

# problem set 3 实验报告

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这次实验实现的游戏规则大致为：玩家会拿到一些字母，他们根据这些字母构造一个或多个单词，每个有效单词根据其长度与字母计算得分。

要完成这个游戏，需要实现几个函数接口，分别如下：

`load_words()`：从txt文件中读取单词存入列表。

`get_frequency_dict(sequence)`：返回一个字典，对应每个字母出现的次数。

`get_word_score(word, n)`：获取单词的分数。

`display_hand(hand)`：显示当前手牌。

`deal_hand(n)`：随机生成手牌。

`update_hand(hand, word)`：根据输入的单词更新手牌。

`is_valid_word(word, hand, word_list)`：判断输入的单词是否合法。

`calculate_handlen(hand)`：计算手牌中还有几个字母。

`play_hand(hand, word_list)`：进行一轮游戏。

`substitute_hand(hand, letter)`：将手牌中的一个字母替换为未出现过的字母。

`play_game(word_list)`：用户界面，将步骤联系起来。

有些函数之前已经实现，所以只需实现以下函数：

## **get\_word\_score(word, n)**

```
word = word.lower()
pos = word.find('*')

temp1 = 0
for i in range(len(word)):
```

```

    if i == pos:
        pass
    else:
        temp1 += SCRABBLE_LETTER_VALUES[word[i]]
temp2 = 7 * len(word) - 3 * (n - len(word))
if temp2 < 0:
    temp2 = 1
score = temp1 * temp2
return score

```

因为之后的需求中要加入通配符，所以里面有考虑通配符的情况。

## update\_hand(hand, word)

```

word = word.lower()
new_hand = hand.copy()
for letter in word:
    # 如果字母不在hand中或者个数不足，就忽略这种情况，其余情况还是会扣除hand
    if (letter in new_hand == 0) or (new_hand[letter] == 0):
        pass
    else:
        new_hand[letter] -= 1
return new_hand

```

## is\_valid\_word(word, hand, word\_list)

```

word = word.lower()
new_hand = hand.copy()

# 如果单词中含有通配符
pos = word.find('*')
if pos != -1:
    for wildcards in VOWELS:
        flag = 1
        new_word = word.replace('*', wildcards)
        # 如果单词不在单词库中，返回False
        if (new_word in word_list) == 0:
            flag = 0

```

```

# 如果字母不在hand中, 返回False
for i in range(len(new_word)):
    if i == pos:
        pass
    elif (new_word[i] in hand) == 0:
        flag = 0
# 如果字母的使用次数超过hand中有的个数, 返回False
for i in range(len(new_word)):
    if i == pos:
        new_hand['*'] -= 1
    else:
        new_hand[new_word[i]] -= 1
for i in new_hand:
    if new_hand[i] < 0:
        flag = 0
if flag:
    return True
# 每次循环new_hand需要更新, 不然会持续减, 导致结果错误
new_hand = hand.copy()

# 如果单词不在单词库中, 返回False
if (word in word_list) == 0:
    return False
# 如果字母不在hand中, 返回False
for letter in word:
    if (letter in hand) == 0:
        return False
# 如果字母的使用次数超过hand中有的个数, 返回False
for letter in word:
    new_hand[letter] -= 1
for i in new_hand:
    if new_hand[i] < 0:
        return False
return True

```

这个函数的实现中, 需要考虑两种情况: 有通配符和无通配符。在实现过程中最开始我忽略掉了一个地方, 在通配符遍历元音的时候, 忘记重置 `hand` 的数量, 导致结果一直不正确, 后来输出 `hand` 查看之后才知道问题出在了什么地方。

这个时候运行给出的 `test_ps3.py` 程序就可以得到以下结果:

```
Loading word list from file...
83667 words loaded.

-----

Testing get_word_score...
SUCCESS: test_get_word_score()

-----

Testing update_hand...
SUCCESS: test_update_hand()

-----

Testing is_valid_word...
SUCCESS: test_is_valid_word()

-----

Testing wildcards...
SUCCESS: test_wildcard()
All done!
```

