MBT Experiments

October 30, 2020

This text contains a description of how to perform experiments with MBT ILP models.

1 Structure of the directory `experiments/`

- `data/` - instancefiles to be solved
- `logs/` - log files for elapsed time (`timelog.txt`) and objective function value (`objlog.txt`)
- `manual/` - this manual
- `models/` - ILP models coded in AMPL
- `old/` - old version of the experiment scripts (no need to bother about them)

2 Running the experiment

The main script for running the experiments is `mbtrun.sh`. The script is executed by typing

```
./mbtrun.sh [path to directory with input files] <time limit>
```

from the directory `experiments/` (where `mbtrun.sh` is located). If the optional parameter ¡time limit¿ in seconds is not specified, the default value (3600s) applies.

3 Input data

The input data files are not expected to follow any specific naming convention. The instances is encoded as

```
cardV cardS cardE
v1 v2
v1 v3
v2 v4
...
lb ub
```

where `cardV` is the number of nodes, `cardS` is the number of sources (the sources have indices 0 - `cardS`-1, and `cardE` is the number of edges (potential communiction links). Finally `lb` and `ub` denote lower and upper bound on the optimal solution, respectively. There must not be any other characters. An example of an input file representing a path on 9 nodes with one source "0" look as follows:

```
9 8 1
0 1
1 2
2 3
3 4
4 5
5 6
6 7
7 8
4 12
```

4 How it works

The script iterates over all filenames in the input directory and reads the data from them. We study two models, let's call them *maxInformed* and *minTime*. Both models are written in `models/MBT-combined.mod`. It contains two ob-

jective functions and with the help of commands `drop [constraint_name]` and `restore [constraint_name]` is specified, which constraints are used for which model. Once the data is loaded, the script runs LP relaxation of the model *maxInformed*, then the same model without the relaxation, and finally the model *minTime*.

When running the model *maxinformed* the script iterates over increasing deadline. The iterative process terminates once either the objective value is `cardV-cardS`, or elapsed time exceeds a given time limit, or the number of iteration reaches an upper bound.

he file `mbtrun.sh` is very ad-hoc and contains several hard coded parameters (location of the cplex solver, log files, etc.), which should be adjusted according to the machine on which it is executed.

5 Logging

Elapsed time in seconds and objective function value of individual methods are stored in files `logs/timelog.txt` and `logs/objlog.txt`. Each line starts with a filename of the processed instance followed by the respective values in the order mentioned above.