International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 3 No. III (2009), pp. 21-33

THE MINIMUM ERROR PROBABILITY DECODING FUNCTION AND THE CHANNEL CAPACITY IN UNIVERSAL CHANNEL CODING

RYO NOMURA AND TOSHIYASU MATSUSHIMA

Abstract

The channel coding problem is one of the most fundamental and important problems in communication systems. In the channel coding problem there are several topics. One of that is to reveal the decoding function that minimizes the (decoding) error probability given the output of the channel. The another one is to show the channel capacity which means the maximum coding rate under the condition that the error probability is smaller than or equal to some small constant. In this paper, we consider the case that we do not know the parameter of the channel, but we know the class of the channel and the prior probability of the parameter. Then we introduce the decoding function which minimizes the probability of error with respect to the Bayes criteria. Moreover we introduce a universal channel capacity from the viewpoint of the Bayes risk. Then we show the introduced universal channel capacity.

———————————————————

Key Words : Universal Channel Coding, Error Probability, Channel Capacity, Bayes Decision Theory