

# A Parallel Application of the Fourier Transformation

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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:

$$f \rightarrow \hat{f}$$

The Fourier transform is defined as:

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

Whereas the inverse Fourier transform is denoted as:

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

## 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 parallelized implementation of the Fourier Transform.