CRACK

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CRACK:

The tests were performed using CRACK version 1.0 beta 18. CRACK is a description logic system with both TBox and ABox, using the logic $\mathcal{ALCRIFO}$. CRACK reasoning procedures are based on a sound and complete tableaux algorithm [1].

Availability:

Source code (CLTL2 compliant common lisp) is available on request. An online working version of CRACK is available at `http://krr.irst.itc.it:1024/crack/`.

Advantages:

CRACK– and its graphical interface for displaying taxonomies – has been successfully tested in the following common-lisp CLTL2 environments: Allegro 4.2/4.3 (Solaris and Linux), Macintosh MCL 2.0/3.3/4.2, Lucid 4.2/Liquid 5.0 (Solaris), CMU Common Lisp 17f. CRACK can be installed to act as a server over a TCP/IP network from any of the above environments; code libraries for developing clients in C++, Java, and Tcl/TK are available.

CRACK is the only implemented system having both `one-of` and inverse roles. It handles also role hierarchies and functional roles.

As a disadvantage, CRACK does not implement neither number restrictions nor full axioms. CRACK algorithms are non-terminating for particular combination of operators, most notably $\mathcal{ALCIO}$ with ABox. CRACK does not employs yet the semantic branching optimization.

Hardware and Software:

PC clone; 200MHz Pentium II CPU; 64MB RAM; Linux; Allegro CL 4.3.

Results:

The synthetic TBox `hc412` generated a memory overflow: this is an example of a sub-language of $\mathcal{ALCRIFO}$ where the complexity of satisfiability is PSPACE-complete requiring exponential space in CRACK.

Note that the translation of KRSS knowledge bases into CRACK's syntax is not complete. As a result, the processing is incomplete with respect to most of the realistic TBoxes and to all random TBoxes.

References

[1] Paolo Bresciani, Enrico Franconi, and Sergio Tessaris. Implementing and testing expressive description logics: a preliminary report. In *Proceedings of DL'95*, pages 131–139, Rome, Italy, June 1995.

Table 1: Tableaux'98 Concept Satisfiability Tests

	Incoherent		Coherent	
Test	**Size**	**Correct**	**Size**	**Correct**
k_branch	2	Y	1	Y
k_d4	2	Y	3	Y
k_dum	3	Y	21	Y
k_grz	1	Y	21	Y
k_lin	5	Y	3	Y
k_path	2	Y	6	Y
k_ph	3	Y	3	Y
k_poly	21	Y	21	Y
k_t4p	1	Y	1	Y

Table 2: Synthetic Tbox Classification Tests

Test	**Concepts**	**Time (s)**	**Correct**
hc14	10	0.21	Y
hc18	18	0.78	Y
hc112	26	1.84	Y
hc24	46	0.28	Y
hc28	94	4.24	Y
hc212	142	11.07	Y
hc34	18	1.25	Y
hc36	26	0.60	Y
hc38	34	2.23	Y
hc44	7	0.00	Y
hc48	7	1.53	Y
hc412	7	>10000.00	?

Table 3: Tableaux'98 KB Tests

	Incoherent			Coherent		
Test	**Size**	**Concepts**	**Correct**	**Size**	**Concepts**	**Correct**
k_branch	1	73	Y	1	71	Y
k_d4	3	114	Y	2	104	Y
k_dum	3	82	Y	21	650	Y
k_grz	1	110	Y	21	1,349	Y
k_lin	21	934	Y	9	939	Y
k_path	1	33	Y	1	91	Y
k_ph	2	28	Y	3	73	Y
k_poly	3	164	Y	2	102	Y
k_t4p	1	77	Y	0	0	Y

Table 4: Realistic Tbox Classification Tests

Test	**Concepts**	**Time (s)**	**Correct**
ckb-roles	79	1.19	Y
datamont-roles	120	1.18	N
espr-roles	142	0.00	Y
fss-roles	132	0.37	Y
wines	267	2.37	N
wisber-roles	140	1.63	N
galen1	2,728	>10000.00	?
galen2	3,926	124.75	N

Table 5: Tableaux'98 Abox Realisation Tests

Test	**Conc's**	**Ind's**	**Time (s)**	**Correct**
k_branch_n	71	27	0.02	Y
k_d4_n	48	24	0.01	Y
k_dum_n	71	14	0.01	Y
k_grz_n	109	19	0.00	Y
k_lin_n	10	10	0.01	Y
k_path_n	91	174	>1,000.00	?
k_ph_n	7	8	0.01	Y
k_poly_n	66	128	>1,000.00	?
k_t4p_n	72	0	>1,000.00	?