

"Capacity of Channels with Feedback"

This paper proposes a general theory for the capacity of channels with feedback. It is a very heavy going paper. The notations are very abstract. There is a lack of examples that further make digesting this paper and evaluating its impact quite difficult. The results on general channels with memory are in terms of optimization of directed mutual information; they are of the infinite-letter variety and do not seem computable. The more interesting results are on Markov channels. Here the authors showed that computing capacity in this case is equivalent to an average cost dynamic programming problem. They claimed that this is an implicit single-letter characterization. However, the state space is not the original state space but is the conditional distribution of the state given the past input and output to the channel. This means that even if the original state space is finite, the new state space is uncountably infinite. So since average cost DP programming is an optimization over the policies on this infinite state space, this is an infinite-dimensional optimization problem. So is it clear this is a single-letter characterization?

The lack of examples is really jarring. Even within the class of Markov channels, there are no concrete examples. In fact, one natural example would have been Gauss-Markov channels. How does the author's result specialize to this case? Can one recover Young-Han Kim's results?