

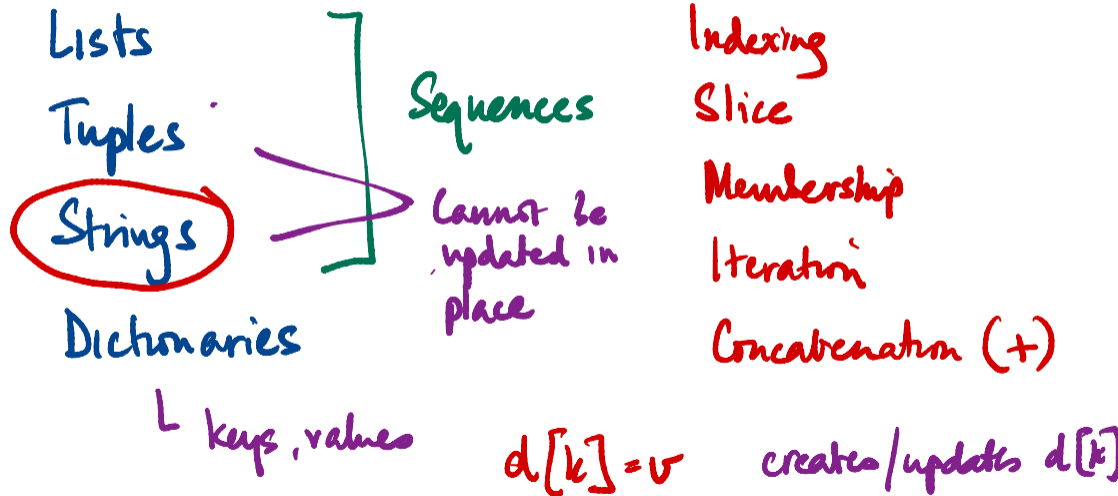
# Lecture 7, 29 August 2024

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Programming and Data Structures with Python

# Collections



# Nested collections

IPL matchlist = list of tuples

matchlist [7]  $\rightsquigarrow$  (City, Team1, Team2, Toss, Win, Target)

t = matchlist [7]

t [3]  $\rightsquigarrow$  Toss

matchlist [7] [3]

not

matchlist [7, 3]



Matrix

$$M \begin{bmatrix} 0 & 1 & 2 \\ 3 & 1 & 0 \\ 2 & 4 & 4 \end{bmatrix}$$

$$M(2,3)$$



$$M(1,2)$$

$$ML = \begin{bmatrix} [0, 1, 2], \\ [3, 1, 0], \\ [2, 4, 4] \end{bmatrix}$$

$$ML[1][2]$$

$$ML[1][2] = 17$$

Where teams have played matches

Dictionary

Keys = Teams

Value = List of Cities

Venues of 'RR'

`d['RR'] ~ [ - - ]`

4th venue

`d['RR'][3]`

List all teams who played in IPL 2024

```
teams = []
```

```
for t in matchlist:
```

```
    teams.append(t[1])
```

```
    teams.append(t[2])
```

```
toss_win = []
```

```
for t in matchlist:
```

```
    toss_win.append((t[3], t[4]))
```

```
[(-, -), (-, -) ... ]
```

```
teams = []  
for t in matchlist:  
    teams.append(t[1])  
    teams.append(t[2])
```

```
Uniqteams = uniq(teams)
```

```
def uniq(l):  
    newl = []  
    for x in l:  
        if not (x in newl):  
            newl.append(x)  
    return (newl)
```



```
def uniqd(l):
```

```
    newd = {}
```

```
    for x in l:
```

```
        newd[x] = 1
```

```
    return (list(newd))
```

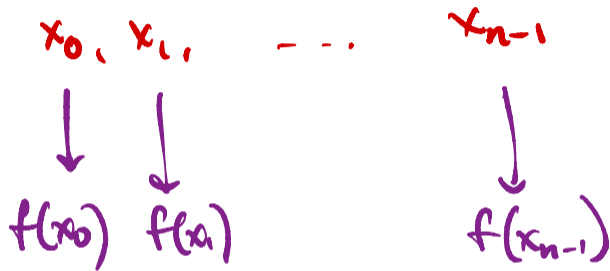
↳ newd.keys()

Full names of all the teams

['CSK', 'RR', ...]

↓            ↓  
Chennai    Rajasthan

```
newl = []  
for x in l:  
    newl.append(f(x))
```



"map"

$\text{map}(f, l)$  - apply  $f$  to each element of  $l$

List matches where CSK won the toss

```
csk_toss = []
```

```
for t in matchlist:
```

```
    if t[3] == 'CSK':
```

```
        csk_toss.append(t)
```

$[t_0, t_1, t_2, \dots, t_{n-1}]$

? ? ? ?  
x ✓ x x x x

↓  
 $t_i$

↓  
 $t_j$

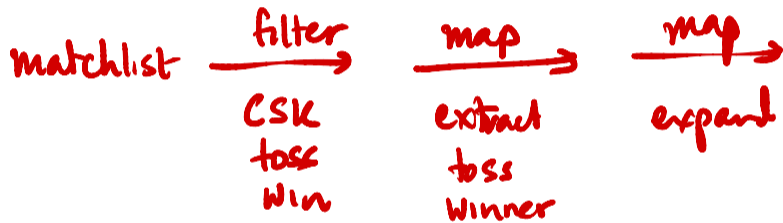
↓  
 $t_m$

Filter

filter (p, l)

p is a function that returns True/False

# Combining



newl = []

for t in l:

if p(t):

newl.append(f(t))

