Assignment #1: 虚拟机,Shell & 大模型

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2025 spring, Complied by 袁奕 2400010766 数院

作业的各项评分细则及对应的得分情况

标准	等级	得分
按时提交	完全按时提交: 1分 提交有请假说明: 0.5分 未提交: 0分	1
源码、耗时(可选)、解题思 路(可选)	提交了4个或更多题目且包含所有必要信息: 1分 提交了2个或以上题目但不足4个: 0.5分 没有提供源码: 0分	1 分
AC代码截图	包含清晰的Canvas头像、PDF文件以及MD或 DOC格式的附件: 1分 缺少上述三项中的任意一项: 0.5分 缺失两项或以上: 0分	1 分
清晰头像、PDF文件、 MD/DOC附件	包含清晰的Canvas头像、PDF文件以及MD或 DOC格式的附件: 1分 缺少上述三项中的任意一项: 0.5分 缺失两项或以上: 0分	1 分
学习总结和个人收获	提交了学习总结和个人收获: 1分 未提交学习总结或内容不详: 0分	1 分
总得分: 5	总分满分: 5分	

说明:

1. 解题与记录:

o 对于每一个题目,请提供其解题思路(可选),并附上使用Python或C++编写的源代码 (确保已在OpenJudge,Codeforces,LeetCode等平台上获得Accepted)。请将这些 信息连同显示"Accepted"的截图一起填写到下方的作业模板中。(推荐使用Typora https://typoraio.cn 进行编辑,当然你也可以选择Word。)无论题目是否已通过,请标明每个题目大致花费的时间。

2. 课程平台与提交安排:

。 我们的课程网站位于Canvas平台(<u>https://pku.instructure.com</u>)。该平台将在第2周 选课结束后正式启用。在平台启用前,请先完成作业并将作业妥善保存。待Canvas平台 激活后,再上传你的作业。 • 提交时,请首先上传PDF格式的文件,并将.md或.doc格式的文件作为附件上传至右侧的 "作业评论"区。确保你的Canvas账户有一个清晰可见的头像,提交的文件为PDF格式, 并且"作业评论"区包含上传的.md或.doc附件。

3. 延迟提交:

如果你预计无法在截止日期前提交作业,请提前告知具体原因。这有助于我们了解情况并可能为你提供适当的延期或其他帮助。

请按照上述指导认真准备和提交作业,以保证顺利完成课程要求。

1. 题目

27653: Fraction类

http://cs101.openjudge.cn/practice/27653/

```
1 from math import gcd
2
3
   class frac():
4
        def __init__(self, a, b):
5
            self.a = a
           self.b = b
6
7
        def __add__(self, other):
            na = self.a * other.b + self.b * other.a
8
9
            nb = self.b * other.b
           return frac(na // gcd(na, nb), nb // gcd(na, nb))
10
11
        def __str__(self):
           return f"{self.a}/{self.b}"
12
13
        def show(self):
            print(f"{self.a}/{self.b}")
14
15
16 a, b, c, d = map(int, input().split())
    print(frac(a, b) + frac(c, d))
17
```

状态: Accepted

源代码

```
from math import gcd

class frac():
    def __init__ (self, a, b):
        self.a = a
        self.b = b

def __add__ (self, other):
        na = self.a * other.b + self.b * other.a
        nb = self.b * other.b
        return frac(na // gcd(na, nb), nb // gcd(na, nb))

def __str__ (self):
    return f"{self.a}/{self.b}"

def show(self):
    print(f"{self.a}/{self.b}")

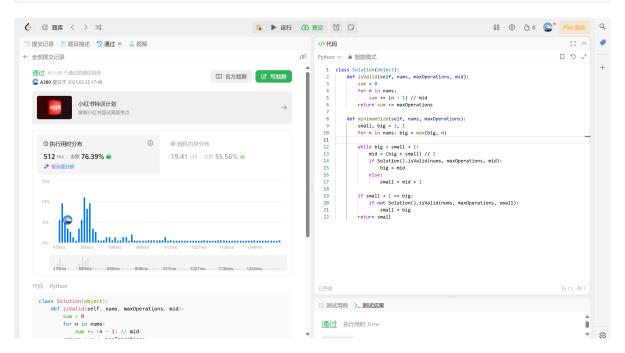
a, b, c, d = map(int, input().split())
print(frac(a, b) + frac(c, d))
```

