# An Outcome Space Algorithm for Minimizing the Product of Two Convex Functions over a Convex Set

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**Abstract:** We consider the convex multiplicative programming problem

$$\min\ f_1(x)f_2(x)\ \ \text{s.t.}\ \ x \in X, \qquad (CP_X)$$

where $X \subset \mathbb{R}^n$ is a nonempty compact convex set, for each $j = 1, 2$, the function $f_j : \mathbb{R}^n \to \mathbb{R}$ is finite, positive and convex on $X$.

It is well known that problem $(CP_X)$ is a global optimization problem. Furthermore, problem $(CP_X)$ is known to be $NP$-hard, even in special case when $X$ is a polyhedron and $f_1, f_2$ are a linear function on $\mathbb{R}^n$ for each $i = 1, 2$. Because of its interesting mathematical aspects as well as its wide range of applications, this problem has attracted the attention of many mathematicians as well as engineers and economists. Many algorithm have been proposed for solving this problem.

This paper presents an outcome-space outer approximation algorithm for solving the problem of minimizing the product of two convex functions over a compact convex set in $\mathbb{R}^n$. The computational experiences are reported. The proposed algrithm is convergent.

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