

A Deterministic Algorithm for the Capacity of Finite-State Channels

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Abstract: In this talk, we focus on the capacity of finite-state channels with input constraints. In particular, we consider the finite-state channels whose input is an irreducible Markov chain with the finite-type mixing constraint. For this kind of channels, we first propose a deterministic algorithm to compute their channel capacity. The convergence analysis of the first algorithm is proved under some concavity assumptions. In general, this algorithm is efficient in the sense that, for a general finite-state channel, it achieves a polynomial accuracy in a polynomial time, and for some special families of finite-state channels, it achieves an exponential accuracy in a polynomial time. At last, by further modifying our first algorithm, another algorithm is proposed to handle the case where the concavity assumption is not available. The local convergence of this algorithm is also given under some regularity assumptions.