1760.袋子里最少数目的球

https://leetcode.cn/problems/minimum-limit-of-balls-in-a-bag/

思路:

```
class Solution(object):
        def isValid(self, nums, maxOperations, mid):
3
            for n in nums:
 4
 5
                sum += (n - 1) // mid
 6
            return sum <= maxOperations
 7
        def minimumSize(self, nums, maxOperations):
 8
9
            small, big = 1, 1
10
            for n in nums: big = max(big, n)
11
            while big > small + 1:
12
13
                mid = (big + small) // 2
                if Solution().isValid(nums, maxOperations, mid):
14
15
                     big = mid
16
                else:
17
                     small = mid + 1
18
19
            if small + 1 == big:
```



04135: 月度开销

http://cs101.openjudge.cn/practice/04135

思路:

```
def isValid(nums, mid, m):
 1
 2
        cnt, sum = 1, 0
 3
        for i, num in enumerate(nums):
 4
            new\_sum = sum + num
 5
            if new_sum <= mid:</pre>
 6
                sum = new_sum
 7
            else:
 8
                sum = num
 9
                 cnt += 1
10
            # 第 i 个循环完成后, cnt 和 sum 分别是前 i 项的
11
        return cnt <= m
12
13
    n, m = map(int, input().split())
14
    nums = []
15
    small, big = 0, 0
    for _ in range(n):
16
17
        num = int(input())
18
        nums.append(num)
19
        small = max(small, num)
20
        big += num
21
```

```
22 | while small + 1 < big:
23
        mid = (small + big) // 2
24
        if isValid(nums, mid, m):
25
            big = mid
        else :
26
27
            small = mid + 1
28
29
   if small < big:</pre>
        if not isValid(nums, small, m):
30
31
            small = big
32
33 print(small)
```

状态: Accepted

源代码

```
def isValid(nums, mid, m):
    cnt, sum = 1, 0
    for i, num in enumerate(nums):
        new sum = sum + num
        if new sum <= mid:</pre>
            sum = new_sum
        else:
            sum = num
            cnt += 1
    return cnt <= m</pre>
n, m = map(int, input().split())
nums = []
small, big = 0, 0
for _ in range(n):
    num = int(input())
    nums.append(num)
    small = max(small, num)
    big += num
while small + 1 < big:</pre>
    mid = (small + big) // 2
    if isValid(nums, mid, m):
        big = mid
    else :
        small = mid + 1
if small < big:</pre>
    if not isValid(nums, small, m):
        small = big
print(small)
```

27300: 模型整理

http://cs101.openjudge.cn/practice/27300/

Remark: 其中 OOP 写法类似 CPP 中自定义的 cmp 比较函数

```
class token():
 1
        def __init__(self, val : str):
 2
            self.val = val
 3
 4
        def num(self):
            if self.val[-1] == "M":
 5
 6
                return float(self.val[:-1])
 7
            return float(self.val[:-1]) * 1e3
8
        def __lt__(self, other):
9
           return token.num(self) < token.num(other)</pre>
10
        def __str__(self):
11
            return self.val
12
13
    n = int(input())
    pair = \{\}
14
    for _ in range(n):
15
        s = input()
16
17
        mid = s.index("-")
18
        name, num = s[:mid], token(s[mid + 1:])
        if name in pair:
19
            pair[name].append(num)
20
21
        else:
22
            pair[name] = [num]
23
24
    for name, num in pair.items():
25
        pair[name] = sorted(num)
26
    names = list(pair.keys())
27
28
    names = sorted(names)
29
    for name in names:
        print(name, end = ": ")
30
        print(*pair[name], sep = ", ")
31
```

