



Hamilton Institute

Polar Codes in Communication Networks

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Abstract: The two central topics of information theory are the compression and the transmission of data. Shannon formalized these problems and determined their fundamental limits. Polar coding is a recent channel coding technique invented by Arikan to achieve the 'symmetric capacity' of binary-input memoryless channels.

Subsequently it was observed by Korada and Urbanke that such codes are also good for lossy source coding, achieving the 'symmetric rate distortion' bound, when the representation alphabet is binary. Also they showed that such codes are also good for general memoryless channels without feedback and several other multiterminal settings.

In this talk, I will apply polar codes to achieve the capacity of symmetric degraded relay channels. The main novelty is to show how polar codes can implement block Markov coding in this degraded setting, and to consequently yield a low complexity method to achieve "decode-and-forward" rates. The encoding and decoding complexities and the error performance of these codes are as in the single-user case: $O(N \log N)$ for encoding and decoding, and $O(-\exp(-\sqrt{N}))$ for block error probability, where N is the block length.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 3.00pm - 4.00pm

Travel directions are available at www.hamilton.ie