



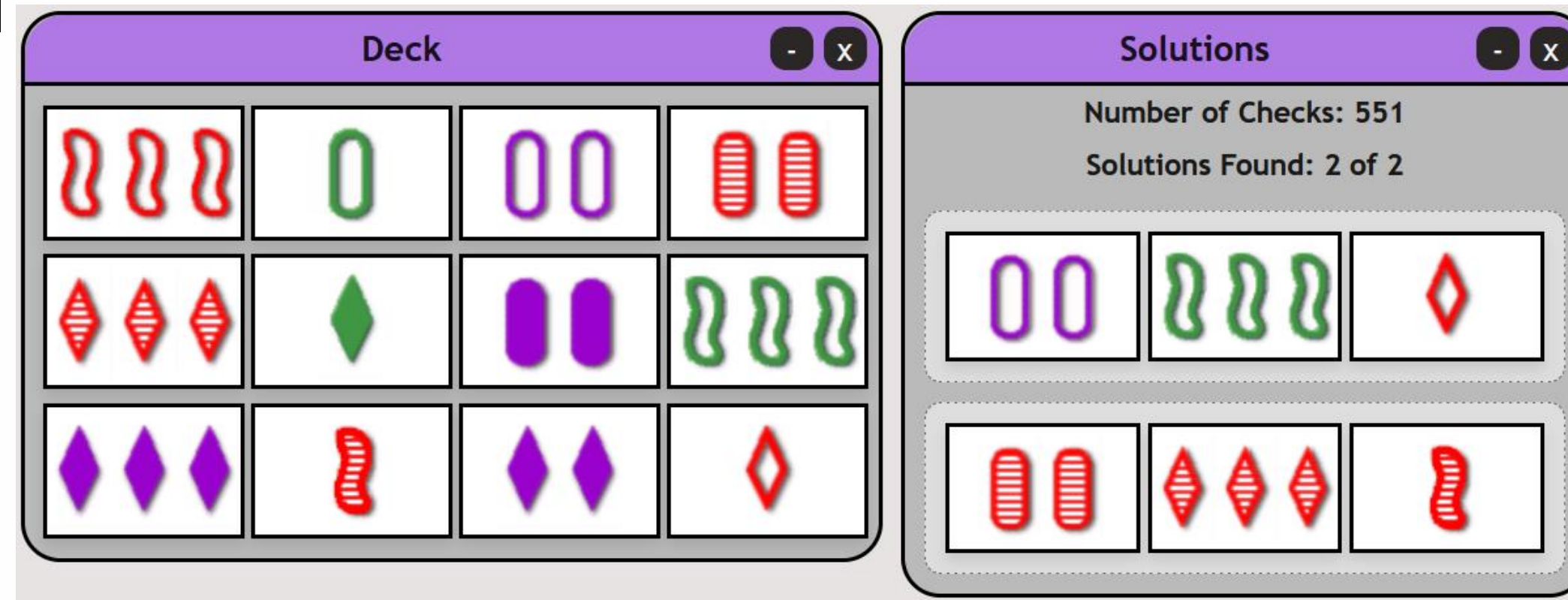
Interactive Graphical Interfaces for Constraint Programming

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Game of SET

A popular card game of visual perception designed in 1974 by geneticist Marsha Falco.

Task: Identify **three cards** in a set of 12 (out of 81) where each **feature** (color, shape, number and shading) is identical or all different.

