Technical Report

We have to find the $\min \nabla f(x_k)^T x$ Using gurobi, so we have to find $\nabla f(x_k)$ first.

In order to find $\nabla f(x_k)$,

we have to use the origin function, which is $\min_x f(x) = -\sum_{i=1}^{n} \log(a_i^T x)$,

we can get

$$\nabla f(x) = \begin{bmatrix} \frac{a_{11}}{a_1^T x} + \frac{a_{21}}{a_2^T x} + \cdots + \frac{a_{n1}}{a_n^T x} \\ \vdots \\ \frac{a_{1p}}{a_1^T x} + \frac{a_{2p}}{a_2^T x} + \cdots + \frac{a_{np}}{a_n^T x} \end{bmatrix}$$

Therefore, we can simply use the parameter and data to calculate this. After that, using gurobipy to find the best direction and using Nestrov methods to choose our step size.

Here is the result: