CS 150 — Dictionaries & Sets - Ch. 12

Note Title 4/13/2012

Announcements

- Email with HW6 grades
  (email only went to 1 person in a group)

- HW9 will be up after class
  covers Ch10, recursion (ch11),
  & 1 question on dictionaries

- Final exam: May 9 (?)

Containers

Any object which provides support for managing a collection!

In Python, each supports:

- for element in data
- element in data
- len(data)

Ex: lists & tuples, SortedSet

Issues

- Order — is the data ordered?
- Mutability — will the container be modified?
  Will the objects inside be modified?
- Other associated data
  - languagehelper was just words
  - storing a dictionary — need definitions
- Heterogeneous versus homogeneous
  - lists are heterogeneous

Dictionaries

Maps keys to associated values.

If the keys are integers, this is a list (or tuple).

Ex: groceries = ['milk', 'eggs', 'tea']

groceries[0] $\longrightarrow$ 'milk'

groceries[1] $\longrightarrow$ 'eggs'

$\uparrow$ key $\uparrow$ value

More general examples

key are movies

values are directors

director['Star Wars'] → 'George Lucas'

director['The Godfather'] → 'Francis Ford Coppola'

director['The Princess Bride'] → 'Rob Reiner'

Here, the keys are more general identifiers.

Keys

- Required to be unique.

- Can be a tuple to allow overlap:

  Ex: director[('Shaft', 1971)]
  versus
  director[('Shaft', 2000)]

- Often a unique # such as SSN or ISBN.

- Keys must be immutable.
  (data can be mutable)

Python's dict class

Ex:
```
director = dict()
director['Star Wars'] = 'George Lucas'
director['The Godfather'] =
                    'Francis Ford Coppola'
director['The Princess Bride'] = 'Rob Reiner'
print director['Star Wars']
print director['The Hobbit']
```

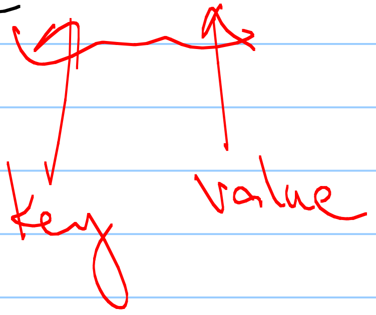
Another way →

Can initialize with {}:

```
    director = {}
```

Also put pairs in when initializing:

```
    dnaTorna = {'A':'U', 'C':'G', 'G':'C', 'T':'A'}
```



Syntax

See p. 404

- d[k]
- d[k] = value
- k in d
- len(d)
- d.clear()
- d.pop(k)

d.keys()
d.values()
} return lists

d.items() } returns a list of tuples

for k in d:

Ex:

```
titles = director.keys()
        # returns a list of movie titles
titles.sort() # couldn't sort dict
for move in titles:
        print movie, 'was directed by',
                      director[movie]
```

Note:

Dictionaries are many-to-one:

A single $\overset{\text{unique!}}{\wedge}$ movie has only one director

(but a director can direct to many movies)

Dictionaries look up based on the unique key only.

(Going the other way is called a reverse dictionary - see 12.3.3)

Another example: Sets

An unordered collection of unique elements

Allows

- containment queries: 'red' in colors (which is very efficient)
- order is arbitrary
- elements in set are immutable.

Ex:

```
colors = set()
colors.add('red')
colors.add('blue')
```

Also - can send in a starter value:

```
myset = set([1, 2, -3, 5, 2])
   ↳    2, -3, 5, 1
letters = set('this is a test')
   ↳    'a', ' ', 'e', 'i', 'h', 's', 't'
```

Operations (p. 411 + 413)

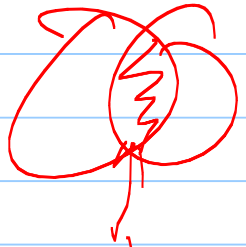
- s.add(v)
- s.remove(v)
- len(s)
- v in s
- for v in s
- s == t
- s <= t
- s.union(t)
- s.intersection(t)
- s - t
- s -= t
- s.update(t)

⋮

lexicographical comparison

return new sets

set1: 5, 1, 3
set2: 2, 6, 3



Practice 12.1

Assume dict.values didn't exist.

Write a code fragment that produces a list of all the values in a dictionary.