Frequency Domain

### To overcome the limitations of the spatial domain, learning from the frequency domain has become a popular approach. The frequency domain is obtained by transforming an image from the spatial domain to the frequency domain using the Fast Fourier Transform (FFT). In this domain, each pixel in the image is represented by its frequency components, which capture the patterns and relationships between the pixels.

# Fast Fourier Transform (FFT)

The Fast Fourier Transform (FFT) is a mathematical technique that transforms a time-domain signal into its frequency-domain representation. In the case of images, the time-domain signal is represented by the pixel values of the image, and the FFT calculates the frequency-domain representation of these pixel values. The FFT can be represented mathematically as:



# Benefits of Learning from the Frequency Domain

The frequency domain provides a more suitable representation for capturing the spatial relationships between different regions of the image. This results in a more effective representation of the underlying patterns in medical images, leading to improved performance in biomedical image segmentation.

