大学计算机-Python算法实践

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Part One

第一讲 列表

- 列表
  - 数据序列，是能存储多个数据的连续存储空间

- 列表的创建
  - a_list=[1,3,5,7,9]
  - a_list=['this','is','a','list','example']
  - a_list=['this','is','a','list','example',1,2,3]
  - b_list=list('hello')
  - b_list=list(range(1,20,2))

列表的访问

- a_list=['this','is','a','list','example',1,2,3]
- 下标访问
  - 下标从0开始
  - a_list[1]
  - a_list[7]
  - a_list[8]
    - IndexError: list index out of range

❑列表的访问

❑a_list=['this','is','a','list','example',1,2,3]

❑下标为负数

❑a_list[-1]

❑切片

❑a_list[1:3]

❑a_list[1:]

☐列表的遍历

```
a_list=['this','is','a','list','example',1,2,3]
for x in a_list:
    print(x)
```

```
a_list=['this','is','a','list','example',1,2,3]
for i in range(len(a_list)):
    print(a_list[i])
```

Part Two

第二讲 顺序查找

◻ 顺序查找

    ◻ aList=[1,3,5,7,9,2,4,6,8,10]

□顺序查找

```
aList=[1,3,5,7,9,2,4,6,8,10]
x=int(input("请输入要查找的整数："))
for i in aList:
    if i==x:
        print("找到了，整数%d在列表中。"%x)
```

```
aList=[1,3,5,7,9,2,4,6,8,10]
x=int(input("请输入要查找的整数："))
for i in range(len(aList)):
    if aList[i]==x:
        print("找到了，第%d个数是%d。"%(i+1,x))
```

❏顺序查找

```
aList=[1,3,5,7,9,2,4,6,8,10]
sign=False
x=int(input("请输入要查找的整数："))
for i in range(len(aList)):
    if aList[i]==x:
        print("找到了，第%d个数是%d。"%(i+1,x))
        sign=True
if sign==False:
    print("没找到，整数%d不在列表中。"%x)
```

◻数据查找

  ◻aList=[1,3,5,7,9,2,4,6,8,10]

  ◻in

    ◻5 in aList

    ◻15 in aList

◻数据查找

　◻aList=[1,3,5,7,9,2,4,6,8,10]

　◻index()

　　◻aList.index(5)

　　　◻返回第一个数据5的下标

　　◻aList.index(5,4,10)

　　　◻返回从下标4开始到下标10-1之间的第一个数据5的下标

□数据查找

    □aList=[1,3,5,7,9,2,4,6,8,10]

    □count()

        □aList.count(5)

           □返回数据5的个数

◻数据查找

◻[1,2,2,3,3,3,4,4,5,6]，输出待查找数据所在位置值

```
aList=[1,2,2,3,3,3,4,4,5,6]
sign=False
x=int(input("请输入要查找的整数："))
for i in range(len(aList)):
    if aList[i]==x:
        print("找到了，第%d个数是%d。"%(i+1,x))
        sign=True
if sign==False:
    print("没找到，整数%d不在列表中。"%x)
```

■数据查找

■[1,2,2,3,3,3,4,4,5,6]，输出待查找数据所在位置值

```
aList=[1,2,2,3,3,3,4,4,5,6]
x=int(input("请输入要查找的整数："))
n=aList.count(x)
if n==0:
    print("没找到，整数%d不在列表中。"%x)
else:
    j=0
    for i in range(n):
        j=aList.index(x,j,len(aList))+1
        print("找到了，第%d个数是%d。"%(j,x))
```
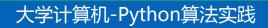
Part Three

第三讲 二分查找

- 二分查找
  - aList=[1,3,5,7,9,11,13,15,17,19]
  - 前提：有序

□二分查找

▢二分查找

☐二分查找

□二分查找

□二分查找

❑二分查找

□二分查找结束条件

　　□找到了，mid就是其位置

　　□没找到，start>end

| s | m | e |

| s | e |

| s |
| e |

```python
aList=[1,3,5,7,9,11,13,15,17,19]
x=int(input("请输入要查找的整数："))
start=0
end=len(aList)-1
while start<=end:
    mid=(start+end)//2
    if aList[mid]==x:
        break
    elif x<aList[mid]:
        end=mid-1
    else:
        start=mid+1
if start<=end:
    print("找到了，第%d个数是%d。"%(mid+1,x))
else:
    print("没找到，整数%d不在列表中。"%x)
```

