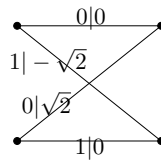# Viterbi Example for AMI

Phil Schniter

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Consider the AMI trellis below, whose edges are labelled as "bit|symbol," i.e., "$I^{(l)}|\tilde{D}_z^{(l)}$," and which requires $\nu = 1$ termination symbol:

Say that $K_b = 3$ information bits where transmitted and the receiver observed the matched filter output sequence $[Q^{(1)}, \ldots, Q^{(4)}] = [-\sqrt{2}, \sqrt{2}, -2\sqrt{2}, \sqrt{2}]$. The Viterbi algorithm works as follows:

	$\ell = $	1	2	3	4
$\Delta^{(\ell-1)} = $		$\begin{bmatrix} 0 \\ \infty \end{bmatrix}$	$\begin{bmatrix} 2 \\ 0 \end{bmatrix}$	$\begin{bmatrix} 0 \\ 2 \end{bmatrix}$	$\begin{bmatrix} 8 \\ 2 \end{bmatrix}$
$Q^{(\ell)} = $		$-\sqrt{2}$	$\sqrt{2}$	$-2\sqrt{2}$	$\sqrt{2}$
$\lvert Q^{(\ell)} - d_{1,1}\rvert^2 = $		$\lvert -\sqrt{2} - 0\rvert^2 = 2$	$\lvert \sqrt{2} - 0\rvert^2 = 2$	$\lvert -2\sqrt{2} - 0\rvert^2 = 8$	$\lvert \sqrt{2} - 0\rvert^2 = 2$
$\lvert Q^{(\ell)} - d_{2,1}\rvert^2 = $		$\lvert -\sqrt{2} - \sqrt{2}\rvert^2 = 8$	$\lvert \sqrt{2} - \sqrt{2}\rvert^2 = 0$	$\lvert -2\sqrt{2} - \sqrt{2}\rvert^2 = 18$	$\lvert \sqrt{2} - \sqrt{2}\rvert^2 = 0$
$\lvert Q^{(\ell)} - d_{1,2}\rvert^2 = $		$\lvert -\sqrt{2} + \sqrt{2}\rvert^2 = 0$	$\lvert \sqrt{2} + \sqrt{2}\rvert^2 = 8$	$\lvert -2\sqrt{2} + \sqrt{2}\rvert^2 = 2$	—
$\lvert Q^{(\ell)} - d_{2,2}\rvert^2 = $		$\lvert -\sqrt{2} - 0\rvert^2 = 2$	$\lvert \sqrt{2} - 0\rvert^2 = 2$	$\lvert -2\sqrt{2} - 0\rvert^2 = 8$	—
$\Delta^{(\ell)} = $		$\begin{bmatrix} 2 \\ 0 \end{bmatrix}$	$\begin{bmatrix} 0 \\ 2 \end{bmatrix}$	$\begin{bmatrix} 8 \\ 2 \end{bmatrix}$	$\begin{bmatrix} 2 \\ - \end{bmatrix}$
$\underline{\hat{I}}_1^{(\ell)} = $		$[0]$	$[10]$	$[100]$	$[1010]$
$\underline{\hat{I}}_2^{(\ell)} = $		$[1]$	$[11]$	$[101]$	—