# INSTANCES DESCRIPTION

The instances have been created upon a benchmark of TTP instances[1] by removing the items on city $n$ and adding a maximum travel time. Each instance file is named as follows:

`XXX_YY_ZZZ_WW_TT.thop`

- `XXX`: TSP base instance groups {`eil51`, `pr107`, `a280`, `dsj1000`}
- `YY`: number of items per city {`01`, `03`, `05`, `10`}
- `ZZZ`: item relation type {`bsc`, `unc`, `usw`}
- `WW`: knapsack capacity class {`01`, `05`, `10`}
- `TT`: maximum travel time class {`01`, `02`, `03`}

The format of each instance follow the same format described in the example below, which represents the instance shown as an example in the paper. The texts after ** are explanatory and are not part of the instance.

```
PROBLEM NAME:   ThOP-example                ** instance name
KNAPSACK DATA TYPE: uncorrelated            ** see obs.1
DIMENSION:      4                           ** number of cities
NUMBER OF ITEMS:        5                   ** total number of items
CAPACITY OF KNAPSACK:   3                   ** W
MAX TIME:       75                          ** T
MIN SPEED:      0.1                         ** vmin
MAX SPEED:      1                           ** vmax
EDGE_WEIGHT_TYPE:       CEIL_2D             ** see obs.2
NODE_COORD_SECTION      (INDEX, X, Y):
1  1.0  1.0
2  6.0  1.0          ** ID of cities and their cartesian coordinates
3  1.0  7.0
4  6.0  7.0
ITEMS SECTION (INDEX, PROFIT, WEIGHT, ASSIGNED NODE NUMBER):
1  20 2 2
2  30 3 2            ** ID, profit, weight and localization (ID of city) of items
3 100 3 3            ** Note that in the first (1) and last (4) city there are no items
4  40 1 3
5  40 1 3
```

Obs.1: defines the relation between the characteristics (weight and value) of the items.

- bounded-strongly-correlated: the values of the items are strongly related to their weights.
- uncorrelated: the values of the items are not related to their weights.
- uncorrelated-similar-weights: the values of the items are not related to their weights, but the weights of all items are similar.

Obs.2: the distance between two cities is the ceil of the euclidean distance, that is, the distance between $p_1 = (x_1, y_1)$ and $p_2 = (x_2, y_2)$ is given by $\left\lceil \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \right\rceil$.

[1] S. Polyakovskiy, M. R. Bonyadi, M. Wagner, Z. Michalewicz, and F. Neumann, "A comprehensive benchmark set and heuristics for the traveling thief problem". In Proceedings of the 2014 Annual Conference on Genetic and Evolutionary Computation, pp. 477–484, 2014, ACM.