Data Application Lab

Basic Algorithm-2 Quiz

1. **What is Collision?**

   Solution: Since a hash function gets us a small number for a key which is a big integer or string, there is possibility that two keys result in same value. The situation where a newly inserted key maps to an already occupied slot in hash table is called collision and must be handled using some collision handling technique.

2. **Explain what a "Hash Algorithm" is and what are they used for?**

   Solution: "Hash Algorithm" is a hash function that takes a string of any length and decreases it to a unique fixed length string. It is used for password validity, message & data integrity and for many other cryptographic systems.

3. **Consider a hash table using the open addressing with linear probing collision resolution mechanism, with table size m = 7 and the hash function.**

   h(k, i) = k + i (mod 7),

   for which we assume that the key k is an integer.

   Draw the hash table (with the above table size and hash function) that would be produced by inserting the following values, in the given order (from left to right), into an initially empty table:

   26, 32, 19, 11

Solution:

0	1	2	3	4	5	6
11				32	26	19

4. **What does a dictionary is used instead of a list?**

   Solution: Dictionaries – are best suited when the data is labelled, i.e., the data is a record with field names.

   lists – are better option to store collections of un-labelled items say all the files and sub directories in a folder. Generally, Search operation on dictionary object is faster than searching a list object.

5. **We have a list of numbers:**

```
L = [1,2,4,8,16,32,64,128,256,512,1024,32768,65536,4294967296]
```

We want to make a dictionary with the number of digits as the key and list of numbers the value, for example,

{1: [1, 2, 4, 8], 2: [16, 32, 64], 3: [128, 256, 512], 4: [1024], 5: [32768, 65536], 10: [4294967296]})

Write a short python program.

Solution:

```
L = [1,2,4,8,16,32,64,128,256,512,1024,32768,65536,4294967296]

from collections import defaultdict
d = defaultdict(list)
for i in L:
    d[len(str(i))].append(i)
print d
print {k:v for k,v in d.items()}
```