Homework #3: CMPT-825

Due in class on Sep 26, 2003

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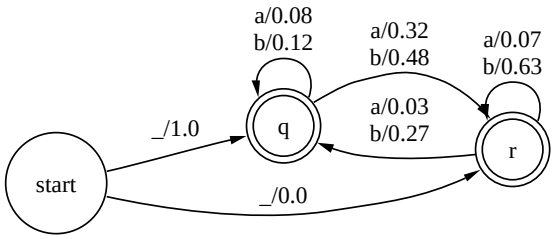
(1) (100pts) **Hidden Markov Models**

a. Change the probabilities in the HMM shown below such that the Viterbi algorithm will obtain the state sequence `qrrrq` given the input observation sequence `bbba`. You can experiment with this HMM on the spreadsheet `viterbi.xls` available in `/cs/825/data`.

	$p(\ldots \mid q)$	$p(\ldots \mid r)$
$p(a, q \mid \ldots)$	0.08	0.03
$p(b, q \mid \ldots)$	0.12	0.27
$p(a, r \mid \ldots)$	0.32	0.07
$p(b, r \mid \ldots)$	0.48	0.63



b. Prove that the following statements are true (see pages 326-331 of M&S):

$$P(O \mid \mu) = \sum_{i=1}^{N} \pi_i \beta_i(1)$$

$$P(O \mid \mu) = \sum_{i=1}^{N} \alpha_i(T+1)$$