状态: Accepted

源代码

```
class token():
    def init (self, val : str):
       self.val = val
    def num(self):
        if self.val[-1] == "M":
            return float(self.val[:-1])
        return float(self.val[:-1]) * 1e3
    def __lt__(self, other):
       return token.num(self) < token.num(other)</pre>
    def str (self):
        return self.val
n = int(input())
pair = \{\}
for _ in range(n):
   s = input()
   mid = s.index("-")
    name, num = s[:mid], token(s[mid + 1:])
    if name in pair:
        pair[name].append(num)
    else:
        pair[name] = [num]
for name, num in pair.items():
    pair[name] = sorted(num)
names = list(pair.keys())
names = sorted(names)
for name in names:
    print(name, end = ": ")
    print(*pair[name], sep = ", ")
```

Q5. 大语言模型 (LLM) 部署与测试

本任务旨在本地环境或通过云虚拟机(如 https://clab.pku.edu.cn/ 提供的资源)部署大语言模型 (LLM) 并进行测试。用户界面方面,可以选择使用图形界面工具如 https://lmstudio.ai 或命令行界面如 https://www.ollama.com 来完成部署工作。

测试内容包括选择若干编程题目,确保这些题目能够在所部署的LLM上得到正确解答,并通过所有相关的测试用例(即状态为Accepted)。选题应来源于在线判题平台,例如 OpenJudge、Codeforces、LeetCode 或洛谷等,同时需注意避免与已找到的AI接受题目重复。已有的AI接受题目列表可参考以下链接:

https://github.com/GMyhf/2025spring-cs201/blob/main/Al accepted locally.md

请提供你的最新进展情况,包括任何关键步骤的截图以及遇到的问题和解决方案。这将有助于全面了解项目的推进状态,并为进一步的工作提供参考。

Q6. 阅读《Build a Large Language Model (From Scratch)》第一章

作者: Sebastian Raschka

请整理你的学习笔记。这应该包括但不限于对第一章核心概念的理解、重要术语的解释、你认为特别有趣或具有挑战性的内容,以及任何你可能有的疑问或反思。通过这种方式,不仅能巩固你自己的学习成果,也能帮助他人更好地理解这一部分内容。

2. 学习总结和个人收获

假期和最近做了如下题目:

