

Assignment #7: Nov Mock Exam立冬

Updated 1646 GMT+8 Nov 7, 2024

2024 fall, Compiled by 佟永鑫 元培学院

说明:

- 1) 月考: AC6。考试题目都在“题库(包括计概、数算题目)”里面,按照数字题号能找到,可以重新提交。作业中提交自己最满意版本的代码和截图。
- 2) 请把每个题目解题思路(可选),源码Python,或者C++(已经在Codeforces/Openjudge上AC),截图(包含Accepted),填写到下面作业模版中(推荐使用typora <https://typoraio.cn>,或者用word)。AC或者没有AC,都请标上每个题目大致花费时间。
- 3) 提交时候先提交pdf文件,再把md或者doc文件上传到右侧“作业评论”。Canvas需要有同学清晰头像、提交文件有pdf、“作业评论”区有上传的md或者doc附件。
- 4) 如果不能在截止前提交作业,请写明原因。

1. 题目

E07618: 病人排队

sortings, <http://cs101.openjudge.cn/practice/07618/>

思路:

原来后append进的会默认排在后面

代码:

```
n = int(input().strip())

elders = []
youngs = []

for _ in range(n):
    patient_id, age = input().strip().split()
    age = int(age)
    if age >= 60:
        elders.append((patient_id, age))
    else:
        youngs.append((patient_id, age))

elders.sort(key=lambda x: -x[1])

for patient_id, _ in elders + youngs:
    print(patient_id)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
n = int(input().strip())

elders = []
youngs = []

for _ in range(n):
    patient_id, age = input().strip().split()
    age = int(age)
    if age >= 60:
        elders.append((patient_id, age))
    else:
        youngs.append((patient_id, age))

elders.sort(key=lambda x: -x[1])

for patient_id, _ in elders + youngs:
    print(patient_id)
```

基本信息

#: 47111347
题目: 07618
提交人: 佟永鑫
内存: 3600kB
时间: 26ms
语言: Python3
提交时间: 2024-11-12 11:57:43

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E23555: 节省存储的矩阵乘法

implementation, matrices, <http://cs101.openjudge.cn/practice/23555/>

思路:

行列分别为key

代码:

```
def matrix_multiple(n, m1, m2, X, Y):
    X_dict = {}
    Y_dict = {}
    for r, c, val in X:
        if r not in X_dict:
            X_dict[r] = []
        X_dict[r].append((c, val))
    for r, c, val in Y:
        if c not in Y_dict:
            Y_dict[c] = []
        Y_dict[c].append((r, val))

    result = []

    for i in X_dict:
        for j in Y_dict:
            result_ij = 0
            for cx, valx in X_dict[i]:
                for ry, valy in Y_dict[j]:
                    if cx == ry:
                        result_ij += valx * valy
            if result_ij != 0:
                result.append((i, j, result_ij))
    result.sort()

    for r, c, val in result:
        print(r, c, val)

n, m1, m2 = map(int, input().split())
```

```

X = []
for _ in range(m1):
    r, c, val = map(int, input().split())
    X.append((r, c, val))

Y = []
for _ in range(m2):
    r, c, val = map(int, input().split())
    Y.append((r, c, val))

matrix_multiple(n, m1, m2, X, Y)

```

代码运行截图 == (至少包含有"Accepted") ==

状态: **Accepted**

源代码

```

def matrix_multiple(n, m1, m2, X, Y):
    X_dict = {}
    Y_dict = {}
    for r, c, val in X:
        if r not in X_dict:
            X_dict[r] = []
        X_dict[r].append((c, val))
    for r, c, val in Y:
        if c not in Y_dict:
            Y_dict[c] = []
        Y_dict[c].append((r, val))

    result = []

    for i in X_dict:
        for j in Y_dict:
            result_ij = 0
            for cx, valx in X_dict[i]:
                for ry, valy in Y_dict[j]:
                    if cx == ry:
                        result_ij += valx * valy
            if result_ij != 0:
                result.append((i, j, result_ij))
    result.sort()

    for r, c, val in result:
        print(r, c, val)

n, m1, m2 = map(int, input().split())

X = []
for _ in range(m1):
    r, c, val = map(int, input().split())
    X.append((r, c, val))

Y = []
for _ in range(m2):
    r, c, val = map(int, input().split())
    Y.append((r, c, val))

matrix_multiple(n, m1, m2, X, Y)

