

Assignment 1

Given an $(m \times n)$ -matrix $A = (a_{ij})$. It is required to approximate the matrix by a sum of two vectors, that is, to find vectors $x = (x_1, \dots, x_m)$ and $y = (y_1, \dots, y_n)$ such that $\max_{i,j} |x_i + y_j - a_{ij}|$ would be minimal.

1. Formulate the problem as a linear programming problem.
2. Write the dual problem.
3. Write a program implementing the simplex method for the solution of the problem.

3.1 The input data for the program:

Line 1: integers m and n : the number of rows and columns in A .

Lines 2 - $m + 1$: m rows of A .

All the numbers in a line should be separated by spaces.

The input file name is "input.txt".

3.2. The output file ("output.txt") should contain the solution: vectors x and y and the minimal value of the target function.

3.3. Do not store the whole matrix of the linear programming problem, calculate necessary its elements when you need them.

4. Write a report containing the problem formulation, dual problem, an example of the input and output files.

5. Submission. Deadline for the assignment submission is 6/02/2009. Submit source files of the program and a file with the report by e-mail to bregman@bgu.ac.il. The subject should be LP-Assignment 1. Write your name and ID in the e-mail text, not only in the attachments.

The assignments may be performed by pairs.

Good luck!