Query languages

Assignment sheet 2

1 nr-Datalog$^\neg$

Consider the following database schema.

movie[title, director, actor]
seen[movieGoer, title]
likes[movieGoer, title]

Express the following nr-Datalog$^\neg$ queries:

1. Who are the actors of the movies directed by "Lucas"?
2. Give the list of directors whose movies are liked.
3. Who are those movie goers who like a movie they have never seen?
4. Who are those movie goers who have seen all movies?
5. Who are those movie goers who like all the movies they have seen?

2 Datalog

Let I be the following instance:

owes	borrower	to	amount
	bob	mark	50
	mark	kate	20
	kate	mike	40
	kate	john	10
	mike	john	50
	bob	mike	20

Consider the following Datalog program P:

can_reimburse(x,y) $\leftarrow$ owes(x,y,_)

can_reimburse(x,y) $\leftarrow$ owes(x,y',_), can_reimburse(y',y).

Give the answer to this program on this instance.

3 Datalog again

Let G_{black} et G_{white} be two graphs defined on the same set of vertices, and seen as two binary relations. Write the Datalog program that computes the set of pairs of vertices (a, b) such that there exists a path from a to b where black and white edges alternate, starting with a white one.

4 Datalog$^\neg$

Give the precedence graph of the two following programs, and indicate for each whether it is stratifiable or not.

$$\begin{array}{lll} T(x,y) \leftarrow & G(x,y) & \\ T(x,y) \leftarrow & G(x,z), T(z,y) & \\ CT(x,y) \leftarrow & \neg T(x,y) & \end{array} \qquad \begin{array}{lll} p \leftarrow & \neg q \\ q \leftarrow & \neg p \end{array}$$

Consider the following database schema: $Metro[Station, NextStation]$, $Bus[Station, NextStation]$.

Write a Datalog$^\neg$ stratifiable program that computes the pair of stations (a, b) such that they are connected (possibly indirectly) using bus but not using metro (i.e., there does not exist a path from a to b using the metro).

5 Using the proper language

Consider the following relation schema $R[A, B]$. Associate each of the following statement with the query language that is expressive enough to express the statement.

The statements are:

- Compute the transitive closure of R
- Give the tuples of R that are mirrored in R (e.g., (a,b) is mirrored in R if R contains both (a,b) and (b,a))
- Give the number of tuples of R
- Check if R is its own transitive closure
- Give the tuples of R for which the value for A is associated with all possible values for B

The languages are: Conjunctive algebra, Relational algebra, Extended relational algebra, Datalog, Datalog$^\neg$.