```

基本信息

#: 47113654
 题目: 23555
 提交人: 佟永鑫
 内存: 3976kB
 时间: 34ms
 语言: Python3
 提交时间: 2024-11-12 15:07:04

M18182: 打怪兽

implementation/sortings/data structures, <http://cs101.openjudge.cn/practice/18182/>

思路:

好像必须用堆, 不然会超时?

代码:

```

import heapq
from collections import defaultdict

def monster(n_cases, cases):
    results = []

    for case in cases:
        n, m, b = case[0]
        skills = case[1]

        skills_time = defaultdict(list)
        for ti, xi in skills:
            skills_time[ti].append(xi)

        for ti in sorted(skills_time.keys()):
            max_damages = heapq.nlargest(m, skills_time[ti])
            total_damage = sum(max_damages)
            b -= total_damage

            if b <= 0:
                results.append(ti)
                break
        else:
            results.append("alive")

    return results

n_cases = int(input().strip())
cases = []
for _ in range(n_cases):
    n, m, b = map(int, input().strip().split())
    skills = [tuple(map(int, input().strip().split())) for _ in range(n)]
    cases.append((n, m, b), skills)
results = monster(n_cases, cases)
for result in results:
    print(result)

```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
import heapq
from collections import defaultdict

def monster(n_cases, cases):
    results = []

    for case in cases:
        n, m, b = case[0]
        skills = case[1]

        skills_time = defaultdict(list)
        for ti, xi in skills:
            skills_time[ti].append(xi)

        for ti in sorted(skills_time.keys()):
            max_damages = heapq.nlargest(m, skills_time[ti])
            total_damage = sum(max_damages)
            b -= total_damage

            if b <= 0:
                results.append(ti)
                break
            else:
                results.append("alive")

    return results

n_cases = int(input().strip())
cases = []
for _ in range(n_cases):
    n, m, b = map(int, input().strip().split())
    skills = [tuple(map(int, input().strip().split())) for _ in range(n)]
    cases.append((n, m, b), skills)
results = monster(n_cases, cases)
for result in results:
    print(result)
```

基本信息

#: 47113995
题目: 18182
提交人: 佟永鑫
内存: 6176kB
时间: 88ms
语言: Python3
提交时间: 2024-11-12 15:30:38

M28780: 零钱兑换3

dp, <http://cs101.openjudge.cn/practice/28780/>

思路:

很标准的dp问题

代码:

```
n, m = map(int, input().strip().split())
coins = list(map(int, input().strip().split()))
dp = [float('inf')] * (m + 1)
dp[0] = 0
for coin in coins:
    for j in range(coin, m + 1):
        dp[j] = min(dp[j], dp[j - coin] + 1)
print(dp[m] if dp[m] != float('inf') else -1)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
n, m = map(int, input().strip().split())
coins = list(map(int, input().strip().split()))
dp = [float('inf')] * (m + 1)
dp[0] = 0
for coin in coins:
    for j in range(coin, m + 1):
        dp[j] = min(dp[j], dp[j - coin] + 1)
print(dp[m] if dp[m] != float('inf') else -1)
```

基本信息

#: 47114937
题目: 28780
提交人: 佟永鑫
内存: 28600kB
时间: 14227ms
语言: Python3
提交时间: 2024-11-12 16:17:39

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T12757: 阿尔法星人翻译官

implementation, <http://cs101.openjudge.cn/practice/12757>

思路:

和之前罗马数字玛雅数字等相似

代码:

