TSPR input file format

This document provides a description of the input file format for benchmark instances for the TSPR, as provided on the website `http://gent.cs.kuleuven.be/tspr`. The order in which the elements are described in this document corresponds to the order of the elements in the input file format.

1 File format

The first line shows general information regarding the instance:

`# Randomly generated data for the integrated task scheduling and personnel rostering problem, skilling=`σ `and tightness=`τ `seed=`ϵ

With σ the level of average skilling, τ the tightness of the instance and ϵ the random seed used to generate the instance.

1.1 Tasks

The tasks in the instance are described as follows:

`Tasks` $= \|T\|$		
$s(0)$	$e(0)$	$d(0)$
$s(1)$	$e(1)$	$d(1)$
...	...	...
$s(\|T\|)$	$e(\|T\|)$	$d(\|T\|)$

With $|T|$ the total number of tasks, followed by, for each task $t \in T$, its starting time $s(t)$, ending time $e(t)$, and day on which it is scheduled $d(t)$.

1.2 Shifts

The shifts are described as follows:

`Shifts` $= \|S\|$					
$sh(0)$	$sh^-(0)$	$sh^+(0)$	$l(0)$	$l^-(0)$	$l^+(0)$
$sh(1)$	$sh^-(1)$	$sh^+(1)$	$l(1)$	$l^-(1)$	$l^+(1)$
...	...	...	...	...	...
$sh(\|S\|)$	$sh^-(\|S\|)$	$sh^+(\|S\|)$	$l(\|S\|)$	$l^-(\|S\|)$	$l^+(\|S\|)$

With $|S|$ the total number of shifts, followed by, for each shift $s \in S$, its starting time $sh(s)$ and duration $l(t)$. For both these properties, allowed minimum and

maximum deviations are specified: $sh^-(s)$ and $sh^+(s)$ for the starting time, and $l^-(s)$ and $l^+(s)$ for the duration. Note that, in the current description of the TSPR, these deviations are set to zero; i.e. the shifts are completely fixed in time.

1.3 Employees

`Employees` $= |E|$
$|T_0|:$ T_0
$|T_1|:$ T_1
$\ldots$ $\ldots$
$|T_{|E|}|:$ $T_{|E|}$

With $|E|$ the total number of employees, and, for each employee $e \in E$, the total number of tasks $|T_e|$ for which e is qualified, followed by the actual tasks for which he is qualified T_e.

1.4 Days

The number of days $|D|$ is specified as follows:

`Days` $= |D|$

1.5 Constraints

The last part of the instance details the soft constraints, as follows:

`Shift constraints`
η^2 η^1
η_0^4 η_0^3
η_1^4 η_1^3
$\ldots$ $\ldots$
$\eta_{|S|}^4$ $\eta_{|S|}^3$
η^6 η^5
α
β
`Forbidden sequences` $= |N|$
s' s $_0$
s' s $_1$
$\ldots$ $\ldots$
s' s $_{|N|}$

These values specify the constraint definitions, following the notation used in [1], and detailed in Table 1.

References

[1] P. Smet, A. Ernst, and G. Vanden Berghe. Heuristic decomposition approaches for an integrated task scheduling and personnel rostering problem. Technical report, KU Leuven, 2015.

N	set containing pairs of shifts (s', s) which cannot be assigned consecutively
η^1, η^2	Maximum, minimum number of days worked
η^3_s, η^4_s	Maximum, minimum number of days with shift s assigned
η^5	Maximum number of consecutive days worked
η^6	Maximum number of consecutive days-off
α	Boolean value which is true if isolated days-off are forbidden
β	Boolean value which is true if complete weekends are required

Table 1: Notation