A Parallel Application of the Fourier Transformation

Justin Spidell – Brett Sumser

October 2021

Abstract

A Fourier transform is a mathematical transform decomposing functions based on space and time into functions based on spatial or temporal frequency. The Fourier transform is denoted by adding a circumflex to the symbol of a function:

$$f \to \hat{f}$$

The Fourier transform is defined as:

$$\hat{f}(\xi) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \xi} dx \tag{1}$$

Whereas the inverse Fourier transform is denoted as:

$$f(x) = \int_{-\infty}^{\infty} \hat{f}(\xi) e^{2\pi i x \xi} d\xi \tag{2}$$

Introduction

The Fourier Transform is an important mathematical concept. It has applications in digital signal processing, convolution in neural networks, and even image recognition.

Parallelization

There are a few different directions to explore when developing a more parallized implementation of the Fourier Transform.

This is a test citation. [1]

References

[1] Donald E. Knuth. Literate programming. *The Computer Journal*, 27(2):97–111, 1984.