Special Issue

Next-Generation Channel Coding: Theory and Applications

Message from the Guest Editors

Channel coding is essential for ensuring data integrity in digital communication. Originating from Shannon's 1948 paper, which proved codes can achieve near-zero error rates below channel capacity, the field has advanced significantly. Breakthroughs like turbo codes, polar codes, and LDPC codes now enable near-capacity performance with practical complexity, leading to their adoption in 5G, broadcasting, and space communications. As 6G and emerging applications (e.g., XR, autonomous vehicles, smart infrastructure) demand higher speeds, reliability, and lower latency/power, novel coding schemes must address diverse requirements. Efficient hardware architectures are also needed to realize theoretical gains cost-effectively. This Special Issue highlights advancements in coding theory and implementation for next-generation systems.

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The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.
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