Denoising CNN Based Channel Estimation for Vehicular OTFS Communication System

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***Abstract*—The orthogonal time-frequency space (OTFS) technique can convert the double dispersive channel in the time frequency (TF) domain into a time-invariant channel in the delayed-Doppler (DD) domain through a series of two dimensional transformations, which shows promising applications in high speed vehicular communication scenarios. As a key part in OTFS system, conventional pilot-based channel estimation schemes have obvious drawbacks, such as low accuracy and poor robustness to mobility. In this paper, we propose a denoising convolutional neural network (DCNN) based channel estimation scheme in OTFS system for high-speed vehicular communications by introducing hybrid dilated convolution (HDC) and residual paths into convolutional neural network (CNN). Simulation results show that the DCNN method can achieve fast DD domain channel estimation with lower complexity compared with the conventional schemes. Meanwhile, it is robust to different vehicle speeds while satisfying high accuracy in channel estimation.**

***Keyword*—OTFS, vehicular communication, channel estimation, OMP**

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