One Class of Disjunctive Optimization Problems with Max-separable Functions.*

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Abstract

Optimization problems of the following form will be considered:
Minimize

$$f(\mathbf{x}) = f(x^{(1)}, \ldots, x^{(n)}) = \max_{j \in J} f_j(x^{(j)}) \tag{1}$$

subject to

$$x^{(j)} \in T_{ij} \text{ for at least one } j(i) \in J \text{ for each } i \in I \tag{2}$$

and

$$x^{(j)} \in Z_j \ \forall j \in J \ , \tag{3}$$

where for all $j \in J = \{1, \ldots, n\}$ and $i \in I = \{1, \ldots, m\}$, $f_j : R^{k_j} \rightarrow R^1$ are continuous functions, Z_j are given non-empty compact sets and T_{ij} are closed subsets of Z_j.
Functions of the form (1) will be called $max - separable$. Conditions under which the optimal solution of $(1) - (3)$ can be found after solving at most mn subproblems consisting in the minimization of $f_j(x^{(j)})$ subject to $x^{(j)} \in T_{ij}$, where $i \in I$, $j \in J$ will be formulated and the corresponding solution procedure will be suggested. Connection with optimization problems with a max-separable objective function and inequality constraints with max-separable functions will be presented. Possibilities of applications to operations research problems will be discussed.

*Under the support of 202-03/2060982 VZ