Exponential Strong Converse Theorems for Source and Channel Networks

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ABSTRACT

For two or multi terminal source or channel coding systems the converse coding theorems state that at any transmission rates exceeding the fundamental theoretical limit of the system the error probability of decoding *can not go to zero* when the block length n of the codes tends to infinity. On the other hand the strong converse theorems state that at any transmission rates exceeding the fundamental theoretical limit the error probability of decoding *must go to one* when n tends to infinity. Specifically, if the error probability of decoding tends to one or equivalently the correct probability of decoding tends to zero exponentially, we say that we have the exponential strong converse theorem. In this talk, we introduce the author's previous works on the exponential strong converse theorem source or channel networks. In those previous works the author propose a new unified method to prove strong converse theorems for several multitermial source or channel networks. The new method consists of two processes shown below:

1. Multi-letter expression on the lower bound of the optimal exponent function is expressed in the form of a max-min optimization on the moment generating function with respect to the information spectral quantity.
2. In the single-letterization of the multi-letter lower bound we introduce a new method called the recursive method.

The second process is the most important and original part in establishing the exponential strong converse theorems.

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