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An Iterative Approach to Optimal Non-Uniform Sampling and Instantaneous Bandwidth Estimation

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Abstract

A new approach to the representation and reconstruction of non-bandlimited signals using non-uniform sampling schemes is introduced. The proposed method is based on estimation of a time-distortion transformation, under which the original signal becomes bandlimited and can thus be reconstructed. This method is optimal in the sense that it requires the minimal sampling rate for exact reconstruction of the signal. The estimation is iterative, and can be used with most available techniques of localized bandwidth approximation. An application suitable for Synthetic Aperture Radar (SAR) is given as an example. The resultant mapping can also be considered as a new means for the definition of local bandwidth.