```
def trans(words):
    num_dict = {
        "zero": 0, "one": 1, "two": 2, "three": 3, "four": 4, "five": 5,
        "six": 6, "seven": 7, "eight": 8, "nine": 9, "ten": 10, "eleven": 11,
        "twelve": 12, "thirteen": 13, "fourteen": 14, "fifteen": 15,
        "sixteen": 16, "seventeen": 17, "eighteen": 18, "nineteen": 19,
        "twenty": 20, "thirty": 30, "forty": 40, "fifty": 50, "sixty": 60,
        "seventy": 70, "eighty": 80, "ninety": 90,
        "hundred": 100, "thousand": 1000, "million": 1000000
    }

    words = words.strip().split()
    is_negative = words[0] == "negative"
    if is_negative:
        words = words[1:]

    result = 0
    current_number = 0
    for word in words:
        if word in num_dict:
            value = num_dict[word]
            if value == 100:
                current_number *= value
            elif value >= 1000:
                current_number *= value
                result += current_number
                current_number = 0
            else:
                current_number += value
        result += current_number
    return -result if is_negative else result

input_str = input().strip()
print(trans(input_str))
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
def trans(words):
    num_dict = {
        "zero": 0, "one": 1, "two": 2, "three": 3, "four": 4, "five": 5,
        "six": 6, "seven": 7, "eight": 8, "nine": 9, "ten": 10, "eleven": 11,
        "twelve": 12, "thirteen": 13, "fourteen": 14, "fifteen": 15,
        "sixteen": 16, "seventeen": 17, "eighteen": 18, "nineteen": 19,
        "twenty": 20, "thirty": 30, "forty": 40, "fifty": 50, "sixty": 60,
        "seventy": 70, "eighty": 80, "ninety": 90,
        "hundred": 100, "thousand": 1000, "million": 1000000
    }

    words = words.strip().split()
    is_negative = words[0] == "negative"
    if is_negative:
        words = words[1:]

    result = 0
    current_number = 0
    for word in words:
        if word in num_dict:
            value = num_dict[word]
            if value == 100:
                current_number *= value
            elif value >= 1000:
                current_number *= value
                result += current_number
                current_number = 0
            else:
                current_number += value
    result += current_number
    return -result if is_negative else result

input_str = input().strip()
print(trans(input_str))
```

基本信息

#: 47114767
题目: 12757
提交人: 佟永鑫
内存: 3700kB
时间: 27ms
语言: Python3
提交时间: 2024-11-12 16:10:44

T16528: 充实的寒假生活

greedy/dp, cs10117 Final Exam, <http://cs101.openjudge.cn/practice/16528/>

思路:

和之前砍树等题相似

代码:

```
n = int(input().strip())

activities = []
for _ in range(n):
    start, end = map(int, input().strip().split())
    activities.append((start, end))

activities.sort(key=lambda x: x[1])
count = 0
last_end_time = -1

for start, end in activities:
    if start > last_end_time:
        count += 1
```

```
last_end_time = end

print(count)
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
n = int(input().strip())

activities = []
for _ in range(n):
    start, end = map(int, input().strip().split())
    activities.append((start, end))

activities.sort(key=lambda x: x[1])
count = 0
last_end_time = -1

for start, end in activities:
    if start > last_end_time:
        count += 1
        last_end_time = end

print(count)
```

基本信息

#: 47114125
题目: 16528
提交人: 佟永鑫
内存: 3796kB
时间: 32ms
语言: Python3
提交时间: 2024-11-12 15:39:08

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2. 学习总结和收获

如果作业题目简单, 有否额外练习题目, 比如: OJ“计概2024fall每日选做”、CF、LeetCode、洛谷等网站题目。

题目整体不难。这两次月考因为实验都没有去机房参加, 下次一定会去计时完成。