Space Complexity of Abelian Groups

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Abstract

We develop a theory of $LOGSPACE$ structures and apply it to construct a number of examples of Abelian Groups which have $LOGSPACE$ presentations. We show that all computable torsion Abelian groups have $LOGSPACE$ presentations and we show that the groups $\mathbb{Z}$, $Z(p^\infty)$, and the additive group of the rationals have $LOGSPACE$ presentations over a standard universe such as the tally representation and the binary representation of the natural numbers. We also study the effective categoricity of such groups. For example, we give conditions are given under which two isomorphic $LOGSPACE$ structures will have a linear space isomorphism.