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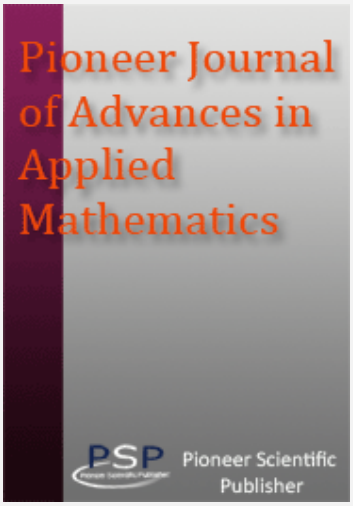

AN ALGORITHM FOR A DISCRETE DISCOUNTED STOCHASTIC PROGRAM WITH INCREASING LINKAGES BETWEEN STATE VARIABLES

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Abstract

We develop an algorithm for solving an infinite horizon discrete time stochastic program with discounting of future single period payoffs and strictly increasing linkages between state variables. Expected value of each state variable over successors of the current state is strictly increasing in the current value of that variable, as well as in action affecting it taken at the current state. Uncertainty is captured by a Markov chain with countable, possibly infinite, state space. Sets of feasible actions are finite. Expected single period payoff at each state is strictly increasing in each state variable. A strategy assigns to each state a feasible action at it. An optimal strategy maximizes the sum of discounted expected single period payoffs. We develop a basic algorithm (and then its simplified version for special cases) that gives for each state the prescription of an optimal strategy for it, without specifying prescriptions for other states.

Keywords and phrases: stochastic program, Markov decision process, discounting, open-ended solution, strictly increasing linkages between state variables.