Mul ctives

CIS 418

An Example of Multiple Objective Optimization

Removing snow in Montreal.

Goal: minimize the expense and at the same time maximize contaminant removal (salt, sand). Different removal sites have different capacities.

*source – Ragsdale

Formulate the problem

- Objective:
  - Minimize cost (assume that it costs k$ per km travelled * ft^3 of snow) / Maximize the amount of contaminants removed
- Decisions:
  - From each sector go which sites are we removing the contaminant snow. 5X10=50 decisio
- Constraints:
  - Site capacity
  - You cannot remove snow that does
  - Non-negative decision variables

Go to the excel file "Non-Linear Problem"->"Montreal Snow removal" and find the optimal solution.

Handling conflicting objectives

- Conflicting objectives:
  - Maximum amount of contaminants that can be removed
  - Minimum cost

- How can you use O s to create a plot showing minimum cost of re aminants removal?
  - Set the constrai
  - Run optimization report: objective of the parameter
  - Plot the efficient frontier by using **“Chart”->”Multiple Optimizations”**

Selecting an operating point on the efficient frontier

- **Efficient Frontier – classic definition:** The efficient frontier is the set of optimal portfolios that offers the highest expected return for a defined level of risk or the lowest risk for a given level of expected return.

- **Efficient Frontier – in our case:** The set of optimal amount of contaminants remo budget), or the set of optimal cost for a d removed.

- What point on the curve the city may to operate? Why?