

**Abstract:**

The linear programming approach to approximate dynamic programming has received considerable attention in the recent network revenue management literature. A major challenge of the approach lies in solving the resulting approximate linear programs (ALPs), which often have a huge number of constraints and/or variables. We show that the ALPs can be dramatically reduced in size for both affine and separable piecewise linear approximations to network revenue management problems, under both independent and discrete choice models of demand. Central to our result is the connection between each ALP and the Dantzig-Wolfe reformulation of a reduced program, which is more compact in size and admits an intuitive probabilistic interpretation. Numerical results show that the reduced programs lead to competitive computational performance using off-the-shelf commercial solvers on a set of test instances taken from the literature.