目录

一、实验题目

1、0/1 Knapsack Problem. There are 5 items that have a value and weight list below, the knapsack can contain at most 100 Lbs. Solve the problem using back-tracking algorithm and try to draw the tree generated

2、Solve the 8-Queen problem using back-tracking algorithm.

二、实验目的

理解回溯法的思想，掌握使用回溯法解决问题的能力，能够 shi 用回溯法解决经典问题，例如 0/1 背包和八皇后问题等

三、实验设计与分析

1、0/1 Knapsack Problem

对于 0/1 背包问题，每个物品来说，只有要或者不要，即 0 或 1 的问题，所以我们可以先列出一个二叉树，将性价比最大值放在解空间树的根结点处，从根结点处开始进行深度优先遍历。中间过程因为有约束函数，所以不会一直深度遍历下去，如果 k(k<n)号物品加入后超出了背包容量时,取消选择 k,回溯至最近的加入背包的物品，选择另一条分支继续 DFS。在这个过程中使用 bond()函数进行剪枝。

2、Solve the 8-Queen problem

使用递归地方法，如果当前行存在可以放置皇后的位置就放置，然后递归至下一行寻找合适的位置，当皇后全部放完时输出结果。

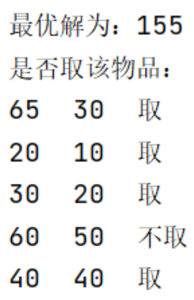
四、实验环境

Windows 10、IntelliJ IDEA 2020.3.2 x64、jdk1.8.0_281

五、项目测试（功能和性能）

1、0/1 Knapsack Problem

实验结果如下图

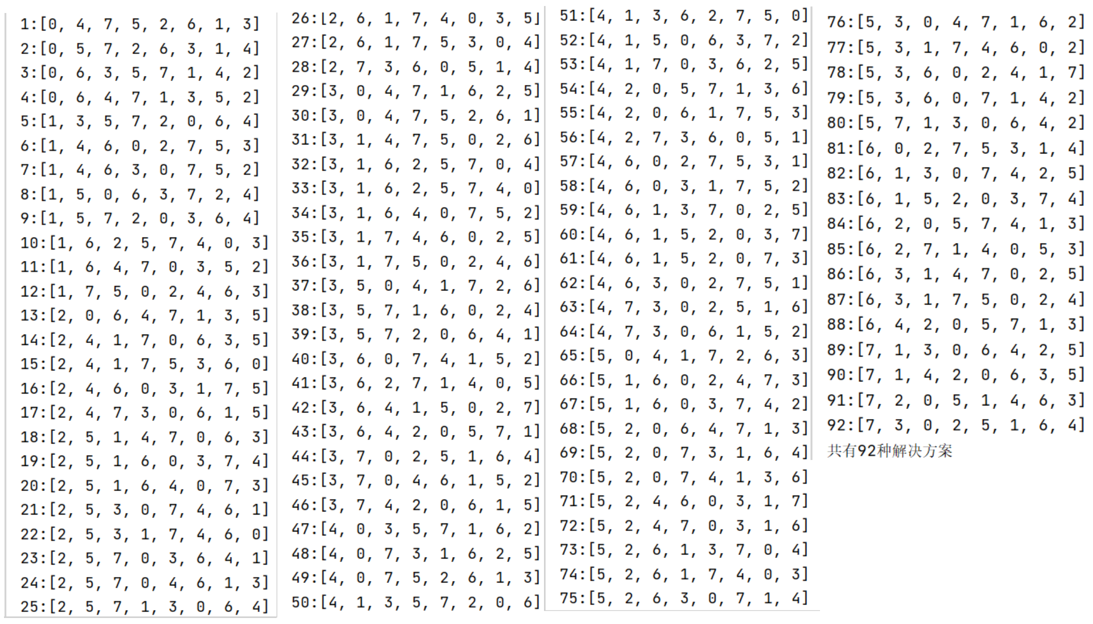


```
最优解为：155
是否取该物品：
65   30   取
20   10   取
30   20   取
60   50   不取
40   40   取
```

算法时间复杂度为 0(2^n)

2、Solve the 8-Queen problem

实验结果如下图，算法时间复杂度为 0(n!)



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共有92种解决方案
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