

On the Finite Length Scaling of q -ary Polar Codes

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The polarization process of polar codes over a prime q -ary alphabet is studied. It has been shown by Guruswami and Xia, that the blocklength of polar codes with prime alphabet size scales polynomially with respect to the inverse of the gap between code rate and channel capacity. However, except for the binary case, the degree of the polynomial in the bound is extremely large.

In this talk, a different approach to computing the degree of this polynomial for any prime alphabet size is shown. This approach is based on computing a lower bound on the polarization step, and involves concave minimization over a convex region.

This method yields a lower degree polynomial for various values of the alphabet size that were examined. It is also shown that even lower degree polynomial can be computed with an additional numerical effort.

This talk is based on a joint work with David Burshtein.