5G users often cannot obtain high-quality communications due to transmission channel noise and channel complexity. Physical Uplink Control Channel (PUCCH-NR: Physical Uplink Control Channel New Radio) plays a crucial role in 5G NR telecommunication technology, which is mainly used to transmit link control information uplink (UCI: Uplink Control Information). This study based of evaluating the performance of channel physical uplink control PUCCH-NR under low Signal-to-Noise Ratios with various antenna numbers reception. We propose the artificial intelligence approach based on deep neural networks (Deep Learning) to estimate the PUCCH-NR channel in comparison with this approach with different conventional methods such as least-square (LS) and minimum-mean-square-error (MMSE). To evaluate the channel performance we use the block error rate (BLER) as an evaluation criterion of the communication system. The results show that the deep neural networks method gives best performance compared with MMSE and LS

Keywords : 5G network, uplink (Uplink), PUCCH channel, NR-PUCCH channel, deep learning

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