Basic Beamer Talk

Brooks Emerick, Yun Lu, and Francis Vasko
Kutztown University

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Introduction

- MOTIVATION: Literature on determining the alternative optima for combinatorial optimization problems, especially NP-Hard problems, is minimal (e.g. determining multiple solutions to TSP [1]).

- The Minimum Cardinality Set Covering Problem (MCSCP) is a combinatorial integer programming problem with many applications (e.g. ingot mold selection [2]).

- GOAL: Develop a methodology for predicting the qualitative number of alternative optima for MCSCP.

Formulation of MCSCP

Let $A = [a_{ij}]$ be an $m \times n$ matrix, where $m < n$, and the entries of A are zeros and ones. Let $x = [x_j]$ be a bit string, then

$$\text{Minimize:} \quad z = \sum_{j=1}^{n} x_j \tag{1}$$

Subject to:

$$\sum_{j=1}^{n} a_{ij} x_j \geq 1 \quad \text{for } i = 1, 2, \ldots, m \tag{2.1}$$

$$\sum_{j=1}^{n} a_{ij} \geq 1 \quad \text{for } i = 1, 2, \ldots, m \tag{2.2}$$

$$\sum_{i=1}^{m} a_{ij} \geq 1 \quad \text{for } j = 1, 2, \ldots, n \tag{2.3}$$

Figures

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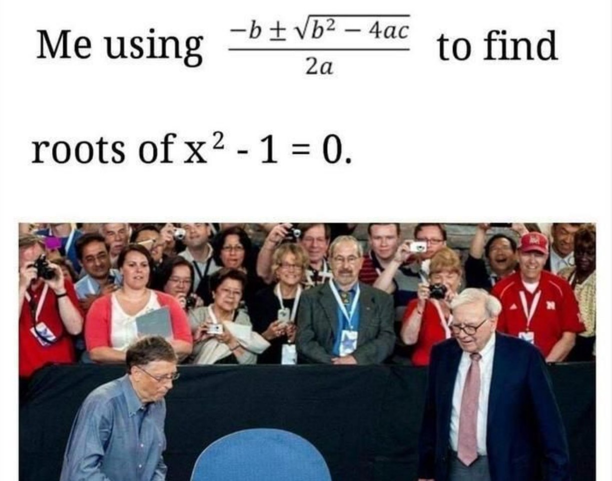

Selected References

T. Huang, Y. Gong, and J. Zhang.
Seeking multiple solutions of combinatorial optimization problems: a proof of principle study.
2018 IEEE Symposium Series on Computational Intelligence (SSCI), Bangalore, India pp 1212-1218.

F. J. Vasko, F. E. Wolf, and K. L. Stott.
Optimal selection of ingot sizes via set covering.
Opns Res, 38, pp 346-353, 1987.

MATLAB.
Statistics and Machine Learning Toolbox User's Guide, R2020a.
1 Apple Hill Dr, Natick, MA, 01760-2098, 2020.

H. Taha.
Operations Research: An Introduction, 10th edition.
Pearson, Boston, MA, 2017.