TP 2 - Members in the US Electoral College

General information

Linear Programming problem

Results and optimization

With our problem as stated before, we have a rather disturbing problem as we can see that some states have fairly similar populations but sometimes have double the members in the electoral college. This is particularly obvious when we took at the lower end of the population spectrum where there isn't a lot of population but we might see for example (insert problem with close population but 1 vs 2 members). This is due to a matrix conditioning problem when working on the LP problem as the orders of magnitude vary greatly between 10^{-6} ($u,\ v$), 10^{0} (α_i) and 10^{6} (x_i).

Thus, our problem has been slightly modified to :

$$\begin{cases} min\ u - v & \\ v - \frac{\alpha_i}{x_i} \times 10^6 & \leq 0 \\ \frac{\alpha_i}{x_i} \times 10^6 - u & \leq 0 \\ \sum_i \alpha_i & = N \end{cases} \tag{1}$$

By doing this, we will do some kind of preconditioning which will make our results better. With this change, the number of members per state is given by (using the state ANSI abreviations):

State	Population	Number of members
AL		
AK		
AZ		
AR		
CA		
CO		
CT		
DE		
DC		
FL		
GA		
HD		
ID		
IL		
IN		
IA		
KS		
KY		
LA		
ME		
MD		
MA		
MI		
MN		
MS		
MO		
MT		
NE		
NV		
NH		
NJ		
NM		
NY		
NC		
ND		
OH		
OK		
OR		
PA		
RI		
SC		
SD		
TN		
TX		
UT		
VT		
VA		
WA		
WV		
WI		
WY		

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