

Methodology

This section describes the implementation methodology and experimental setup used in the optimization project.

Algorithm Implementation

Gradient Descent Algorithm

The core algorithm implements the following iterative procedure:

Input: Initial point x_0 , step size α , tolerance ϵ , maximum iterations N

Output: Approximate solution x^*

$k = 0$

while $k < N$:

$f = \text{compute_gradient}(x_k)$

 if $\|f\| < \epsilon$:

 return x_k # Converged

$x_{k+1} = x_k - \alpha f$

$k = k + 1$

return x_k # Maximum iterations reached

Test Results: Convergence Metrics