On the Stochastic Knapsack Value Function for Random Items of Multiple Classes

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Abstract

We consider a stochastic knapsack problem that packs random items of different classes. The pairs of profit and space requirement for items of the same class are independent and identically distributed. However, such pairs for items of different classes are independent but not necessarily identically distributed. It is shown that when the knapsack capacity increases, the ratio of the knapsack value function to the capacity almost surely converges to a constant value. A formula for computing the asymptotic value is developed.