Part Four

第四讲 添加数据

◻数据添加

    ◻aList=[1,3,5,7,9,2,4,-1,-1,-1]

❑数据添加

❑aList=[1,3,5,7,9,2,4,-1,-1,-1]

```
aList=[1,3,5,7,9,2,4,-1,-1,-1]
x=int(input("请输入一个整数："))
i=len(aList)-1
while i>=0:
   if aList[i]!=-1:
      break
   i=i-1
aList[i+1]=x
for x in aList:
   if x!=-1:
      print(x)
```

□数据添加

　　□aList=[1,3,5,7,9,12,14,-1,-1,-1]

□数据添加

```python
aList=[1,3,5,7,9,12,14,-1,-1,-1]
x=int(input("请输入一个整数："))
i=len(aList)-1
while i>=0:
    if aList[i]==-1:
        pass
    elif aList[i]>x:
        aList[i+1]=aList[i]
    else:
        break
    i=i-1
aList[i+1]=x
for x in aList:
    if x!=-1:
        print(x)
```

◻数据添加

    ◻aList=[1,3,5,7,9,2,4]

    ◻append()

    ◻extend()

    ◻insert()

◻数据添加

◻aList=[1,3,5,7,9,2,4]

◻append()

```
aList=[1,3,5,7,9,12,14]
x=int(input("请输入一个整数："))
aList.append(x)
for x in aList:
    print(x)
```

□数据添加

  □aList=[1,3,5,7,9,2,4]

  □extend()

```
aList=[1,3,5,7,9,12,14]
aList.extend([23,25,27])
for x in aList:
    print(x)
```

数据添加

aList=[1,3,5,7,9,2,4]

insert()

```
aList=[1,3,5,7,9,12,14]
x=int(input("请输入一个整数："))
aList.insert(1,x)
for x in aList:
    print(x)
```

Part Five

第五讲 删除数据

□数据删除

　　□aList=[1,3,5,7,9,2,4,6,8,10]

□数据删除

```
aList=[1,3,5,7,9,2,4,6,8,10]
x=int(input("请输入要删除的整数："))
n=len(aList)
for i in range(n):
    if aList[i]==x:
        break;
for j in range(i,n-1):
    aList[j]=aList[j+1]
aList[n-1]=-1
for x in aList:
    if x!=-1:
        print(x)
```

☐ 数据删除

```
aList=[1,3,5,7,9,2,4,6,8,10]
x=int(input("请输入要删除的整数："))
n=len(aList)
for i in range(n):
    if aList[i]==x:
        break;
for j in range(i,n-1):
    aList[j]=aList[j+1]
aList[n-1]=-1
for x in aList:
    if x!=-1:
        print(x)
```

```
aList=[1,3,5,7,9,2,4,6,8,10]
x=int(input("请输入要删除的整数："))
n=len(aList)
for i in range(n):
    if aList[i]==x:
        aList[i]=-1;
for x in aList:
    if x!=-1:
        print(x)
```

◻数据删除

◻aList=[1,3,5,7,9,2,4,6,8,10]

◻pop()

```
aList=[1,3,5,7,9,2,4,6,8,10]
aList.pop()
for x in aList:
    print(x)
```

```
aList=[1,3,5,7,9,2,4,6,8,10]
aList.pop(1)
for x in aList:
    print(x)
```

◻数据删除

  ◻aList=[1,3,5,7,9,2,4,6,8,10]

  ◻remove()

    ◻删除第一个符合要求的数据

```
aList=[1,3,5,7,9,2,4,6,8,10]
aList.remove(9)
for x in aList:
    print(x)
```

❑问题：删除列表中的所有重复数据

❑[1,2,2,3,3,3,4,4,5,6]

```
aList=[1,2,2,3,3,3,4,4,5,6]
x=int(input("请输入要删除的整数："))
n=aList.count(x)
if n!=0:
    for i in range(n):
        aList.remove(x)
for x in aList:
    print(x)
```

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THANK YOU！