NONPARAMETRIC APPROACHES TO SOME PROBLEMS

FOR DEPENDENT AND INDEPENDENT DATA

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The use of nonparametric techniques is investigated in dependent and independent data analysis problems. The problem involving independent data is to test the hypothesis that k random samples are all taken from the same distribution against the alternative hypothesis that the distributions differ in any manner except a location change. The approach involves comparing the sample entropy of the k samples using recent developments in nonparametric estimation of entropy. The power of the entropy-based hypothesis test is investigated in a series of simulations. The simulations show that the test has good power properties, especially when compared to the commonly used Kolmogorov-Smirnov test.

The dependent data problem involves estimating the coefficients in a linear time series model with an additive error term. Two variations on the model are considered: the case where the unknown coefficients represent fixed parameters and the case where the coefficients are random. In both cases the approach involves carrying out the estimation in the frequency domain where the model is simplified. The estimators considered in the two cases are similar with an important difference: the random coefficient case requires a biasing term based on the "signal to noise" ratio. Estimation of this ratio poses an interesting problem for which the EM algorithm is well suited. In both the random and fixed coefficient cases the estimators are shown to provide good accuracy in recovering the signal for simulated data. A bootstrap method is used to create confidence intervals.