

A Problem Solving Demos

Friday, March 22, 2024 2:00 PM

- 1 - read the input. \rightarrow into List.
- 2 - ignore -1
- 3 - compute average of what remains.
 - \hookrightarrow compute sum
 - divide by number of elements.

1) read input string
split by spaces
turn into numbers.

numbers = [⁰-1, ¹0, ²0, ³1]

i [~~0~~] ^{range} [0...5]
3

• kattis: nodup

Pseudocode:

read the string
split by spaces. into a list of words.

idea 1: use basic operators:

Loop: {
take the word at position 0
compare it with words at positions 1...end.
take the word at position 1
compare it with the words at positions 2...end.
take the word at position 2
compare it with the words at positions 3...end.
take the word at position 3
compare it with the words at positions 4...end.

take the word at position p
 compare it with the words at positions $p+1 \dots \text{end}$.
 ...
 take the word at position $\text{end}-1$
 compare it with the words at positions end .

```

for p in range(len(words)-1):
    for q in range(p+1, len(words)):
        if words[p] == words[q]:
            repetition = True!
  
```

idea #2.

use one in-built method/function. `sort()`

- Sort the list.

```

- for p in range(len(words)-1):
    if words[p] == words[p+1]:
        return True.
  
```

idea #3 place words in set.

`myset = set()`

```

for w in words:
    if w in myset:
        return True
    else:
        myset.insert(w)
  
```

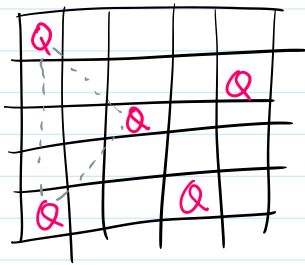
`return False`

• The n-queens problem.

given a chessboard of size $n \times n$, check

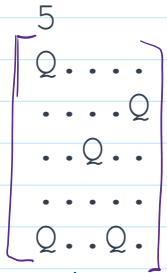
if there is a solution.

given a chessboard of size $n \times n$, check whether the queens in the board attack each other.



- there will be n -queens in the board

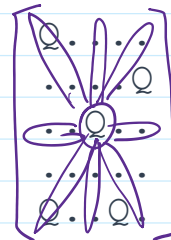
$n=5$



read input
store queen locations in list

represented as:

$$q = [[0,0], [1,4], [2,2], [3,0], [4,3]]$$



check not in same row:

$$q[i][0] \neq q[j][0]$$

for all $i, j \quad i \neq j$

check not in same column:

$$q[i][1] \neq q[j][1]$$

for all i, j

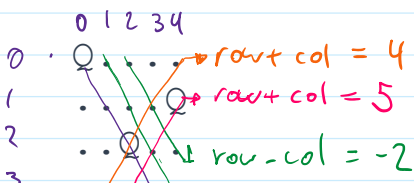
check not in same diagonal.

$$q[i][0] + q[i][1] \neq q[j][0] + q[j][1]$$

for all i, j

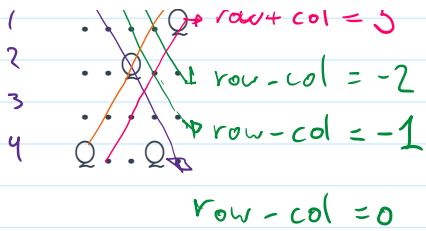
$$q[i][0] - q[i][1] \neq q[j][0] - q[j][1]$$

for all i, j

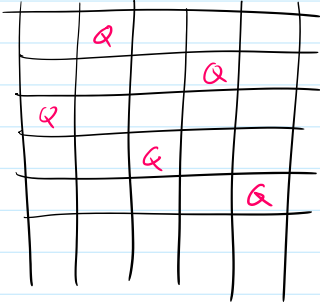


1) read the input

2) Time complexity: $O(n^2)$ data to data structures



- 1) read the input
- 2) Transform data to data structure
- 3) check the queens.



$$a = [\overset{0}{-1}, -1, -1, 0, 1, 1, 1, 1, 1, 1]$$

$$q = [\overset{0}{a}, \overset{1}{b}, \overset{2}{c}, \overset{3}{d}, \overset{4}{e}]$$

$$i = 0$$

$$j = 1, 2, 3, 4$$

$$i = 1$$

$$j = 2, 3, 4$$

$$i = 2$$

$$j = 3, 4$$

$$i = 3$$

$$j = 4$$