**第十一届浙江工业大学“健行”本科生学术论坛征文**

**导师推荐表**

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| 论文题目 | GRCR-Net: A Complex Residual Network with GPR Denoising and Rotational Augmentation for Automatic Modulation Classification | | | | | | |
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| 论文摘要 | Automatic Modulation Classification (AMC) is a key technology in intelligent wireless communications, crucial for enhancing spectral efficiency and network performance. However, existing deep learning methods suffer from a significant degradation in classification accuracy under low Signal-to-Noise Ratio (SNR) conditions. This paper addresses this issue by proposing an AMC method. This method uniquely integrates three core techniques: First, adaptive Gaussian Process Regression (GPR) is employed for signal denoising, achieving optimal denoising effects at different noise levels through an SNR-adaptive length-scale adjustment strategy. Second, rotational data augmentation is utilized based on the geometric symmetry of modulation signal constellation diagrams to enrich the training data. Finally, a hybrid complex convolutional-residual network architecture is designed. This architecture combines the advantages of Complex Convolutional Networks (ComplexCNN) in processing complex I/Q signals and preserving phase information with the characteristics of Residual Networks (ResNet) in deep feature learning and gradient stability. Experimental results on the RML2016.10a dataset show that the proposed method achieves a classification accuracy of 65.38%, significantly outperforming current state-of-the-art methods. This research provides a robust solution for modulation recognition in complex electromagnetic environments and is of great significance for the development of cognitive radio and next-generation intelligent communication systems. The code is open-sourced at: https://github.com/LJK666666666/radioML-v3 | | | | | | |
| 原创申明 | 本论文由作者独立研究创作，未使用任何未标注来源的内容，未曾在学术期刊、会议或网络平台公开发表。  （所有作者签字）  年 月 日 | | | | | | |
| 导师推荐  意见 | 该论文针对低信噪比环境下识别精度下降的问题，提出了一套系统性的解决方案。作者巧妙地将自适应高斯过程回归（GPR）去噪、旋转数据增强及混合复数残差网络相结合，设计了GRCR-Net算法，并实验验证了算法有效性。论文的研究思路清晰，其部分性能指标超越了现有方法，具备一定的学术价值。  综上，特此推荐其参与本次学术论坛交流。  （签 字）  2025年 6月 10日 | | | | | | |