

Lecture 2: Games (1 hour)

When does a relation algebra have a representation?

This fundamental question has elicited a lot of work over the decades. We will approach it by games, played on networks. A network is an approximation to a representation. The moves of the games allow a network to be repeatedly refined, becoming more like a full representation. We can characterise whether the given relation algebra has a representation by whether the second player has a winning strategy in the games. This in turn can be written out as first-order axioms defining the representable relation algebras.

We will use these games as tests for representability. We are more interested in the existence of the axioms than what form they take, though they can be written out if desired. Several kinds of game will be considered. We give examples of their use.