

ELECTRICAL ENGINEER

ANALYSIS OF MULTIRATE RANDOM SIGNALS

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Multirate digital signal processing techniques have been developed in recent years for a wide range of applications, such as speech and image compression, digital audio, statistical and adaptive signal processing, numerical solution of differential equations and many other fields.

The purpose of this thesis is to extend optimal filtering techniques to random signals sampled at different rates. In particular, two major problems are considered: (1) optimal filtering of two sets of observations at different sampling rates as a multirate Wiener filter, and (2) linear prediction on successive samples of a random process. In the first problem it is shown that the standard Wiener filter can be extended to the multirate case, while preserving its optimality. In the second problem it is shown that multichannel linear prediction on successive samples of a process, yields orthogonal uncorrelated innovations.

DoD KEY TECHNOLOGY AREAS: Electronics, Computing and Software, Sensors

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