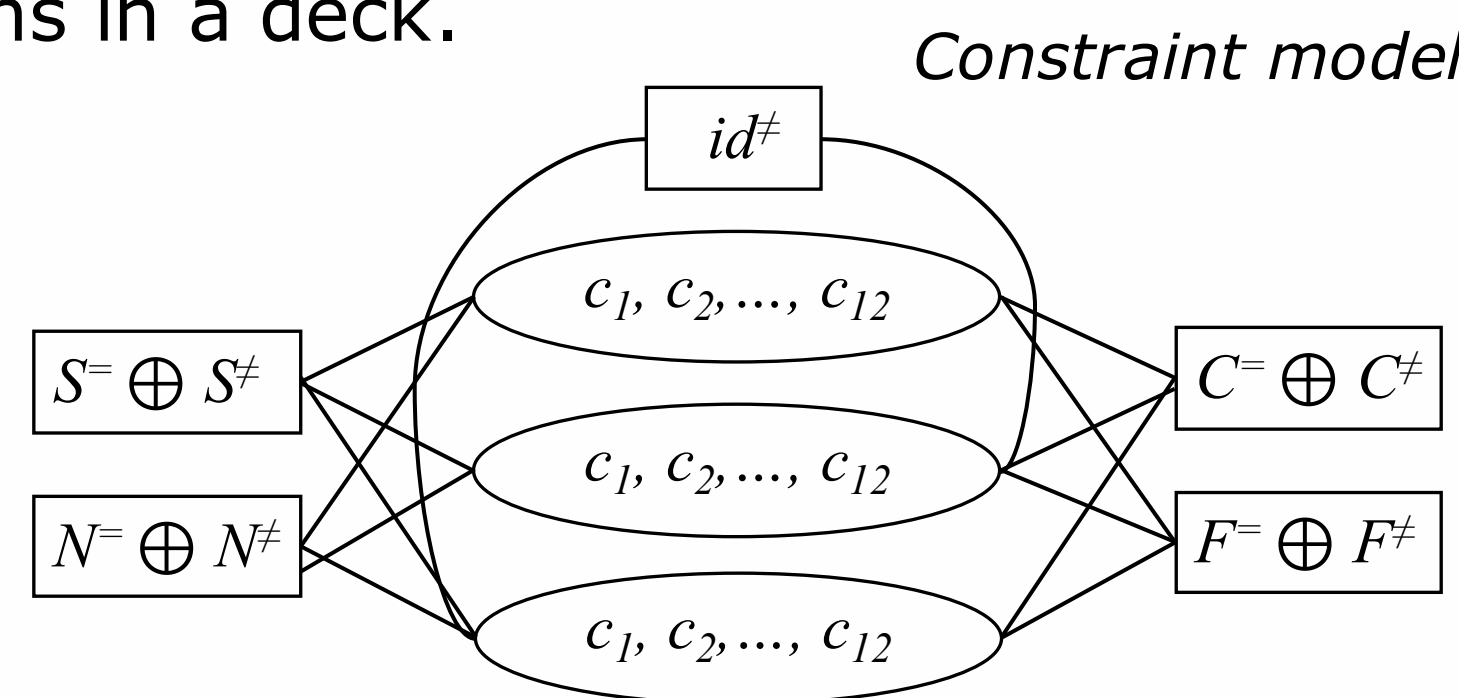


Data structure representing the deck

Attribute	c ₁	c ₂	c ₃	c ₄	c ₅	c ₆	c ₇	c ₈	c ₉	c ₁₀	c ₁₁	c ₁₂
Number	3	1	2	2	3	1	2	3	3	1	2	1
Color	r	g	p	r	r	g	p	g	p	r	p	r
Filling	e	e	e	s	s	f	f	e	f	s	f	e
Shape	s	o	o	o	d	d	o	s	d	s	d	d

Goal: Explore visualizations to teach children to play and reason about the game

Contributions: Built an interactive online interface to play the Game of SET and to find all solutions in a deck.

