**SIMPLEX METHOD USING PYTHON**

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The simplex method is a widely used algorithm for solving linear programming problems. It is an iterative algorithm that starts with an initial feasible solution and then improves it in each iteration until an optimal solution is reached. The method uses the concept of basic variables, which are the variables that have a non-zero coefficient in the objective function of the current solution, and non-basic variables, which have a zero coefficient. At each iteration, the algorithm selects a basic variable to enter the basis and a non-basic variable to leave the basis, in order to improve the objective function value. The method terminates when no further improvement is possible, or when an unbounded solution is reached. The simplex method has a polynomial worst-case time complexity, making it a practical method for solving large-scale linear programming problems.

The simplex method is a powerful optimization algorithm used to solve linear programming problems. It is widely used in various industries and research areas to optimize a range of problems. In this project, we implement the simplex method using Python programming language and integrate it with a graphical user interface (GUI) to make it more user-friendly. The GUI provides an intuitive and interactive way to enter the linear programming problem and displays the optimal solution. It also displays the step-by-step procedure of the simplex method, allowing the user to better understand the algorithm. This project will be helpful for students, researchers, and practitioners who want to learn or apply the simplex method to solve optimization problems.

The simplex method is an iterative algorithm for solving linear programming problems. The general algorithm can be summarized in the following steps:

1. Convert the linear programming problem into standard form: maximize/minimize a linear objective function subject to linear equality and inequality constraints.
2. Create an initial feasible solution: choose a basic feasible solution by setting some of the variables to zero and solving for the remaining variables.
3. Perform an iteration of the simplex algorithm:

a. Choose a non-basic variable (a variable that is not currently in the basis) to enter the basis, based on the objective function's coefficient.

b. Determine the variable that should leave the basis, based on the ratios of the constants in the constraints and the entering variable's coefficient.

c. Update the basic feasible solution by swapping the entering and leaving variables.

1. Repeat step 3 until an optimal solution is found or it is determined that the problem is unbounded.
2. If the problem is unbounded, stop and report that the problem is unbounded. Otherwise, the optimal solution has been found.

Note that there are several variations of the simplex method, such as the two-phase method and the revised simplex method, which are designed to handle different types of problems and to improve the algorithm's efficiency.