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Arthur Berg* (berg@ufl.edu), Division of Biostatistics, Cancer Institute, H069, 500 University Drive, P.O. Box 850, Hershey, PA 17033-0850. *A New Use of Group Representation Theory in Statistics.*

In this talk, I will show how the use of group representation theory and a familiar faithful group representation of the symmetric group on k elements, S_k , can be applied in a new way to statistics. The results can be used to analyze statistical data that is collected in a time course, like the daily returns of the S&P 500 or monthly sunspot counts. In such data, it is useful to consider a weighted Fourier transform which results in an estimate of the so-called spectral density.

However, the mapping that takes the original data to its corresponding spectral density estimate is not invertible; there is a loss of information. An attempt to overcome this loss leads to an estimation of the polyspectrum, a multivariate function that also arises from a weighted Fourier transform. But a new issue is presented—the need to construct a “symmetric form” of a given k -variable function. After a formal connection is made with group representations, an optimal k -variable function arises that possesses an idealized property of having minimal L_2 norm (an estimator with smallest variance) under a certain class of functions.

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