

VLSI IMPLEMENTATION VITERBI DECODER

ABSTRACT

Viterbi decoding is the best known implementation of the maximum likely-hood decoding. Here we narrow the options systematically at each time tick. The principal used to reduce the choices is this

1. The errors occur infrequently. The probability of error is small
2. The probability of two errors in a row is much smaller than a single error that is the errors are distributed randomly.

The viterbi decoder examines an entire received sequence of a give length. The decoder computes a metric for each path and makes a decision based on this metric. All paths are followed until two paths converge on one node. Then the path with the higher metric is kept and the one with lower metric is discarded or vice versa. The paths selected are called survivors. For an N bit sequence, total number of possible received sequence is 2^N , of these only 2^{kl} are valid. The viterbi algorithm applies the maximum-likelihood principles to limit the comparison to 2 to the power of KL surviving paths instead of checking all paths. The most common metric used is hamming distance metric for hard decision decoding. We're going to compute a metric to measure the "distance" between what we received and all of the possible channel symbol pairs we could have received.