Deductive Databases
Summer Term 2018
Prof. Dr. W. May

3. Unit: Well-founded and Stable Semantics

Discussion by 4./6.2.2014

Exercise 1 (Well-Founded Model) a) Show that there are non-stratifiable Datalog¬ programs that have a total well-founded model (i.e., no atoms undefined).

b) Are there (non-ground) non-stratifiable Datalog¬ programs that have a total well-founded model for *all* EDB instances?

Exercise 2 (Well-Founded Model) Give an instance of the win-move game that has no total stable model.

Exercise 3 (Well-Founded Model) Consider again the win-move game from the lecture:
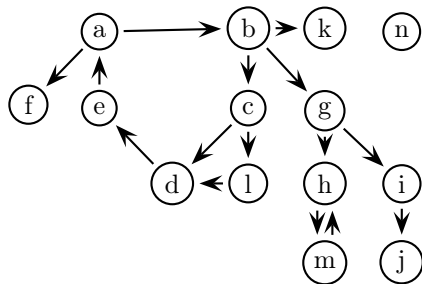
Consider to start the Alternating Fixpoint Computation for the rules `win(X) :- move(X,Y), not win(Y).`
`lose(X) :- pos(X), not win(X).`

with $\mathcal{H}_0$ as

- some atoms that are correct: lose(k), win(b), win(d)
- some atoms that actually are in contrast to the well-founded model of the above game: win(f), lose(c), win(m).

(it is often called "seed" when starting an iterative algorithm with some initial values)

Exercise 4 (Stable Models: soccer league) A newspaper article (in german) took the ranking of the 2nd german soccer league (after 29 rounds of the 2017/18 season, Friday april 13th morning) and shows a possible final table (after 34 rounds) where all teams from the 4th to the last, 18th place have 44 points each (the ranking is actually quite dense, all teams from 5th position on fight against relegation).

Original article:
https://www.welt.de/sport/article175403621/Fussball-Die-wahnsinnige-Tabellensituation-in-der-Zweiten.html

How must the teams play such that this final table would come true?

Use the following fragment which contains all relevant data about the season:

```
round(29..34).
p(29..68).   %% maximally 68P can be reached by the current leader

team(d).   team(n).   team(ki).  team(r).   team(in).  team(bo).
team(bi).  team(au).  team(svs). team(du).  team(un).  team(bs).
team(dd).  team(sp).  team(ft).  team(hdh). team(da).  team(kl).

% standings after 29 rounds:
points(29,d,53).
points(29,n,50).
points(29,ki,46).
points(29,r,41).
points(29,in,41).
points(29,bo,40).
points(29,bi,40).
points(29,au,39).
points(29,svs,38).
points(29,du,38).
points(29,un,37).
points(29,bs,37).
points(29,dd,37).
points(29,sp,37).
points(29,ft,37).
points(29,hdh,34).
points(29,da,32).
points(29,kl,29).

% games of the remaining rounds:
game(30,in,n).   game(30,hdh,d).   game(30,dd,ki).
game(30,du,svs). game(30,ft,r).    game(30,sp,un).
game(30,bi,au).  game(30,da,bs).   game(30,bo,kl).

game(31,ki,n).   game(31,d,in).    game(31,au,du).
game(31,r,sp).   game(31,svs,da).  game(31,un,hdh).
game(31,bs,bi).  game(31,kl,dd).   game(31,ft,bo).

game(32,n,bs).   game(32,dd,d).    game(32,in,ki).
game(32,du,r).   game(32,hdh,svs). game(32,da,un).
game(32,bi,kl).  game(32,sp,ft).   game(32,bo,au).

game(33,svs,n).  game(33,d,ki).    game(33,ft,du).
game(33,r,da).   game(33,un,bo).   game(33,sp,bi).
game(33,bs,in).  game(33,kl,hdh).  game(33,au,dd).

game(34,n,d).    game(34,ki,bs).   game(34,du,sp).
game(34,bo,r).   game(34,dd,un).   game(34,bi,svs).
game(34,in,kl).  game(34,hdh,ft).  game(34,da,au).
```

Guess, how many possibilities exist.