

LeetCode #49

Group Anagrams

Count sort and hashing

The main idea for solving this problem is to count all occurrences of letters in each word, calculate a hash based on the counts, and store it in a hash table. We initialize a hash map where the key is the hash (which could be a string, tuple or other representation), and the value is a list. Then, we iterate through the input list of strings. For each word we create an array of size 26 (assuming only lowercase letters) to count letter occurrences. Further we calculate the hash of this array and append the word to the list corresponding to that hash. After processing the input array, we return list of values from the hash map.

strs

↓	“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
---	-------	-------	-------	-------	-------	-------

word

↓	‘e’	‘a’	‘t’
---	-----	-----	-----

curr

0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value

```
word = “eat”  
ch = ‘e’  
curr[ch - ‘a’] += 1 = curr[4] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘e’	‘a’	‘t’
-----	-----	-----

curr

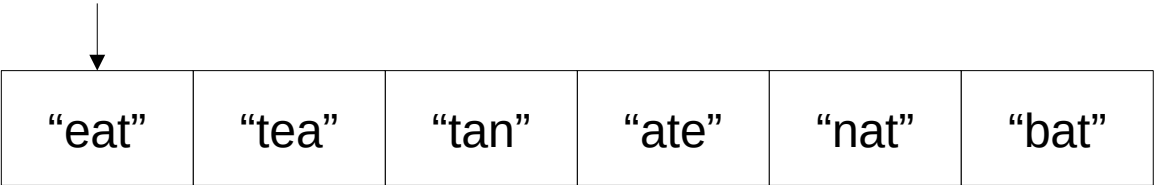
1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

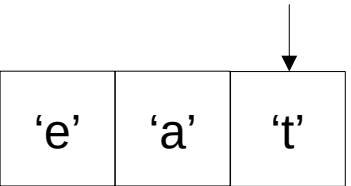
key	value

```
word = “eat”  
ch = ‘a’  
curr[ch - ‘a’] += 1 = curr[0] = 1
```

strs



word



curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value

```
word = “eat”  
ch = ‘t’  
curr[ch - ‘a’] += 1 = curr[19] = 1
```

strs

↓	“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
---	-------	-------	-------	-------	-------	-------

word

‘e’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[eat]

word = “eat”
res[k1] = [“eat”]

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘e’	‘a’
-----	-----	-----

k1 = “100010000000000000001000000”

curr

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[eat]

word = “tea”
ch = ‘t’
curr[ch – ‘a’] += 1 = curr[19] = 1

strs

"eat"	"tea"	"tan"	"ate"	"nat"	"bat"
-------	-------	-------	-------	-------	-------

word

't'	'e'	'a'
-----	-----	-----

k1 = "100010000000000000001000000"

curr

0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[eat]

```
word = "tea"  
ch = 'e'  
curr[ch - 'a'] += 1 = curr[4] = 1
```


strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘e’	‘a’
-----	-----	-----

k1 = “100010000000000000001000000”

curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[eat]

```
word = “tea”  
ch = ‘a’  
curr[ch - ‘a’] += 1 = curr[0] = 1
```



strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

k1 = “100010000000000000001000000”

word

‘t’	‘e’	‘a’
-----	-----	-----

curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]

```
word = “tea”
res[k1] = [“eat”, “tea”]
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘a’	‘n’
-----	-----	-----

k1 = “100010000000000000001000000”

curr

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]

```
word = “tan”  
ch = ‘t’  
curr[ch - ‘a’] += 1 = curr[19] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘a’	‘n’
-----	-----	-----

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

k1 = “100010000000000000001000000”

res

key	value
k1	[“eat”, “tea”]

```
word = “tan”  
ch = ‘a’  
curr[ch - ‘a’] += 1 = curr[0] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘a’	‘n’
-----	-----	-----

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

k1 = “100010000000000000001000000”

res

key	value
k1	[“eat”, “tea”]

```
word = “tan”  
ch = ‘n’  
curr[ch - ‘a’] += 1 = curr[13] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘t’	‘a’	‘n’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “1000000000000001000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]
k2	[“tan”]

```
word = “tan”  
res[k2] = [“tan”]
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘a’	‘t’	‘e’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “1000000000000001000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]
k2	[“tan”]

```
word = “ate”  
ch = ‘a’  
curr[ch - ‘a’] += 1 = curr[0] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘a’	‘t’	‘e’
-----	-----	-----

k1 = “10001000000000000001000000”
k2 = “1000000000000010000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]
k2	[“tan”]

word = “ate”
ch = ‘t’
curr[ch – ‘a’] += 1 = curr[19] = 1

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘a’	‘t’	‘e’
-----	-----	-----

k1 = “10001000000000000001000000”

k2 = “100000000000001000001000000”

curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”]
k2	[“tan”]

word = “ate”
ch = ‘e’
curr[ch - ‘a’] += 1 = curr[4] = 1

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘a’	‘t’	‘e’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “100000000000001000001000000”

curr

1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”]

```
word = “ate”
res[k1] = [“eat”, “tea”, “ate”]
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘n’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “1000000000000001000001000000”

curr

0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”]

```
word = “nat”  
ch = ‘n’  
curr[ch - ‘a’] += 1 = curr[13] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘n’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “1000000000000001000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”]

```
word = “nat”  
ch = ‘a’  
curr[ch - ‘a’] += 1 = curr[0] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘n’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”
k2 = “10000000000000010000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”]

word = “nat”
ch = ‘t’
curr[ch – ‘a’] += 1 = curr[19] = 1

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------



word

‘n’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “10000000000000010000001000000”

curr

1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”, “nat”]

word = “nat”
res[k2] = [“tan”, “nat”]

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘b’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “10000000000000010000001000000”

curr

0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”, “nat”]

```
word = “bat”  
ch = ‘b’  
curr[ch - ‘a’] += 1 = curr[1] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘b’	‘a’	‘t’
-----	-----	-----

k1 = “10001000000000000001000000”
k2 = “10000000000000010000001000000”

curr

1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”, “nat”]

word = “bat”
ch = ‘a’
curr[ch - ‘a’] += 1 = curr[0] = 1

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------

word

‘b’	‘a’	‘t’
-----	-----	-----

k1 = “100010000000000000001000000”

k2 = “1000000000000001000001000000”

curr

1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”, “nat”]

```
word = “bat”  
ch = ‘t’  
curr[ch - ‘a’] += 1 = curr[19] = 1
```

strs

“eat”	“tea”	“tan”	“ate”	“nat”	“bat”
-------	-------	-------	-------	-------	-------



word

‘b’	‘a’	‘t’
-----	-----	-----

k1 = “10001000000000000001000000”

K2 = “10000000000001000001000000”

k3 = “1100000000000000000001000000”

curr

1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

res

key	value
k1	[“eat”, “tea”, “ate”]
k2	[“tan”, “nat”]
k3	[“bat”]

```
word = “bat”
res[k3] = [“bat”]
return [[“eat”, “tea”, “ate”], [“tan”, “nat”], [“bat”]]
```