CSE 414: Section 4 Datalog

July 12th, 2018

Datalog Terminology

Head - Body - Atom/Subgoal/Relational predicate

Base Relations (EDB) vs Derived Relations (IDB)

Wildcard -> ignore

```
Helper(a,b):-Base1(a,b,_)
NonAns(j):-Base2(j,k),!Base3(k)
Ans(x):-Helper(x,y),!NonAns(y)
```

Query Safety

Need a positive relational atom of every variable

What's wrong with this query?

Find all of Alice's children without children:

```
U(x) :- ParentChild("Alice",x), !ParentChild(x,y)
```

A datalog rule is safe if every variable appears in some positive relational atom.

Query Safety

```
U(x) :- ParentChild("Alice",x), !ParentChild(x,y)
```

It is domain dependent! Unsafe!

Double negation to the rescue. Why does this work?

```
NonAns(x) :- ParentChild("Alice",x), ParentChild(x,y)
# All of Alice's children with children
U(x) :- ParentChild("Alice",x), !NonAns(x)
# All of Alice's children without children (safe!)
```

Query Safety

But we can do better...

```
hasChild(x) :- ParentChild(x,_)
# People with children
U(x) :- ParentChild("Alice",x), !hasChild(x)
# All of Alice's children without children (safe!)
```

Datalog with Recursion

Able to write complicated queries in a few lines

Graph analysis

Done with query once output does not change.

Stratified Datalog

Recursion might not work well with negation

E.g.

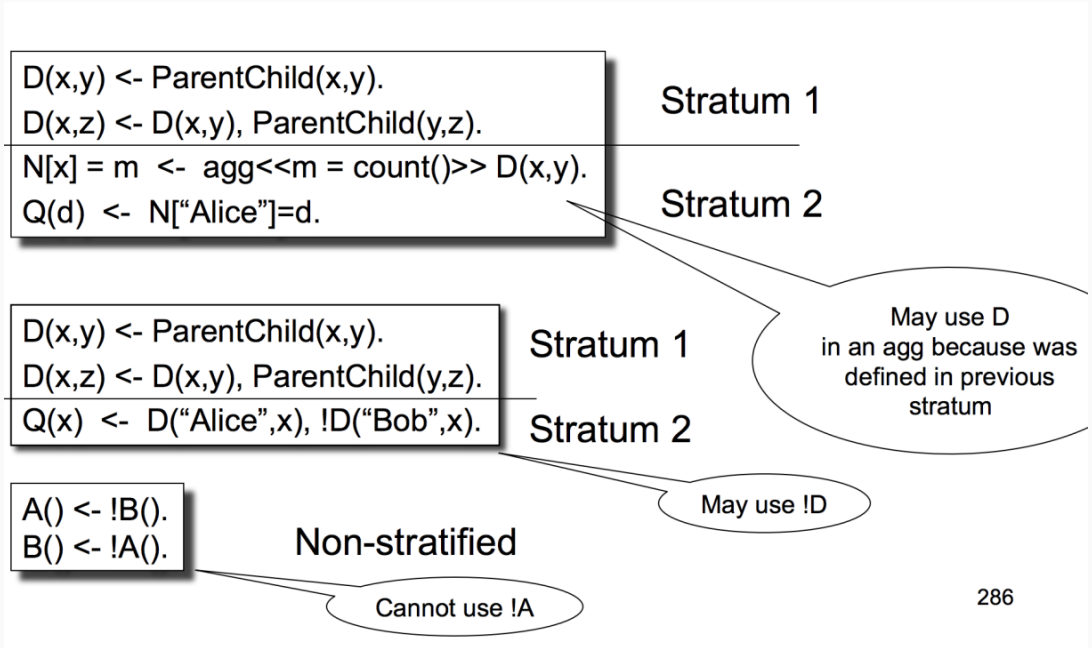
```
A(x):- Table(x), !B(x)
B(x):- Table(x), !A(x)
```

Solution: Don’t negate or aggregate on an IDB predicate until it is defined

Stratified Datalog Query

Stratified Datalog

Only IDB predicates defined in strata 1, 2, ..., n may appear under ! or agg in stratum n+1



Souffle (HW4)

Install from source:

https://github.com/souffle-lang/souffle/wiki/build