Low Complexity Signal Space Detector for DVD Channel

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Signal Space Detector uses One Hyperplane

A signal space detector (SSD) that uses only a single hyperplane offers nearly the same performance as the fixed delay tree search with decision feedback (FDTS/DF). The SSD technology, which can be applied to a variety of systems, including DVD channels, estimates a channel input symbol by detecting input symbols from a finite number of observation samples that define an observation vector. A multi-dimensional space, including first and second regions that correspond to first and second opposite symbols, respectively, is defined. The first and second regions are separated by a single hyperplane. The SDD process determines whether the observation vector is a first or second symbol (depending on which region the observation vector falls into) and releases a corresponding hard decision (e.g., a binary simple decision). Analysis and simulation results verify the performance advantage of the SSD over partial response based threshold and Viterbi detectors. The distance between the received signal and the single hyperplane can be interpreted as soft information, which can be used along with iterative and probabilistic error connection codes such as low density parity check codes, resulting in large performance gains. Furthermore, when jitter noise is significant, the slope of the hyperplane decision boundary can be readily adjusted to improve the performance beyond that of the standard FDTS/DF detector.

Adjustable for Jitter Noise

Data communication systems and data storage systems, such as DVD systems, generally require signal processing techniques. At high densities, readback signals suffer severely from bit crowding or inter-symbol interference and have very poor signal-to-noise ratio. Conventional readback processing, such as that which involves run-length limited codes with peak detection and some readback equalization is becoming inadequate at very high densities. This SSD technology is low complexity and can be adjusted for jitter noise.

BENEFITS AND FEATURES:

- Single hyperplane
- Low complexity
- Adjusts for jitter noise
- Performance comparable to FDTS/DF

APPLICATIONS:

- Data communication systems
- Data storage systems
- DVD systems
- Symbol detection

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