Homework 5 Solution and Discussion

Example MATLAB code written by Max Yi Ren and Emrah Bayrak were modified in solving the following nonlinear constrained optimization problem:

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The optimization settings were first defined by creating function handles for the objective function (f), the gradient of the objective function (df), constraints (g), and gradient of constraints (dg). The gradients are defined as row vectors.

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Two different algorithms can be specified to solve the optimization problem (“myqp” and “matlabqp”). ‘myqp’ solves the QP problem by implementing an Active-Set strategy whereas “matlabqp” uses one of three algorithms which can be user-specified:

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For this problem, the active set algorithm will be utilized.

Optimization Process and Results:

The optimization begins at the initial point [x1, x2] = [1, 1]. This is confirmed to be in the feasible region before proceeding with the optimization. Sequential quadratic programming works by solving multiple optimization subproblems. The subproblems will be solved until the termination criteria is met; the norm of the Lagrangian gradient must be smaller than a user-defined tolerance ε. In this case, ε is 1\*10-3.

**Solution Points for Each Iteration**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P1 | P2 | P3 | P4 |  | P5 |
| x1 | 1 | 1.750000 | 0.938524 | 1.0705432 |  | 1.0604169 |
| x2 | 1 | 2.250000 | 1.542121 | 1.4652623 |  | 1.4563356 |

Chart

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