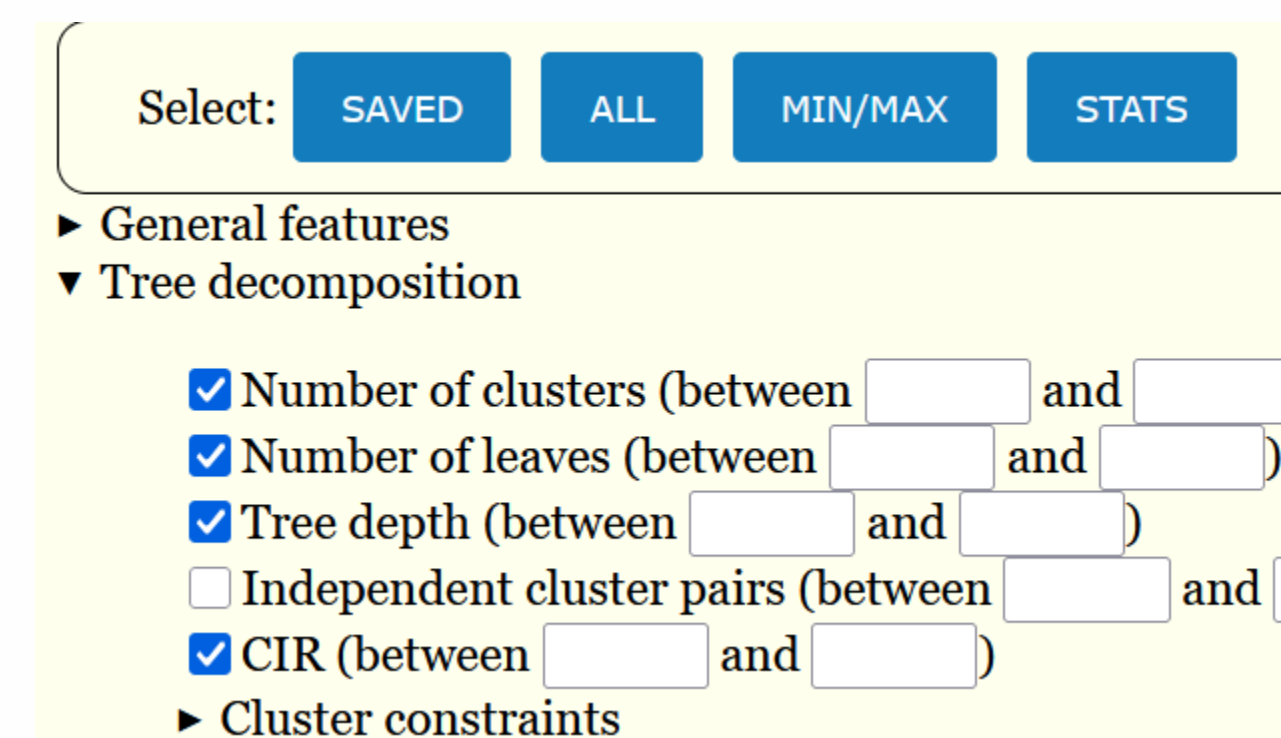


Attribute	Values	Constraint
Card id	1, 2,.. , 81	id [#]
Number	1, 2, 3	N ⁼ ⊕ N [≠]
Color	r, g, p	C ⁼ ⊕ C [≠]
Filling	e, f, s	F ⁼ ⊕ F [≠]
Shape	d, o, s	S ⁼ ⊕ S [≠]

Next steps: Build interactive visualizations of a decomposition algorithm for solving the game without enumerating combinations [Swearngin+ 2011].

Benchmark DB: Advanced Query

The CP benchmark Database stores a large number of constraint networks used for empirical studies in the Constraint Systems Laboratory. The DB maintains information about the characteristics and attributes of the benchmark instances that are used in evaluating new algorithms developed in the Laboratory. As such, it is a critical resource for our research.



Tree decomposition								
Number of leaves	Tree depth	CIR	Cluster constraints			Clusters per variable		
			min	max	mean	min	max	mean
18	8	0.152525	2	18	6.41304	1	21	9.8
21	8	0.131206	2	10	5.57143	1	22	10.27
22	10	0.249562	0	5	3.15	1	26	9.52
23	10	0.268603	0	6	3.13559	1	25	9.01
18	7	0.157576	2	8	5.13043	1	18	8.65

Contributions

1. Added several attributes to the DB to support current research activities
2. Enhanced the query functionalities to support repeated queries
3. Enhanced output into Excel files ready for analysis of large experiments

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