Instances description

Instances for the Heterogeneous Inventory Routing Problem with Batch Size (HIRP-BS) Available at https://perso.limos.fr/~diperdigao/research/HIRP-BS/instances/

Authored by Diego Perdigão Martino, Philippe Lacomme, Katyanne Farias

1 Sets and data

Sets/Data	Description
N	Set of customers
\mathcal{N}'	Set of customers and the supplier $(\mathcal{N}' = \mathcal{N} \cup \{0\})$
${\mathcal T}$	Set of T discrete time periods from 1 to $ \mathcal{T} $
\mathcal{T}'	Set of $T + 1$ discrete time periods from 0 to $ \mathcal{T} $ $(\mathcal{T}' = \mathcal{T} \cup \{0\})$
${\cal K}$	Set of available types of vehicles throughout the entire time horizon
\mathcal{K}^t	Set of types of vehicles at time period $t \in \mathcal{T}$
$m^{k,t}$	Number of vehicles of type $k \in \mathcal{K}^t$ available in period $t \in \mathcal{T}$
$\mathcal{B}^{k,t}$	Capacity of vehicle of type $k \in \mathcal{K}^t$
$f^{k,t}$	Fixed cost of using a vehicle of type $k \in \mathcal{K}^t$
$v^{k,t}$	Cost per unit of distance traveled with vehicle of type $k \in \mathcal{K}^t$
$c_{i,j}$	Distance from $i \in \mathcal{N}'$ to $j \in \mathcal{N}'$
r^t	Supplier production at time period $t \in \mathcal{T}$
d_i^t	Demand of customer $i \in \mathcal{N}$ at time period $t \in \mathcal{T}$
ℓ_i	Batch size for customer $i \in \mathcal{N}$
U_i	Maximum inventory level allowed for customer $i \in \mathcal{N}$
s_i	Initial inventory level of $i \in \mathcal{N}'$
h_i^t	Inventory holding cost of $i \in \mathcal{N}'$ at time period $t \in \mathcal{T}'$

Table 1: Description of sets and data

2 Parameters for data generation

Parameters	Generation method		
Customer demand (d_i^t)	rand([10, 100])	$\forall \ i \in \mathcal{N}, t \in \mathcal{T}$	
Inventory cost (h_i^t)	rand([0.1, 0.5])	$\forall \ i \in \mathcal{N}, t \in \mathcal{T}$	
Number of vehicle types per period (\mathcal{K}^t)	rand([1,6])	$\forall \ t \in \mathcal{T}$	
Number of vehicles of each type $(m^{k,t})$	rand([1,5])	$\forall \ t \in \mathcal{T}, \ k \in \mathcal{K}^t$	
Capacity of vehicle type k at period $t (B^{k,t})$	$\left[\frac{\sum_{i \in N} d_i^t}{ \mathcal{K}^t } \times rand([1, 1.5])\right]$	$\forall \ t \in \mathcal{T}, \ k \in \mathcal{K}^t$	
Fixed cost for vehicle type k at period t $(f^{k,t})$	rand([50, 150])	$\forall \ t \in \mathcal{T}, k \in \mathcal{K}^t$	
Variable cost for vehicle type k at period t $(v^{k,t})$	rand([0.5,3])	$\forall \ t \in \mathcal{T}, k \in \mathcal{K}^t$	
Maximum inventory allowed for customer $i(U_i)$	$\lceil max(d_i^t) \times rand([1,2]) \rceil$	$\forall \ i \in \mathcal{C}, t \in \mathcal{T}$	
Initial inventory level for customer $i(s_i)$	$\lceil U_i \times rand([0.2,1]) \rceil$	$\forall \ i \in \mathcal{N}$	
Batch size for customer $i(\ell_i)$	$\left\lceil \frac{d_i^t}{rand([5,8])} \right\rceil$	$\forall i \in \mathcal{N}, t \in rand([1, \mathcal{T}])$	
Supplier production at period $t(r^t)$	$\sum_{i \in \mathcal{N}} d_i^t \times rand([1.2, 2])$	$\forall \ t \in \mathcal{T}$	
Inventory holding cost of supplier at period t (h_0^t)	rand ([0.1, 0.5])	$\forall \ t \in \mathcal{T}$	
Initial inventory level of supplier (s_0)	$rac{\sum_{i\in\mathcal{N}}s_i^0}{2}$		

Table 2: Parammeters for the instances generation

3 Instances

The files of instances are organized in three categories according to their size. The files are named according to $A_B_C_D.dat$, in which: A corresponds to the instance size (small (s), medium (m) or large (l)); B represents the number of customers; C, the number of periods; and D, the instance type. The groups of instances are summarized in Table 3.

	Small-scale	Medium-scale	Large-scale
Number of instances	13	57	10
Number of periods	7	7, 14, 21, 28	7, 14, 21, 28
Number of customers	19	$19^*, 34, 46, 58, 83$	114,149,170,183

(*) Except for a time horizon with 7 periods

Table 3: Groups of generated instances for the HIRP-BS

4 readme

 $|\mathcal{N}|$ $|\mathcal{T}|$ for each period $t \in \mathcal{T}$ $t |\mathcal{K}^t|$ Vehicles data for each type $k \in \mathcal{K}^t$ of vehicle available $k m^{k,t} B^{k,t} f^{k,t} v^{k,t}$ $0 s_0$ for each period $t \in \mathcal{T}$ Supplier data $h_0^t r^t$ for each customer $i \in \mathcal{N}$ $i \quad s_i \quad U_i \quad \ell_i \quad h_i^t \quad d_i^t$ Customers data for each $i \in \mathcal{N}'$ for each $j \in \mathcal{N}'$ $c_{i,j}$