DB Updates & NonMonotonic Reasoning

CS240B Notes

Notes based on Section 10.2 of Advanced Database Systems—Morgan Kaufmann, 1997
C. Zaniolo, April 2002
Stratification and Stable Models

Theorem: Let $P$ be a stratified program. Then $P$ has a stable model that is equal to the result of the iterated fixpoint procedure.
Local stratification. A program $P$ is locally stratifiable iff $B_P$ can be partitioned into a (possibly infinite) set of strata $S_0, S_1, \ldots$, such that the following property holds: For each rule $r$ in $\text{ground}(P)$ and each atom $g$ in the body of $r$, if $h(r)$ and $g$ are, respectively, in strata $S_i$ and $S_j$, then

(i) $i \geq j$ if $g \in pg(r)$, and

(ii) $i > j$ if $g \in ng(r)$.

A locally stratified program defining integers

- $\text{even}(0)$.
- $\text{even}(\text{s}(\text{J})) \leftarrow \neg \text{even}(\text{J})$. 

**Theorem:** Every locally stratified program has a stable model that is equal to the result of the iterated fixpoint computation \( \text{on ground}(P) \).

1. Local stratification, behaves unlike regular stratification from the viewpoints of computation and implementation.

2. The existence of local stratification often depends on the database content. Thus, it cannot be checked at compile-time. Also, checking is \( \mathcal{NP} \)-hard.

3. In the Barber example, the existence of a local stratification depends on whether \( \text{villager(barber)} \) is in the database.