Finite automata presentable Abelian groups

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Abstract. A language over some alphabet Σ is called *regular* if there exists a finite automaton that recognizes it. A countable, relational structure $(M; R_1, ..., R_k)$, where M is the universe of the structure and $R_1, ..., R_k$ are the relations, is called **automatic** if there exists a regular language $D \subseteq \Sigma^*$ and a bijection : $D \to M$ such that the relations $g^{-1}(R_1), ..., g^{-1}(R_k)$ are also regular. Automatic structures are attractive from many points of view. e.g. their first order theories and the model checking problem are decidable. However, the condition of admitting an automatic presentation turns out to be rather restrictive. Even if one considers simple algebraic structures such as groups, the definition is still very restrictive: every finitely generated subgroup of an automatically presentable group is virtually Abelian. It is therefore natural to consider only Ableian groups.

In this talk we will show that any torsion-free Abelian group G that has an automatic presentation must be the extension of a finite rank free group F by a finite direct sum of Prüfer groups $\mathbb{Z}(p^\infty)$. However, the remaining class of "candidates" still allows all kinds of strange examples and counter examples as we will demonstrate. This is joint work with Gábor Braun.

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