

# FIT5216: Modelling Discrete Optimization Problems

## Inclass Task 5: Most Separated

### 1 Problem Statement

Given  $n$  points  $P$  and a distance array  $d[p1, p2]$  which defines the pairwise distance between any two points, and a value  $v[p]$  for each point, together with a distance limit  $l$  and size limit  $k$ . Find the set of  $m \leq k$  such that the average separation of the points chosen is at least  $l$ , that maximises the value of the chosen set.

The data is given by

```
int: n;                % number of points
set of int: P = 1..n;  % points
array[P,P] of int: d;  % distance matrix
array[P] of int: v;    % value matrix
int: k;                % size limit for chosen set
int: l;                % average distance lower bound
```

Build a MiniZinc model `mostseparated_array` which solves the problem. It should use the decision variables

```
set of int: P0 = 0..n;
array[1..k] of var P0: Sx;
```

where a 0 in the array indicates no point (so less than  $k$ )

Build a MiniZinc model `mostseparated_set` which solves the problem. It should use the decision variables

```
var set of P: S;
```

Can you simply add to the previous model to generate this one?

Try the models out on the various data sets provided.

### 2 Instructions

Edit the provided `mzn` model files to solve the problems described above. Your implementations can be tested locally by using the *Run* icon in the MINIZINC IDE or by using,

```
minizinc ./modelname.mzn ./datafile.dzn
```

at the command line.