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Title:	Character Theoretic methods in word maps
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Keywords:	Theoretic word maps
Issue Date:	May-2023
Publisher:	IISER Mohali
Abstract:	This thesis reviews and explores the use of character theory in the study of word maps over finite groups, focusing on their broad applications. We begin by reviewing previous research on this topic and examining some relevant questions and results that have emerged in the field. We then introduce basic character theory to investigate word maps and to understand properties of a word map are completely determined by the character table. Specifically, we count the number of ways in which elements can be written in the form of a word in d−tuples of elements, w(x 1 , x 2 , . . . , x d), and the resulting fiber sizes of word maps, which form a class function on the group. Our examination of the commutator word is of particular interest, as it provides insight into the estimation of bounds of fiber sizes on nilpotent groups. Using the irreducible characters, we compute the fiber sizes for the commutator word and the generalised commutator words. We then study probability distributions induced by word maps, especially over nilpotent groups. We discuss a conjecture regarding the bounds of these distributions, and highlight a few results in this direction.
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