Rostering

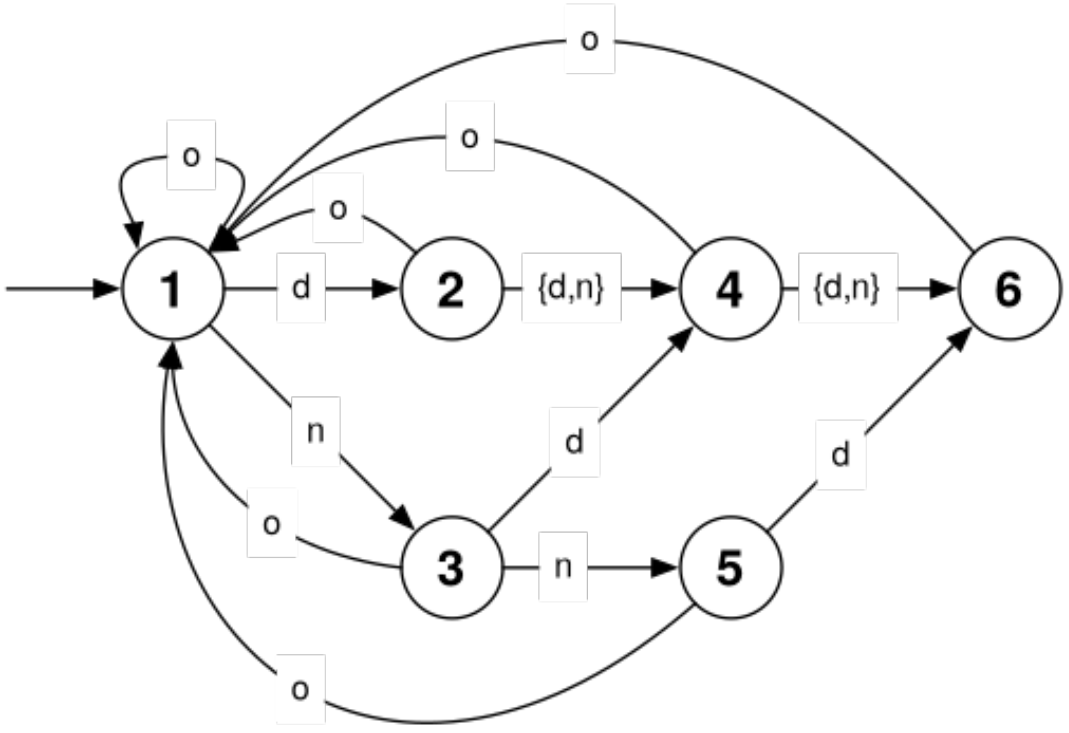
Example (nurse-roster)

Schedule the shifts of `num_nurses` nurses over `num_days` days.

Each nurse is scheduled for each day as either: (d) on day shift, (n) on night shift, or (o) off. In each four day period a nurse must have at least one day off, and no nurse can be scheduled for 3 night shifts in a row.

We require `req_day` nurses on day shift each day, and `req_night` nurses on night shift, and that each nurse takes at least `min_night` night shifts.

Nurse rostering condition as a DFA



	d	n	o
1	2	3	1
2	4	4	1
3	4	5	1
4	6	6	1
5	6	0	1
6	0	0	1

The regular constraint

Is a sequence of symbols accepted by a DFA?

`regular(array[int] of var int: x, int: Q, int: S,`
`array[int,int] of int: d, int: q0, set of int: F)`

Constrains that the sequence of values in array x (which must all be in $\{1, \ldots, S\}$ is accepted by the DFA of Q states with input alphabet $\{1, \ldots, S\}$ and transition function

$$d : \{1, \ldots, Q\} \times \{1, \ldots, S\} \rightarrow \{0, \ldots, Q\}$$

and initial state $q0 \in \{1, \ldots, Q\}$ and accepting states F. State 0 is reserved to be a fail state.

See also `regular_nfa` .

The seesaw problem[21]

Example (seesaw)

Adam (36 kg), Boris (32 kg) and Cecil (16 kg) want to sit on a 10-foot long seesaw such that they are at least 2 feet apart and the seesaw is balanced.

Write a general model for any number of people.
Possible decision variables?

1. Position on the seesaw for each person.
2. Distances between persons, position of the first person, and order of persons.
3. Person or empty for each position on the seesaw.

Multiple modeling?

How to improve performance of our model?

[21] From R. Barták's practical