LOGIC, LATTICES, AND PROFINITE STRUCTURES

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Abstract

In this talk I will explore some connections between logic, lattices and profinite structures. I will start with a tutorial introduction of the classical theory and then move on to contemporary research.

In the first part, I will introduce the topological duality theory for distributive lattices initially developed by Stone and Priestley, and I will show how this theory applies in particular to the study of type spaces in model theory, and to completeness and interpolation theorems.

In the second part, I will discuss more recent insights in the area, including a logic-based approach to profinite monoids, and I will explain how duality theory has recently developed some interesting new connections to the foundations of computer science, specifically for problems coming from automata and programming language theory.

Throughout the talk, I will use concrete examples to illustrate the theory and make them accessible to a wide audience, including Master's and PhD students who have some background in logic. The talk will be based on [1], [2] and [3].

References

[1] Mai Gehrke and Sam v. Gool, *Topological Duality for Distributive Lattices: Theory and Applications*, 2023. arXiv:2203.03286.
[2] Sam v. Gool and Jérémie Marquès, *On duality and model theory for polyadic spaces*, 2022. arXiv:2210.01018.
[3] Sam v. Gool and Benjamin Steinberg, *Pro-aperiodic monoids via saturated models*, Israel Journal of Mathematics **234** (2019), 451–498.