204 01760: Disk Tree	Trie	-	http://cs101.openjudge.cn/practice/01760/
204 124.二叉树中的最大路径和	dfs	Tough	https://leetcode.cn/problems/binary-tree-maximum-path-sum/
204 199.二叉树的右视图	bfs	Medium	https://leetcode.cn/problems/binary-tree-right-side-view/
203 01703: 发现它,抓住它	disjoint set	-	http://cs101.openjudge.cn/practice/01703/
203 01611: The Suspects	disjoint set		http://cs101.openjudge.cn/practice/01611/
203 01182: 食物链	disjoint set	Tough	http://cs101.openjudge.cn/practice/01182
202 01145: Tree Summing	disjoint set	rough	http://cs101.openjudge.cn/practice/01145/
202 02788: 二叉树 (2)			http://cs101.openjudge.cn/practice/02788/
202 02766: 二叉树 (2)	-	-	http://cs101.openjudge.cn/practice/02766/
201 02524: 宗教信仰	disjoint set	必须会	http://cs101.openjudge.cn/dsapre/02524/
	disjoint set	必须云	http://cs101.openjudge.cn/practice/02499/
201 02499: Binary Tree	=	-	
201 02255: 重建二叉树	-	-	http://cs101.openjudge.cn/practice/02255/
131 27625: AVL树至少有几个结点	-	-	http://cs101.openjudge.cn/practice/27625/
131 05455: 二叉搜索树的层次遍历	-	-	http://cs101.openjudge.cn/practice/05455/
131 22275: 二叉搜索树的遍历	-		http://cs101.openjudge.cn/practice/22275/
130 18164: 剪绳子	-	必须会	http://cs101.openjudge.cn/practice/18164/
130 22161: 哈夫曼编码树	-	Tough	http://cs101.openjudge.cn/practice/22161/
130 晴问9.7: 向下调整构建大顶堆	-	-	https://sunnywhy.com/sfbj/9/7
129 04078: 实现堆结构	-	必须会	http://cs101.openjudge.cn/practice/04078/
129 25145: 猜二叉树 (按层次遍历)	-	-	http://cs101.openjudge.cn/practice/25145/
129 24729: 括号嵌套树	=	-	http://cs101.openjudge.cn/practice/24729/
128 01577: Falling Leaves	-	-	http://cs101.openjudge.cn/practice/01577/
128 22158: 根据二叉树前中序序列建树	_	必须会	http://cs101.openjudge.cn/practice/22158/
128 24750: 根据二叉树中后序序列建树	-	必须会	http://cs101.openjudge.cn/practice/24750/
127 02775: 文件结构"图"	_	Tough	http://cs101.openjudge.cn/practice/02775/
127 25140: 根据后序表达式建立队列表达式	_	Tough	http://cs101.openjudge.cn/practice/25140/
127 20140. 根据后序农区以建立队列农区以		Feet	https://leetcode.cn/problems/binary-tree-level-order-traversal/
126 06646:二叉树的深度	-	Easy	
	=	-	http://cs101.openjudge.cn/practice/06646/
126 108.将有序数组转换为二叉搜索树	-	Easy	https://leetcode.cn/problems/convert-sorted-array-to-binary-search
126 100.相同的树	-	Easy	https://leetcode.cn/problems/same-tree/
125 08581: 扩展二叉树	=	-	http://cs101.openjudge.cn/practice/08581/
125 543.二叉树的直径	-	Easy	https://leetcode.cn/problems/diameter-of-binary-tree/
125 101.对称二叉树	-	Easy	https://leetcode.cn/problems/symmetric-tree/
124 27637: 括号嵌套二叉树	=	-	http://cs101.openjudge.cn/practice/27637/
124 226.翻转二叉树	-	Easy	https://leetcode.cn/problems/invert-binary-tree/
124 104.二叉树的最大深度	-	Easy	https://leetcode.cn/problems/maximum-depth-of-binary-tree/
123 27638: 求二叉树的高度和叶子数目	_	-	http://cs101.openjudge.cn/practice/27638/
123 94.二叉树的中序遍历	_	Easy	https://leetcode.cn/problems/binary-tree-inorder-traversal/
	-	-	tree begin
		,	Anna Banda
22 2005 武佑五小火从早气了数妇。	- 10114-00-m	- 1	tree begin
23 3095.或值至少K的最短子数组I	- 滑动窗口		https://leetcode.cn/problems/shortest-subarray-with-or-at-least-k
22 04137: 最小新整数	monotonous-stack	- - -	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-khttp://cs101.openjudge.cn/practice/04137/
	monotonous-stack queue	- ' - - -	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-http://cs101.openjudge.cn/practice/04137/http://cs101.openjudge.cn/practice/27925/
22 04137: 最小新整数	monotonous-stack	- - - - Medium	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-khttp://cs101.openjudge.cn/practice/04137/
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈	monotonous-stack queue OOP辅助栈		https://leetcode.cn/problems/shortest-subarray-with-or-at-least-http://cs101.openjudge.cn/practice/04137/ http://cs101.openjudge.cn/practice/27925/ https://leetcode.cn/problems/min-stack/
