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Stochastic Linear Programming*

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Linear programming deals with the maximization of a linear form under linear inequalities. These inequalities can be transformed into equalities by the use of slack variables. We maximize $\phi = a'x$ (a and x column vectors of n components) under the conditions: $Bx = c$ (B a matrix, c a column vector of m components) and $x \geqq 0$. Select m values of a, x, c and m columns of B. Denote the selection $By^{(k)}$. Then $\phi^{(k)} = a^{(k)'}x^{(k)}$ requiring $x^{(k)} = B^{(k)-1}c^{(k)} \geqq 0$. The x is chosen for which $\phi^* = \max \phi^{(k)}$. Let the probability distribution of the elements of a, B, c be $P(a, B, c; v)$ where v is a set of controlled parameters. From P we derive the probability distribution of the maximand: $Q(\phi^*; v)$. We maximize the functional $g[Q(\phi;v)]$ with respect to v. A special case is $g = E\phi^*$, the mathematical expectation of the maximand.

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