Project 1

Juan Diego Sánchez-Torres.[1]

[1] Department of Mathematics and Physics, ITESO. dsanchez@iteso.mx

17 March, 2021

This project's main objective is to apply standard convex optimization procedures to industrial and data-based modeling problems.

Activities

Problem 1: Warm up

Use the Pyomo package[2] to reproduce all the seven examples of the Pyomo Gallery. Note that some details are missing, and the code may need an update. So, it is necessary an adequate mathematical formulation, a brief background of the problem (and its bibliographical references), a much better explanation, more graphics, and an updated and working code (consider the good practices of coding, as the presence of comments, spacing, and tabulation).

Problem 2: Additional Operational Problems

Perform the same scheme of **Problem 1** to the following cases:

1. Gasoline Blending
2. Transportation Networks
3. Machine Bottleneck
4. Soft Landing Apollo 11 on the Moon

Problem 3: Applications to modeling

It seems the Pyomo examples are not the only ones that need a better explanation. The CVXOPT package also requires examples with a better presentation. So, at this point, it is necessary to perform the procedure of **Problem 1** to the 15 *most practical examples*. The mentioned cases are from the list of 23 examples from the book Convex Optimization by Boyd and Vandenberghe[1], given in the CVXOPT page. The criteria for selecting the 15 *most practical examples* is the applicability to data-based modeling.

Considerations

1. The presentation should be in teams of one to five people.
2. A bonus point will be granted to the teams that upload the whole project to Github, of course, using Github's formats and standards.

References

[1] S. Boyd, S.P. Boyd, and L. Vandenberghe. *Convex Optimization*. Cambridge University Press, 2004. ISBN 9780521833783. URL https://web.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf.

[2] William E. Hart, Carl D. Laird, Jean-Paul Watson, David L. Woodruff, Gabriel A. Hackebeil, Bethany L. Nicholson, and John D. Siirola. *Pyomo – Optimization Modeling in Python. Second Edition*. Springer, 2017. URL https://www.springer.com/gp/book/9783319588193.