Introduction

This small code project demonstrates a fully-tested numerical optimization implementation with comprehensive analysis and visualization capabilities. The project showcases the complete research pipeline from algorithm implementation through testing to result visualization.

Research Context

Numerical optimization forms the foundation of many scientific and engineering applications. This project implements and analyzes gradient descent methods for solving optimization problems of the form:

$$\min_{x \in \mathbb{R}^n} f(x)$$

where $f : \mathbb{R}^n \to \mathbb{R}$ is a continuously differentiable objective function.

Key Components

The implementation includes:

- **Gradient descent algorithm** with configurable parameters