

Database Consistency: Logic-Based Approaches

Problem set #1

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Problem 1

Unary functional dependencies are of the form $A \rightarrow B$ where A and B are single attributes of the same relation. Provide an axiomatization of unary functional dependencies, and show that it is sound and complete.

Problem 2

Prove or disprove the following property:

Given a set of functional dependencies F and a database D , the set of repairs of D w.r.t. F can be represented as the set of minimal models of some ground formula in CNF.

If this property does not hold, study the impact of restricting the number of FDs to 1. Estimate the size of the formula as a function of the number of tuples in the database.

Problem 3

Study the problem of *incremental maintenance* of the conflict hypergraph under the following operations:

- insert a tuple
- delete a tuple
- modify a component of a tuple.

Provide appropriate algorithms.