The mpTSPs Test Problems

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The test problem suite consists of data and computational results for 5 two-stage stochastic mixed-integer programs arising in City Logistics contexts. More precisely, given a graph characterized by a set on nodes connected by arcs, in the mpTSPs we consider that, for every pair of nodes, we have multiple paths between the two nodes. Each path is characterized by a random travel time which can be decomposed in the sum of a deterministic term and a stochastic term, which represents the travel time oscillation due to the path congestion.

The problem formulation is described in [1, 2], while the instance generation is reported in [2]. The problems have pure binary first-stage and second-stage variables. All possible discrete values that the random variable can assume, are represented by a set of 100 scenarios and are assumed to be exogenous to the problem. The data files are contained in the zipped folder MPTSPs.zip. The format is described in Format_Instance.txt contained in the data folder.

Instances

The following table presents the instance set. The instances are named MPTSPs_D*d*_*n*, where *d* is the number of potential server locations, *n* is the nodes distribution strategies [2] and *n* is the potential number of customers.

Table 1: Instance set

Name	Node distribution	Customers	Scenarios
MPTSPs_D0_50	City center	54	100
MPTSPs_D1_50	Suburban area	55	100
MPTSPs_D2_50	City center and Suburban area (3:1)	56	100
MPTSPs_D3_50	City center and Suburban area (1:1)	56	100
MPTSPs_D1_100	Suburban area	105	100

Results

Computational results are given in Table 2. The CPLEX 12.5 was used for solving the stochastic problems to optimality. For each instance we solved:

- Recourse Problem (RP)
- Expected result of Expected Value Problem (EEV)
- Generalized Loss Using the Skeleton Solution (GLUSS) [4]

Table 2: Computational Results

Name	RP	EEV	GLUSS 25%	GLUSS 50%	GLUSS 75%	GLUSS 100%
MPTSPs_D0_50	23544.2	24537.3	23544.2	24064.1	24278.4	24537.3
MPTSPs_D1_50	15250.7	15964.3	15250.7	15250.7	15821.8	15964.3
MPTSPs_D2_50	16509.8	16836.3	16509.8	16509.8	16631.5	16836.3
MPTSPs_D3_50	11898.7	12173.4	11898.7	11972.5	12090.1	12173.4
MPTSPs_D1_100	22094	22855.6	22094	22094	22119.7	22855.6

The complete solutions are included in the zipped folder containing data files.

References

[1] Roberto Tadei, Guido Perboli, Francesca Perfetti, The multi-path Traveling Salesman Problem with stochastic travel costs, *EURO Journal on Transportation and Logistics*, 2014

[2] Guido Perboli, Luca Gobbato, Francesca Maggioni, A Progressive Hedging method for the multi-path Traveling Salesman Problem with stochastic travel times, submitted to *Journal of Management Mathematics*, 2014

[3] Francesca Maggioni, Stein W. Wallace, Analyzing the quality of the expected value solution in stochastic programming, *Annals of Operations Research*, 2010

[3] Francesca Maggioni, Guido Perboli, Generalized skeleton solution in two-stage stochastic programming, in preparation