



“Intelligent Feature Selection Techniques for Pattern Classification of Time-Domain Signals”

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Abstract

Time-domain signals form the basis of analysis for a variety of applications, including those involving variable conditions or physical changes that result in degraded signal quality. Typical approaches to signal analysis fail under these conditions, as these types of changes often lie outside the scope of the domain's basic analytic theory and are too complex for modeling. Sophisticated signal processing techniques are required as a result. In this work, we develop a robust signal analysis technique that is suitable for a wide variety of time-domain signal analysis applications. Statistical pattern classification routines are applied to problems of interest involving a physical change in the domain of the problem that translate into changes in the signal characteristics. The basis of this technique involves a signal transformation known as the Dynamic Wavelet Fingerprint, used to generate a feature space in addition to features related to the physical domain of the individual application. Feature selection techniques are explored that incorporate the context of the problem into the feature space reduction in an attempt to identify optimal representations of these data sets.