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**Title:**

Parallel Discrete Fourier Transformation for Image Processing: A Performance Analysis

**Abstract:**

The aim of this project is to develop a parallel implementation of the Discrete Fourier Transform (DFT) and apply it to image processing tasks. The DFT is a fundamental tool for analyzing and processing signals in the frequency domain, and its parallelization can significantly accelerate computations, particularly for large datasets such as images. The project will focus on implementing the parallel DFT algorithm using OpenMP or MPI for distributed memory systems.

The parallel DFT implementation will be applied to various image processing tasks, including image filtering, compression, and feature extraction. Performance metrics such as speedup, efficiency, and scalability will be evaluated to assess the effectiveness of parallelization. Additionally, the project will investigate the impact of different parallelization strategies and input sizes on performance.

The main objectives of the project include:

1. Implementing parallel DFT algorithms using OpenMP or MPI.
2. Applying parallel DFT to image processing tasks, such as filtering and compression.
3. Evaluating the performance of parallel DFT in terms of speedup, efficiency, and scalability.
4. Analyzing the impact of parallelization strategies and input sizes on performance.

The project will provide insights into the benefits of parallel computing for DFT-based image processing tasks and contribute to the optimization of computational resources in image processing pipelines. The results will be valuable for researchers and practitioners working in fields such as computer vision, remote sensing, and medical imaging.