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10/28/2021

<div align="center">Final Project Abstract/Proposal</div>

I propose to a recreation of the results detailed in "The Reconstruction of Discontinuous Piecewise Polynomial Signal". In this article, the Gibbs phenomenon is discussed and recreated for a truncated DFT function on an interval bound by [-1,1]. The error generated by the phenomenon is shown as possible to remove through the use of Gegenbaur polynomials for discontinuous functions. A denoising technique is also discussed.

I plan to replicate the results of this article by implementing the same Fourier transform algorithm for a truncated piecewise function. I will then replicate the Gibbs oscillations as well as the signal reconstructed without the Gibbs phenomenon present, as described in the article. This will entail a creation of a function to produce the coefficients of an N-term Gegenbaur polynomial in addition to the coefficients of an N-term Fourier series expansion of the aforementioned function. I will also recreate the denoising effects which serve as a practical application of the previous case.

Barring any setbacks or other delays in progress there is an interesting opportunity to expand upon the work done in this article. The first avenue of advancement of research through this methodology is to compare the results of multiple, differing piecewise functions. The second avenue would be to show the variations in efficacy as the sampling approaches the Nyquist frequency from higher frequencies.

Reference(s):

C. S. MacInnes, "The reconstruction of discontinuous piecewise polynomial signals," in *IEEE Transactions on Signal Processing*, vol. 53, no. 7, pp. 2603-2607, July 2005, doi: 10.1109/TSP.2005.849217.