Assigment1

- Zitong Huang, 12432670, Computer Science and Engineering

- 3d Gaussian Splatting for Scene Reconstruction

- Prof. Feng Zheng

TSP

- Fix Start City:

TSP ask for visit all city, so we can assum every path start from one（since every path should pass by this city）.

- All Path:

There are $(n-1)!$ ways to arrange the remaining $n-1$ cities. This represents all possible sequences of visiting the cities.

- Flip path

Consider two flip path are same, result should devided by 2.

- Answer:

An n-city Traveling Salesman Problem has

$$\frac{(n-1)!}{2}$$

different routes.

Load Balancing(4-job)

Approach:

1. All possible job partitions

   - Since machines are identical, consider unordered partitions of the total jobs (4) into up to 3 non-negative integers.

     - [4, 0, 0]
     - [3, 1, 0]
     - [2, 2, 0]
     - [2, 1, 1]

Answer:

- For summary, total num is 1+4+3+6=14

2. Calculate:

   - Partition [4, 0, 0]:

     - only **1** unique assignment.

   - Partition [3, 1, 0]:

     - $\binom{4}{3} = 4.$

   - Partition [2, 2, 0]:

     - $\binom{4}{2}/2 = 3$

   - Partition [2, 1, 1]:

     - $\binom{4}{2} = 6$

Load Balancing (n-job)

Approach:

- Total number of possible assignments is 2^n.

- Machines are identical, swapping the assignments between machines doesn't yield a new solution, so total num should be devided by 2.

Answer:

For 2 identical machines and n distinct jobs, there are 2^{n-1} different solutions.

30-Item-Knapsack

Keypoints:

1. choices are independent

   solutions includes the selection of **no items** and the selection of **all items**.

2. Each item have **2** state

   0: not selected, 1: selected

Answer:

The total number of possible solutions is 2^{30}.