Combinatorial Optimization

Written by HADIOUCHE Azouaou.

Disclaimer

This course extremely losely follows what Mr.Berrachedi is supposed to mean.

> To seperate the contents of the course to actual additions or out of context information, a black band will be added by its side like the one englobing this comment.

Contents

Chapter 1

Optimization Problems

> **Note**: *These will be added later... probably*
> - *Vector comparision*
> - *Problem notation*

1.1. Transformation Of C.O. Problems

We consider the following integer optimization problem,

$$(\text{INP}) \begin{cases} \max c \cdot x \\ Ax \leq b \\ x \in \mathbb{N}^m \end{cases}$$

with $A \in \mathbb{Z}^{n \times m}, b \in \mathbb{Z}^m, c \in \mathbb{Z}^m$.

- A special case of this is a binary variable problem (BVP), where we take the variable we want to optimize on x to be binary, that is, $x \in \{0,1\}^m$. The knapsack is a special case where the b is the volume and A is the volume of each element, while c is their usefulness and x represents either taking it or not.

If we take by hypothesis that $\mathcal{D}$ is bounded, notice that the set $S \subset \mathcal{D}$ that satisfies the INP problem are finite.

> **Note**: *Proof will be written in a bit*