6.00²

Lecture 1: Introduction

Three models
- optimization
- statistical
- similation.

Optimization mocle

objective function to maximize or minimize.
set of constraints that eliminate some solutions.

Knapsack problem: a theift in a house want to take all maximum value stuff that can fit in his backpack.

0|1 Knapsack: you take the object or you don't
fraction knapsack: take piece of it (can be solved using greedy algorithm).

0/1 Knapsack.

each item is pair <value, weight>
Limit weight of knapsack is W
Vector L of len n represent set of available item.
Vector V of len n indicate wether item taken or not. V[i]=1 taken
V[i]=0 not taken

Find
$$\sum_{i=0}^{n-1} V[i] \cdot L[i].value$$

Greedy algorithm always find local optimam solution but not global optimum, but it also depends how you implement and the input data.

Brute force

- Generate a power set
- del all combination whose weight > w
- From remaing chose the heighst value

<slow algorithm> 2^n

"There is no better algo than the exponential Brute force"

"But there is some good algo like Greedy algo ≤ Brute force"