Modeling Discrete Optimization Workshop:
Group Photo

1 Introduction

The aim of this workshop is to recognize where a global constraint may be used to model a problem.

The Group Photo - `groupphoto.mzn`

Given a group of n people where n is even, we must arrange them for a photo in 2 rows. The best photo is when people are next to their friends, so the aim is to arrange them so that each person is next to (to the left, right, in front or behind) with as many friends as possible. The data for the problem is given as

```
n = <size of problem>;
array[1..n,1..n] of var bool:  friend;
```

where $friend[f1, f2]$ means $f1$ and $f2$ are friends. You can assume that the friend array is symmetric.

You should output a list of the people in their position to maximize the number of adjacent friends. For example given the data

```
n = 8;
friend = [| false,  true, false, false,  true, false,  true, false
         |  true, false, false, false,  true, false, false,  true
         | false, false, false,  true,  true, false, false, false
         | false, false,  true, false,  true, false, false, false
         |  true,  true,  true,  true, false,  true,  true, false
         | false, false, false, false,  true, false, false,  true
         |  true, false, false, false,  true, false, false,  true
         | false,  true, false, false, false,  true, true, false |];
```

your should output a diagram of the two rows of people, as well as the objective value, e.g.

```
obj = 9
3 6 8 7
4 5 2 1
```

Note there will often be many equally good optimal solutions for this problem.

Try your model on the data files: `groupphoto1.dzn`, `groupphoto3.dzn`, `groupphoto3.dzn`, `groupphoto4.dzn`.

2 Technical Requirements

For completing the workshop you will need MiniZinc 2.0 (`http://www.minizinc.org/2.0/`).