Filter  
+  
Map



Squares of even numbers  $> 0$

$$\{ n^2 \mid n \in \mathbb{N}, n \bmod 2 = 0 \}$$

$f(x)$        $x$  from  
                 some  
                 set       $p(x)$  is true

"Set comprehension"

List comprehension

$[ f(x) \text{ for } x \text{ in } l \text{ if } p(x) ]$

[t for t in matchlist] - copy of t

[t[3] for t in matchlist] - list of toss winners

(t[3],) for list of one tuples

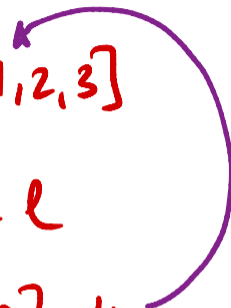
[t for t in matchlist if t[3] == 'CSK']  $\binom{x}{x}$

[expand(t[3]) for t in matchhist if t[3]== 'csk']

Also dictionary

{ t[3]: expand(t[3]) for t in matchhist }

$l = [1, 2, 3]$   
 $newl = l$   
 $newl[0] = 4$



vs

$x = 17$

$y = x$

$y = 19$

~~$x$~~   $\leadsto 17$

$y \leadsto 19$

# Mutable & Immutable Values

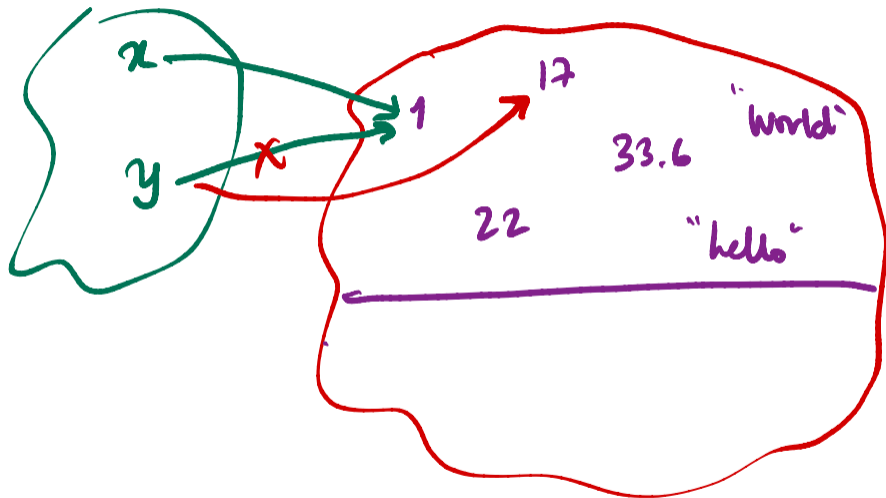
↓  
List  
Dictionary

|  
Int  
Float  
Bool  
String  
Tuple

# Immutable

$x=1$   
 $y=x$

$y=17$

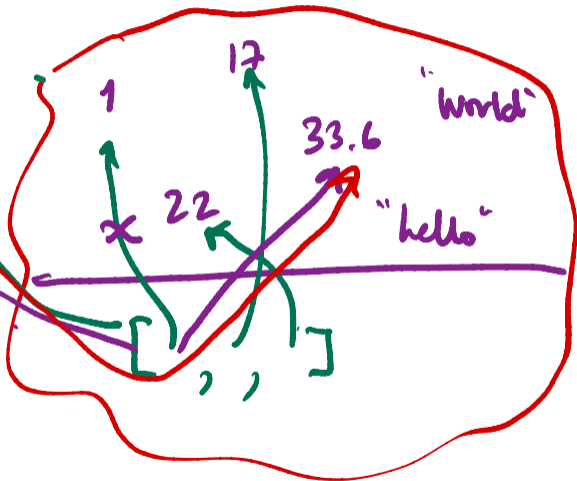


$l = [1, 17, 22]$

$newl = l$

$newl[0] = 33.6$

$l[0]$

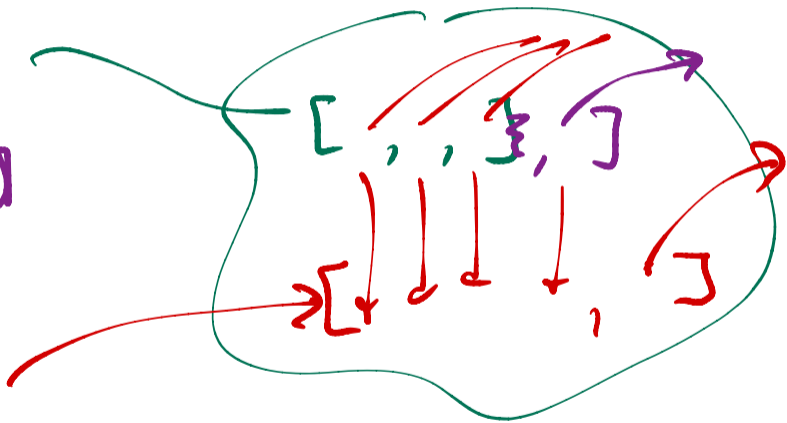




$l = [1, 2, 3]$

$l.append(4)$

$d = l + [5]$



$l = l[:]$   
new list

$newl = l[:]$