Separation of Variables and the Computation of Fourier Transforms on Finite Groups, II

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Abstract

We present a general diagrammatic approach to the construction of efficient algorithms for computing
the Fourier transform of a function on a finite group. By extending work which connects Bratteli diagrams to the
construction of Fast Fourier Transform algorithms we make explicit use of the path algebra connection and work in
the setting of quivers. In this setting the complexity of an algorithm for computing a Fourier transform reduces to path
counting in the Bratelli diagram, and we generalize Stanley's work on differential posets to provide such counts. Our
methods give improved upper bounds for computing the Fourier transform for the general linear groups over finite
fields, the classical Weyl groups, and homogeneous spaces of finite groups.

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