SENSITIVITY OF NEURAL NETWORKS WHICH APPROXIMATE THE NEYMAN−PEARSON DETECTOR TO THRESHOLD VARIATIONS (WedPmOR11)

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Abstract :

The application of adaptive systems trained in a supervised manner to approximate the Neyman−Pearson detector is considered. The general expression of the function approximated when using the LMSE criterion is calculated. To evaluate the sensitivity of the decision rule based on this function to threshold variations, a novel strategy is proposed based on the calculus of the partial derivative of the probabilities of detection and false alarm with respect to detection threshold. Results allow us to explain the dependence of the decision rule performance on design parameters such as the prior probabilities, the desired outputs and the signal to noise ratio selected for training (TSNR). In previous works based on a trial and error strategy, TSNR has appeared as a critical parameter, but until now, no effort had been made to explain it. As an example, the detection of gaussian signals in gaussian interference is considered.

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