

关于 main_1_3.py 总模型求解值为全 0 的问题分析:

基于 main_1_3.py 文件分析

1. 运行结果 (部分):

```
I:\temp\02\16fc16a145a097f33516f084725f-pulp.sol (default strategy 1)
At line 2 NAME          MODEL
At line 3 ROWS
At line 92379 COLUMNS
At line 415366 RHS
At line 507741 BOUNDS
At line 538738 ENDDATA
Problem MODEL has 92374 rows, 61992 columns and 256500 elements
Coin0000I MODEL read with 0 errors
Option for timeMode changed from cpu to elapsed
Continuous objective value is 3.38286e+07 - 0.13 seconds
Cgl0004I processed model has 92374 rows, 61992 columns (30996 of which binary)) and 256500 elements
Cbc0038I Initial state - 0 integers unsatisfied sum - 1.08802e-14
Cbc0038I Solution found of -3.38286e+07
Cbc0038I Relaxing continuous gives -3.38286e+07
Cbc0038I Before mini branch and bound, 30996 integers at bound fixed and 30881 continuous
Cbc0038I Mini branch and bound did not improve solution (0.79 seconds)
Cbc0038I After 0.81 seconds - Feasibility pump exiting with objective of -3.38286e+07 - took 0.14 seconds
Cbc0012I Integer solution of -33828564 found by feasibility pump after 0 iterations and 0 nodes (0.84 seconds)
Cbc0001I Search completed - best objective -33828564, took 0 iterations and 0 nodes (0.88 seconds)
Cbc0035I Maximum depth 0, 0 variables fixed on reduced cost
Cuts at root node changed objective from -3.38286e+07 to -3.38286e+07
Probing was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Gomory was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Knapsack was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Clique was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
MixedIntegerRounding2 was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
FlowCover was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
TwoMirCuts was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
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TwoMirCuts was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
TwoMirCuts was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
ZeroHalf was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)

Result - Optimal solution found

Objective value:           33828564.00000000
Enumerated nodes:           0
Enumerated nodes:           0
Total iterations:           0
Total iterations:           0
Time (CPU seconds):         1.08
Time (CPU seconds):         1.08
Time (Wallclock seconds):   1.08
Time (Wallclock seconds):   1.08

Option for printingOptions changed from normal to all
```

2. 当前问题: 结果输出 xlsx 为全 0:

1. 可能原因:

- CBC 求解器告诉我们, 找到可行解', 但是该解为负, 即在利润最大化目标函数中出现负值。一般来说, 应该是计算逻辑导致“收益<成本”。 顾首先考虑是否是约束条件的过于严苛, 比如“每种作物在单个地块种植的面积不宜太小”和“每种作物每季的种植地不能太分散”。我们开始尝试放宽部分条件, 看看是否能得到非零结果。
- 二元决策: 由于种植决策是二元的, 因此当某些作物、地区和季节没有种植时, 结果可能为零。您可能会检索到零, 因为相应的种植决策为零。

3. 尝试改进: 放松部分约束

- 新代码允许在第二季种植最多 5 种作物, 而不是原来的严格约束。这可能有助于更可行的解决方案和非零结果。如果确实不符合要求, 请直接放弃
- 休耕: 我查询到可能存在‘休耕决策’的概念, 顾允许模型在某些季节明确让土地休耕。(可以灵活解释为什么现在出现非零值, 因为模型现在可以选择种植或让土地闲置。)

- c) 如果当前结果在关键区域仍然包含许多零，则还需要进一步调整**成本结构**或更深入地放宽某些约束，服从题目要求的情况下。如果种植面积不再为零，则表明模型正在按预期运行。

4. 其他可能性尝试：

- a) 求解器警告和提示： terminal log 中出现 "feasibility pump"，并且没有找到更优解。可以尝试增加时间限制或者使用更强大的求解器（例如 Gurobi），或者更好的解释器。
- b) 存储非零值：添加检查以仅在 `planting_decision.varValue == 1` 时存储值，以避免导出不必要的零。
- c) 目标函数的制定也可能导致求解器发现最好不植入任何东西的情况。您可能需要仔细检查预期销售额、价格和成本，以确保它们不会无意中使所有情况下的目标函数为零。

5. 附件文件：

- a) `main_1_3.py` 原文件
- b) `main_1_3_modified.py` 修改后文件
- c) `result1_1_modified.xlsx` `main_1_3_modified.py` 执行后结果表
- d) `result1_2_modified.xlsx` `main_1_3_modified.py` 执行后结果表
- e)