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Abstract

We first give the language and Kripke semantics for graded modal logic. Under Kripke semantics, we will show that a class of models is definable in graded modal logic iff it is closed under disjoint unions, surjective graded bisimulations graded ultrafilter extensions, while its complement is closed under graded ultrafilter extensions. We also use frame formulas (Jankov-Fine formulas) to show a Goldblatt-Thomason theorem within the class of finite transitive frames.

The second part of the lecture will work within the coalgebraic semantic for graded modal language. We first define Omega-coalgebras for graded modal logic and some coalgebraic model constructions. Then we show the following Goldblatt-Thomason theorem for coalgebraic graded modal logic: a class of coalgebras which is closed under Omega-ultrafilter extensions is definable in graded modal logic iff it closed under coalgebraic sums, generated subcoalgebras and Omega-homomorphic images, while its complement is closed under Omega-ultrafilter extensions. The proof is by using the duality between graded modal algebras and Omega-coalgebras.

The third section consists of several things. First, we give some remarks on the coalgebraic correspondence between graded modal logic and weak second-order logic. Then we subcoalgebra formulas and its extension to canonical formulas. Finally, we will observe the classification of graded modal formulas as well as some extensions of graded modal logic.

I will give some open questions in modal logic for future work at the end.