OPTIMAL LEARNING RECOGNIZER FOR UNKNOWN SIGNAL SETS IN A CHANNEL
WITH FEEDBACK LINK

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ABSTRACT

A general Kalman filter type supervised optimum quadric dichotomizer for an on-off sequence of unknown signal is presented. Then, the optimum analogue feedback is obtained which makes the average of forward signal transmission energy minimum. The extension of the proposed machine to nonsupervised problems is also discussed. The effectiveness of a feedback method over a non-feedback method is clarified. It is also tested by computer simulation.

I. INTRODUCTION

In some communication channels such as in space communications, it is a good assumption that the forward channel in the satellite-to-ground direction may be considered to be limited in the available transmission energy and be liable to be contaminated by additive noises. On the contrary, the ground power in the reverse direction can be taken much larger than in the forward direction. For such a case, feedback communication methods have been proposed so as to enhance the efficiency of the forward channel. In this paper, an optimum communication method in an on-off communication system with feedback link for an unknown signal waveform is described. Since a secondary radar for aircraft, etc. may also be regarded as a feedback communication system, the proposed method can also be applied to such problems.

In the dichotomization of an unknown signal is estimated from noisy measurements and then the measurement is dichotomized based
Fig. 1. Feedback communication system.