Walking Bus Challenge: technical details

Federico Malucelli[1] and Emanuele Tresoldi [*1]

[1]DEIB - Politecnico di Milano

January 16, 2017

Solver input

The solver must read a plain text file (*.dat* extension) as input and must be able to take the input file name (or the input file complete path) as command line argument.
E.G. command line on a Windows system:

```
solvername.exe C:\path\instancename.dat
```

Input file format

The input file contains the description of the instance using AMPL syntax (can be easily read in any programming language). An example of input file is reported below.

Input File Example

```
data;
param n := 10
;

param alpha := 1.46
;

param coordX [*] :=
 0  46
 1  34
 2  55
 3  46
 4  57
 5  27
 6  13
 7   2
 8  51
 9  48
10  43
;
```

[*] emanuele.tresoldi@polimi.it

```
param coordY [*] :=
 0  31
 1  19
 2  54
 3  16
 4  42
 5  16
 6  40
 7   8
 8  35
 9  51
10  35
;

param d [*,*]:
0 1 2 3 4 5 6 7 8 9 10  :=
0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
1 0.97 0.00 0.62 0.85 0.65 0.73 0.96 0.39 0.08 0.52 0.10
2 0.95 0.84 0.00 0.24 0.96 0.53 0.82 0.43 0.54 0.68 0.14
3 0.98 0.68 0.44 0.00 0.93 0.77 0.18 0.06 0.39 0.85 0.04
4 0.92 0.22 0.74 0.25 0.00 0.83 0.42 0.73 0.82 0.66 0.53
5 0.96 0.61 0.99 0.26 0.06 0.00 0.60 0.14 0.21 0.69 0.62
6 0.98 0.81 0.09 0.43 0.66 0.20 0.00 0.78 0.60 0.03 0.17
7 0.98 0.15 0.87 0.56 0.04 0.27 0.78 0.00 0.03 0.15 0.91
8 0.96 0.65 0.08 0.87 0.14 0.09 0.81 0.90 0.00 0.35 0.24
9 0.95 0.63 0.55 0.85 0.86 0.52 0.33 0.35 0.34 0.00 0.96
10 0.99 0.24 0.34 0.84 0.81 0.64 0.18 0.69 0.46 0.94 0.00
;
```

In the input file, n is the number of nodes in the graph (node 0 is the school), *alpha* is the maximum ratio between the distance, along the solution paths, from a node to 0 and the shortest path from the node to 0, *coordX* and *coordY* are the x and y coordinates of the nodes in the graph. Distances among nodes are linear and can be easily computed starting from the coordinates using the Pythagorean theorem (consider 4 decimal places). Matrix d is the dangerousness of the path connecting a node (row) to another (column).

Solver output

The solver must write a solution file containing the best solution found. The output file is a plain text file. The name of the output file is the same as the input file but with a different extension: *.sol* instead of *.dat* (e.g. if the input file name is *instance*1*.dat* then the output file name must be *instance*1*.sol*.). The output file must be written in the same location (directory) where the solver is located.

Output file format

The solver must write in a file the best feasible solution found, if any, within the time limit (1 hour). The output file is the list of the arcs used in the solution. Arcs are identified by pairs of nodes separated by a blank space and are listed, in no particular order, one arc per line.

Output File Example

```
1 10
2 9
3 0
4 8
5 3
6 10
7 1
8 0
9 4
10 0
```

Checker

The checker is a piece of software that can be used in order to verify the feasibility of the solution found by your solver. The checker is written in python 2.7 and does not required any additional library or package, it runs on any operating system with python 2.7 installed.

The checker is a text only software, no GUI available.

It can be run from the terminal (the shell of your operating system) with the following syntax:

```
python pedibus_checker.py <instance.dat> <solution.sol>
```

E.G. running the checker:

```
python pedibus_checker.py ../pedibus_10.dat ../pedibus_10.sol
```

If the solution submitted to the checker is a feasible solution for the instance it write a message on the screen with the value of the solution in terms of number of leaves and dangerousness.

E.G. feasible solution:

```
Feasible solution, leaf: 4 danger: 4.29
Value for the challenge: 4.429
```

If the solution is not feasible it prints a message with some details on the reason of the infeasibility.

E.G. not feasible solution:

```
Not feasible: path from 2 to 0 is longer than 1.17 times
 the shortest path from 2 to 0 ( 8.3592 > 8.273187 ).
```

Test Solutions Submission

For comparison and auto-evaluation purpose, students can send solution found on test instances to:

`emanuele.tresoldi@polimi.it` .

All solution will be validated and the results will published on a challenge board.

The challenge board can be found here:

https://docs.google.com/spreadsheets/d/1vu-ZyruqcY3KohLknv1w7zbgpgl6hKqYa0eK4yCwgqw/edit?usp=sharing