

DLP

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DLP:

The tests were performed using the 1 March 1998 version of DLP, modified to allow for incoherent concept definitions. DLP is an experimental description logic classifier whose subsumption reasoning uses a sound and complete tableaux algorithm. DLP employs a wide range of optimisations, including normalization, backjumping, and caching. DLP is written in ML, in a mostly-functional style.

DLP has many configurable options. All the tests were run using one setting for these options.

Availability:

The sources for DLP are available from:

<http://www-db.research.bell-labs.com/user/pfps>.

Advantages:

DLP is written in ML, a freely-available programming language that runs on various systems. DLP has several interfaces, including one for proving theorems in various propositional modal logics, such as propositional dynamic logic.

Hardware and Software:

SPARC Ultra 1; main memory 64MB; Model 140 Ultra-SPARC CPU; Solaris 2.5.1; SML-NJ compiler, version 110.

Timing was done using the internal CPU timing built into SML-NJ.

Results:

Note that DLP ignores some of the constructs in the realistic Tbox tests, notably role hierarchies, defined roles, disjointness, and qualified number restrictions. Therefore, the knowledge bases “ckb”, “datamont”, “espr”, “fss”, and “wisber” were processed in their atomic role forms.

Table 3: Random Tbox Classification Tests

| Test | Concepts | Time (s) | Correct |
|-----------|----------|----------|---------|
| kris151 | 16 | 0.030 | Y |
| kris301 | 31 | 0.060 | Y |
| kris451 | 46 | 0.090 | Y |
| kris601 | 61 | 0.160 | Y |
| kris751 | 76 | 0.170 | Y |
| kris901 | 91 | 0.410 | Y |
| kris1051 | 106 | 0.340 | Y |
| kris1201 | 121 | 0.340 | Y |
| kris1351 | 136 | 0.520 | Y |
| kris1501 | 151 | 0.730 | Y |
| kris2001 | 201 | 0.750 | Y |
| kris4001 | 401 | 2.530 | Y |
| kris6001 | 601 | 4.900 | Y |
| kris8001 | 801 | 6.320 | Y |
| kris10001 | 1001 | 10.430 | Y |
| kris12001 | 1201 | 12.620 | Y |
| kris14001 | 1401 | 13.810 | Y |
| kris16001 | 1601 | 22.420 | Y |
| kris18001 | 1801 | 21.420 | Y |
| kris20001 | 2001 | 33.460 | Y |
| kris25001 | 2501 | 45.260 | Y |
| kris30001 | 3001 | 49.350 | Y |
| kris35001 | 3501 | 68.280 | Y |
| kris40001 | 4001 | 88.360 | Y |
| kris45001 | 4501 | 107.190 | Y |
| kris50001 | 5001 | 133.030 | Y |

Table 1: Tableaux’98 Concept Satisfiability Tests

| | Incoherent | | | Coherent | | |
|----------|------------|----------|---------|----------|----------|---------|
| Test | Size | Time (s) | Correct | Size | Time (s) | Correct |
| k_branch | 18 | 55.360 | Y | 12 | 55.080 | Y |
| k_d4 | 21 | 0.120 | Y | 21 | 2.430 | Y |
| k_dum | 21 | 0.050 | Y | 21 | 0.090 | Y |
| k_grz | 21 | 0.080 | Y | 21 | 0.170 | Y |
| k_lin | 21 | 0.050 | Y | 21 | 5.500 | Y |
| k_path | 21 | 1.290 | Y | 21 | 1.390 | Y |
| k_ph | 7 | 96.250 | Y | 13 | 84.860 | Y |
| k_poly | 21 | 0.380 | Y | 21 | 0.650 | Y |
| k_t4p | 21 | 0.140 | Y | 21 | 0.340 | Y |

Table 2: Tableaux’98 TBox Tests

| | Incoherent | | | Coherent | | |
|----------|------------|----------|---------|----------|----------|---------|
| Test | Size | Concepts | Correct | Size | Concepts | Correct |
| k_branch | 5 | 601 | Y | 5 | 602 | Y |
| k_d4 | 17 | 1350 | Y | 12 | 1102 | Y |
| k_dum | 21 | 585 | Y | 21 | 650 | Y |
| k_grz | 21 | 1330 | Y | 21 | 1349 | Y |
| k_lin | 21 | 934 | Y | 9 | 939 | Y |
| k_path | 11 | 1293 | Y | 10 | 1291 | Y |
| k_ph | 6 | 324 | Y | 6 | 319 | Y |
| k_poly | 8 | 571 | Y | 8 | 587 | Y |
| k_t4p | 21 | 637 | Y | 21 | 1192 | Y |

Table 4: Synthetic Tbox Classification Tests

| Test | Concepts | Time (s) | Correct |
|-------|----------|----------|---------|
| hc14 | 10 | 0.040 | Y |
| hc18 | 18 | 0.170 | Y |
| hc112 | 26 | 0.370 | Y |
| hc24 | 46 | 0.380 | Y |
| hc28 | 94 | 2.010 | Y |
| hc212 | 142 | 5.210 | Y |
| hc34 | 18 | 0.210 | Y |
| hc36 | 26 | 0.480 | Y |
| hc38 | 34 | 0.920 | Y |
| hc44 | 7 | 0.030 | Y |
| hc48 | 7 | 0.070 | Y |
| hc412 | 7 | 0.100 | Y |

Table 5: Realistic Tbox Classification Tests

| Knowledge Base | Concepts | Time (s) | Correct |
|----------------|----------|----------|---------|
| ckb-roles | 79 | 0.270 | Y |
| datamont-roles | 120 | 0.360 | Y |
| espr-roles | 142 | 0.130 | Y |
| fss-roles | 132 | 0.640 | Y |
| wines | 267 | 2.050 | Y |
| wisber-roles | 140 | 0.780 | Y |
| galen1 | 2728 | 284.070 | Y |
| galen2 | 3926 | 65.850 | Y |