Solving Constraints Modelled by Automata

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The Automaton Constraint

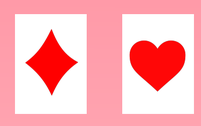
DFA augmented with accumulators can encode a constraint on a sequence S of variables using an automaton whose size does not depend on the length of S [Beldiceanu & al., CP 2004].

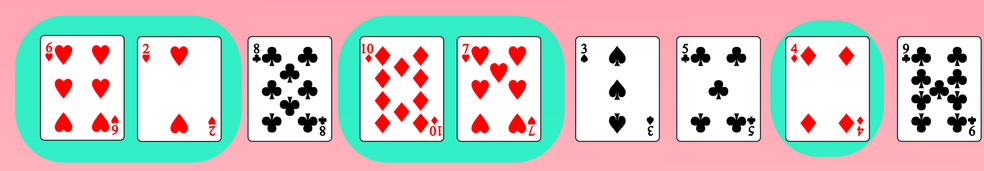
Enforcing structure and cost constraints simultaneously is stronger than its decomposition [Menana and Demassey 2009].

Example

The **nGroup(N, S, W)** constraint holds if and only if there are N groups of values from the set W in the sequence S of variables.

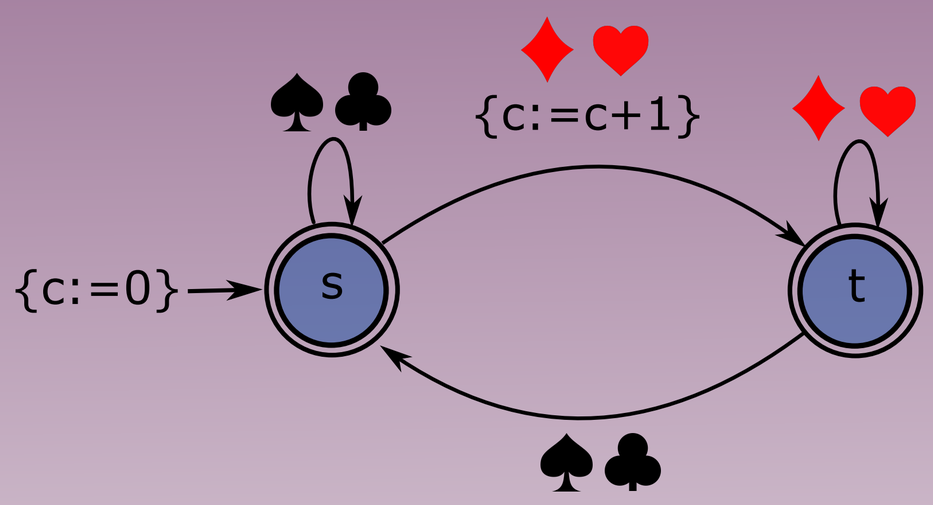
The following instance holds:

N=3 W= 

S= 

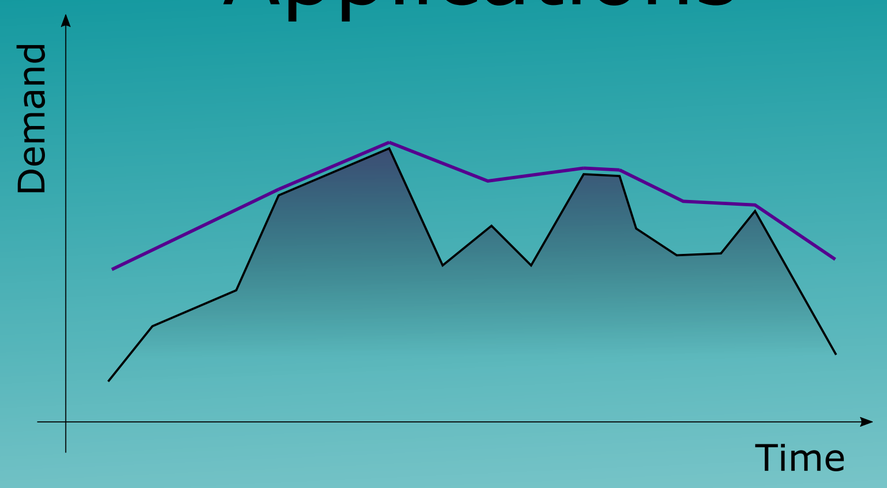
group 1 group 2 group 3

Describing Constraints with Automata



Increase the counter every time a group is found.

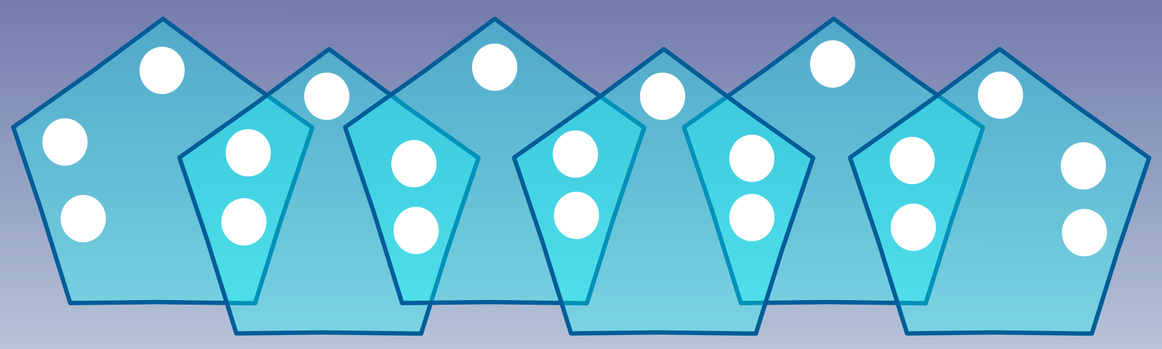
Applications



- ✔ Satisfy the demand
- ✔ Take business rules into account
- ✔ Respect regulations
- ✔ Minimise the total cost

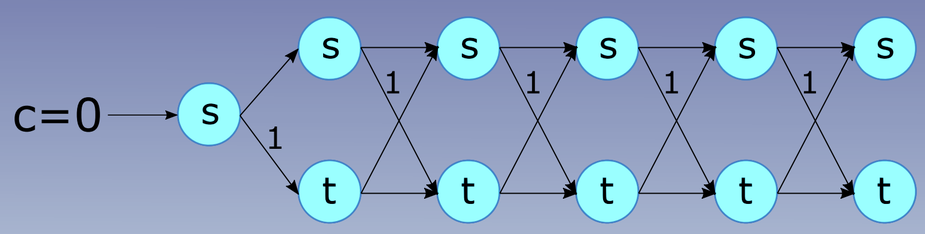
Propagation Algorithms

Decompositions



Easy to implement, but less powerful (in general)

Graph Algorithms



More powerful, but difficult to implement and less generic/expressive

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