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈 21 02299: Ultra-QuickSort	monotonous-stack queue OOP辅助栈 merge sort	Tough	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-l http://cs101.openjudge.cn/practice/04137/ https://cs101.openjudge.cn/practice/27925/ https://leetcode.cn/problems/min-stack/ http://cs101.openjudge.or/practice/02299/
22 04137: 最小新整数 22 27925: 小组队列 22 155最小栈 21 02299: Ultra-QuickSort 21 sy322: 跨步迷宫	monotonous-stack queue OOP辅助栈 merge sort bfs	Tough Medium	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-i http://ss10.openjudge.cn/practice/204137/ http://ss10.openjudge.cn/practice/27925/ https://leetcode.cn/problems/min-stack/ http://ss101.openjudge.cn/practice/02299/ https://ssunnywhy.com/sbj/872/322
22 04137: 最小新整数 22 7955: 小组队列 22 7955: 协组队列 21 02299: Ultra-QuickSort 21 sy322: 跨步迷宫 21 sy323: 李符迷宫	monotonous-stack queue OOP輔助栈 merge sort bfs bfs	Tough	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-l http://cs101.openjudge.cn/practice/04137/ http://cs101.openjudge.cn/practice/27925/ https://cs101.openjudge.cn/practice/02299/ https://sunnywhy.com/sfbj/8/2/322 https://sunnywhy.com/sfbj/8/2/323
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈 21 05299: Ultra-QuickSort 21 sy322: 跨步迷宫 21 sy323: 字符迷宫 20 03151: Pots	monotonous-stack queue OOP辅助栈 merge sort bfs bfs	Tough Medium Medium -	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-lhttp://cs.101.openjudge.cn/practice/04137/ https://cs.101.openjudge.cn/practice/27925/ https://cs.101.openjudge.cn/practice/02299/ https://sunnywhy.com/sfbj/8/2/322 https://sunnywhy.com/sfbj/8/2/323 http://sunnywhy.com/sfbj/8/2/323
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈 21 02299: Ultra-QuickSort 21 sy322: 跨步迷宫 12 sy323: 字符迷宫 00 03151: Pots 20 sy320: 迷宫问题	monotonous-stack queue OOP辅助栈 merge sort bfs bfs bfs bfs	Tough Medium	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-ihttp://ss10.openjudge.cn/practice/04137/ https://ss10.openjudge.cn/practice/71925/ https://leetcode.cn/problems/min-stack/ http://ss101.openjudge.cn/practice/02299/ https://ss101.openjudge.cn/practice/02299/ https://ssunnywhy.com/sfbi/8/2/322 https://sunnywhy.com/sfbi/8/2/323 https://sunnywhy.com/sfbi/8/2/323 https://sunnywhy.com/sfbi/8/2/320
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈 21 02299: Ultra-QuickSort 21 sy322: 跨步迷宫 21 sy323: 字符迷宫 20 03151: Pots 00 sy320: 迷宫问题 20 05902: 迷宫问题	monotonous-stack queue OOP輔助枝 merge sort bfs bfs bfs bfs queue	Tough Medium Medium -	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-http://cs101.openjudge.cn/practice/04137/ http://cs101.openjudge.cn/practice/17925/ https://subarray-ratice/nyatice/17925/ https://subarray-ratice/nyatice/02299/ https://sunnywhy.com/sfbj/8/2/322 https://sunnywhy.com/sfbj/8/2/323 http://cs101.openjudge.cn/practice/03151/ https://sunnywhy.com/sfbj/8/2/320 http://cs101.openjudge.cn/practice/05902/
22 04137: 最小新整数 22 27925: 小组队列 22 155.最小栈 21 105.是小栈 21 09299: Ultra-QuickSort 21 sy222: 跨步迷宫 21 sy222: 字符迷宫 20 03151: Pots 20 05920: 迷宫问题 20 05902: 双端队列 19 04067: 回文数字	monotonous-stack queue OOP辅助栈 merge sort bfs bfs bfs bfs queue queue	Tough Medium Medium - Medium - -	https://leetcode.cn/problems/shortest-subarray-with-or-at-least-ihttp://ss101.openjudge.cn/practice/04137/ http://ss101.openjudge.cn/practice/27925/ https://leetcode.cn/problems/min-stack/ http://s101.openjudge.cn/practice/02299/ https://sunnywhy.com/sfbj/8/2/322 https://sunnywhy.com/sfbj/8/2/322 https://sunnywhy.com/sfbj/8/2/320 http://ss101.openjudge.cn/practice/03151/ https://ss101.openjudge.cn/practice/05902/ http://ss101.openjudge.cn/practice/0657/
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以及自己写了一个程序用来规范Latex Mathmode Format, yuanyi-350/Markdown