

# Proposal

Michael Ito , Mouhamad Obeid & Ahmad Shmayssani

Team Name: OptiVisioners

March 09, 2023

## Phase I

**Big Question: How do different parameters of the Wolfe conditions affect the convergence rate and accuracy of the optimization algorithm for a nonlinear problem?**

To accomplish our goal, we will first define the nonlinear-functions we will work on and select an appropriate optimization algorithm, such as gradient descent or newton or quasi-Newton methods. We will then focus on implementing and testing different combinations of the parameters of the Wolfe conditions, mainly the curvature condition, and the sufficient decrease condition, and analyze their impact on the performance of the optimization algorithm. We will investigate how the choice of the parameters affects the convergence rate, accuracy, and robustness of the optimization algorithm. Finally, we will present our findings and recommendations for selecting the optimal combination of parameters for the Wolfe conditions for this problem. We will document our methodology, results, and analysis in a final report.

We believe that our project will have practical implications for a wide range of applications, such as machine learning, engineering, and finance, where optimization is a crucial component. Our study aims to provide a comprehensive understanding of the role of the parameters of the Wolfe conditions in the optimization process, and we hope that our findings will be useful for practitioners and researchers working in the field of optimization. To achieve our goal, we will leverage various tools and techniques, including Python programming language, and visualization tools, and we will work collaboratively as a team to ensure that the project is completed on time and to a high standard. We are excited about the opportunity to undertake this project and look forward to contributing to the field of optimization.