2021 Meichu Hackathon

宇宙戰艦黃思HOW (Supermicro-7)
吳宗叡
胡詔宸
溫品堯
周信廷

01
Frontend

02
Monte Carlo

03
DRL

04
Future Works

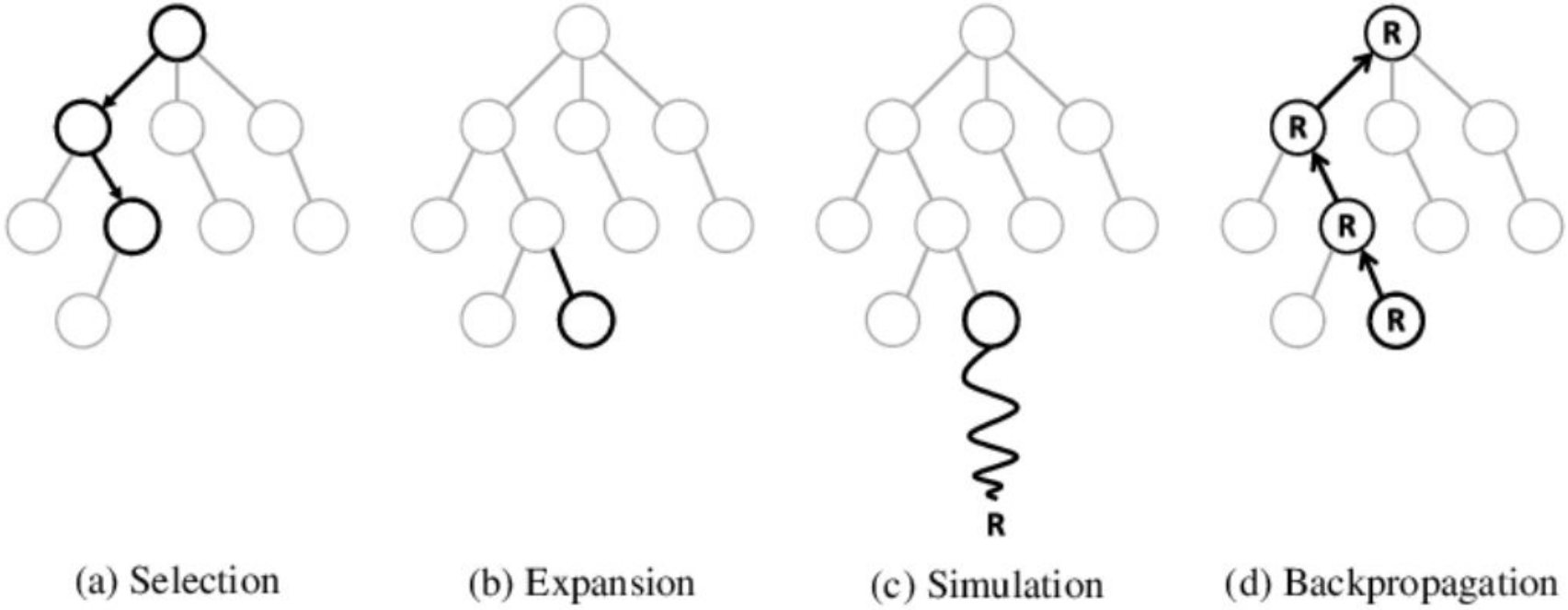
01. Frontend

02.
Monte Carlo

Algo Brainstorming

1. Pallets vs Container
2. Sorting
3. Weight
4. Gravity

Tree Search



(a) Selection (b) Expansion (c) Simulation (d) Backpropagation

Reward Function

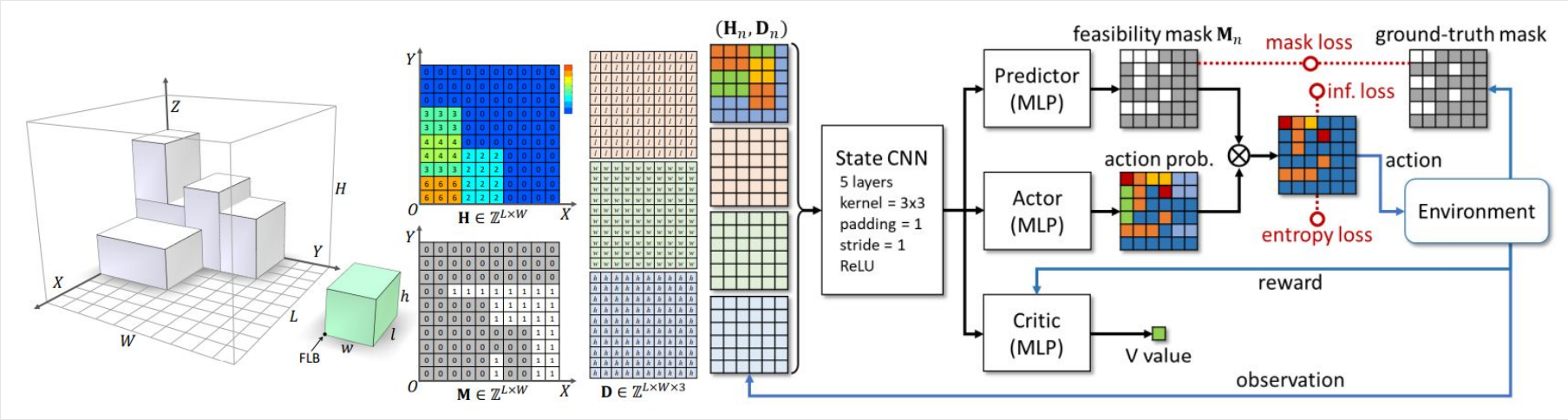
```
while bestNode is not None:
    bestContainer = bestNode.projectedContainer
    bestNode = containerMCTS.getBestLeaf(bestNode, explorationConstant=0)


def getBestLeaf(self, node, explorationConstant, alpha):
     bestTotalCBM = float(0)
     bestNextLeaf = None

     for child in node.children.values():
         nodeCBM = child.totalCBM * alpha + child["weight"] * (1-alpha)
         if nodeCBM >= bestTotalCBM:
             bestTotalCBM = nodeCBM
             bestNextLeaf = child
```