说明以上实现是正确的。

接下来就要开始实现玩游戏的功能。

## calculate\_handlen(hand)

```
n = 0
for letter in hand:
    n += hand[letter]
return n
```

## play\_hand(hand, word\_list)

```
total_score = 0
while(1):
    print('Current Hand:', end = ' ')
    display_hand(hand)
    word = input('Enter word, or "!!" to indicate that you are
finished: ')
    if word == '!!':
        print('Total score:', total_score, 'points')
        break
    else:
        if is_valid_word(word, hand, word_list):
            score = get_word_score(word, calculate_handlen(hand))
            total_score += score
```

```

        print('\n "{}" earned {} points. Total: {}
points\n'.format(word, score, total_score))
    else:
        print('That is not a valid word. Please choose another
word.\n')
        hand = update_hand(hand, word)
    if calculate_handlen(hand) == 0:
        print('Ran out of letters. Total score:', total_score,
'points\n')
        break

    return total_score

```

## substitute\_hand(hand, letter)

```

new_hand = hand.copy()
num = new_hand.pop(letter)
letters = string.ascii_lowercase
for i in hand:
    letters = letters.replace(i, '')
new_letter = random.choice(letters)
new_hand[new_letter] = num
return new_hand

```

## play\_game(word\_list)

```

num_of_hands = int(input('Enter total number of hands: '))
total_score = 0
flag_sub = 1
flag_re = 1
for _ in range(num_of_hands):
    hand = deal_hand(HAND_SIZE)
    new_hand = hand.copy()
    if flag_sub:
        print('Current hand:', end = ' ')
        display_hand(hand)

        # 询问是否替换字符，且只能替换一次

```

```

    if flag_sub:
        sub = input('would you like to substitute a letter?(Please
enter \'yes\' or \'no\'): ')
        if sub == 'yes':
            letter = input('which letter would you like to replace: ')
            hand = substitute_hand(hand, letter)
            flag_sub = 0

    new_score = play_hand(hand, word_list)
    total_score += new_score
    print('-----')

    # 询问是否replay
    if flag_re:
        re = input('would you like to replay the hand?(Please enter
\'yes\' or \'no\'): ')
        if re == 'yes':
            total_score -= new_score
            total_score += play_hand(new_hand, word_list)
            print('-----')
            flag_re = 0
    print('Total score over all hands: ', total_score)

```

至此，整个游戏就已经实现了。试玩结果如下：

```
Loading word list from file...
 83667 words loaded.
Enter total number of hands: 2
Current hand: * a n n k x
Would you like to substitute a letter?(Please enter 'yes' or 'no'): yes
Which letter would you like to replace: x
Current Hand: * a n n k g
Enter word, or "!!" to indicate that you are finished: an*
"an*" earned 24 points. Total: 24 points

Current Hand: n k g
Enter word, or "!!" to indicate that you are finished: kg
That is not a valid word. Please choose another word.

Current Hand: n
Enter word, or "!!" to indicate that you are finished: !!
Total score: 24 points
-----
Would you like to replay the hand?(Please enter 'yes' or 'no'): no
Current Hand: * e w j m d
Enter word, or "!!" to indicate that you are finished: j*w
"j*w" earned 144 points. Total: 144 points

Current Hand: e m d
Enter word, or "!!" to indicate that you are finished: emd
That is not a valid word. Please choose another word.

Ran out of letters. Total score: 144 points
-----
Would you like to replay the hand?(Please enter 'yes' or 'no'): no
Total score over all hands: 168
```

```
Loading word list from file...
  83667 words loaded.
Enter total number of hands: 2
Current hand: * u n k r t
Would you like to substitute a letter?(Please enter 'yes' or 'no'): yes
Which letter would you like to replace: r
Current Hand: * u n k t b
Enter word, or "!!" to indicate that you are finished: bur*
"bur*" earned 110 points. Total: 110 points

Current Hand: k t
Enter word, or "!!" to indicate that you are finished: !!
Total score: 110 points
-----
Would you like to replay the hand?(Please enter 'yes' or 'no'): no
Current Hand: * o h f m z
Enter word, or "!!" to indicate that you are finished: mo*
"mo*" earned 48 points. Total: 48 points

Current Hand: h f z
Enter word, or "!!" to indicate that you are finished: hz
That is not a valid word. Please choose another word.

Current Hand: f
Enter word, or "!!" to indicate that you are finished: !!
Total score: 48 points
-----
Would you like to replay the hand?(Please enter 'yes' or 'no'): yes
Current Hand: * o h f m z
Enter word, or "!!" to indicate that you are finished: ho*
"ho*" earned 60 points. Total: 60 points

Current Hand: f m z
Enter word, or "!!" to indicate that you are finished: !!
Total score: 60 points
-----
Total score over all hands: 170
```