

Exponential strong converse revisited

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The strong converse for a coding theorem claims that the optimal asymptotic rate possible with vanishing error probability cannot be improved by allowing a fixed error probability. In order to prove such a claim for multi-user information theory problems, such as the source coding with coded side-information, Ahlswede, Gács, and Körner introduced the tool termed the blowing-up lemma. Later, Marton provided a simple proof of the blowing-up lemma, which is now known as an important methodology to prove measure concentration. The exponential strong converse further claims that, if a coding rate is beyond the asymptotic limit, the correct decoding probability converges to zero exponentially. Even though the tight strong converse exponent for point-to-point problems have been identified, the strong converse exponent for multi-user problem have been unsolved until recently. In this talk, we present the recently obtained result by Takeuchi and Watanabe providing the tight exponential strong converse for the source coding with coded side-information. Instead of the blowing-up lemma, the proof is based on manipulations of information quantities as in the weak converse argument (called “change-of-measure argument”). We also discuss connection to Marton’s work.