03.
DRL

Online 3D Bin Packing with Constrained Deep Reinforcement Learning



Zhao, H., She, Q., Zhu, C., Yang, Y., & Xu, K. (2021, May). Online 3D Bin Packing with Constrained Deep Reinforcement Learning. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 35, No. 1, pp. 741-749).

嘗試改進方向

- 將問題的實際數值帶入訓練過程（棧板大小、箱子尺寸範圍）

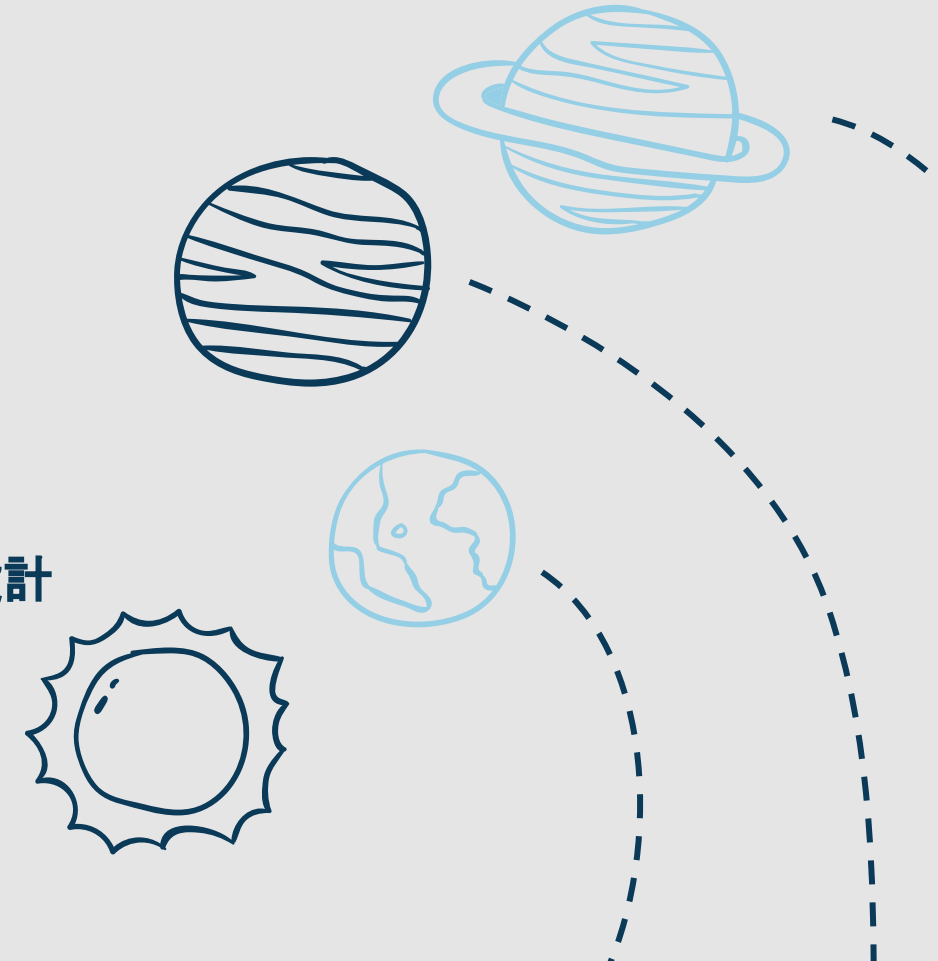
```
parser.add_argument(
    '--item-size-range', default=(10,10,10,30,30,30), type=tuple, help='the item size range, (min_width, min_length, min_height, max_width,
)
parser.add_argument(
    '--bin-size', default=(104, 110, 12), type=tuple, help='the size of bin, (width, length, height)'
)
```

- 修改 feasibility mask 的條件，讓輸出的action符合問題設定
  - 藍邊的重量差距需 < 15%，黃邊重量差距也需 < 15%
  - 上方堆疊貨物懸空面積不超過40%

04. Future Works

- 完成前端 Config Import
- 修改DRL模型的參數量及複雜度，

  完成模型訓練
- Sorting algorithm 的參數調整與設計



Thanks For Listening