

Python Programming

Column-major order processing

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Average Cols!

- We have 4 subjects. How to compute the average per subject?
- This requires column-based processing
- Take 10 min to make it pythonic in a single line

```
3 grades = [ [50, 33, 40, 30],
4             [35, 50, 44, 17],
5             [30, 35, 50, 37],
6             [50, 35, 44, 22],
7             [50, 44, 50, 30],
8             [50, 36, 18, 50],
9             [35, 30, 47, 16]]
10
11 # assume equal columns / at least 1 seq
12 def compute_col_avg(lst_of_lsts):
13     # let's iterate column-major order
14     col_avg = []
15
16     for j in range(len(lst_of_lsts[0])):
17         sum = 0
18         for i in range(len(lst_of_lsts)):
19             sum += lst_of_lsts[i][j]
20         col_avg.append(sum / len(lst_of_lsts))
21     return col_avg
22
23 print(compute_col_avg(grades))
24 #[42.85, 37.5, 41.85, 28.85]
25
26 # can we pythonic it?
27
```

The * unpacking

```
2
3 grades = [ [1, 2, 3, 4],
4             [5, 6],
5             [7, 8, 9, 10, 11]
6           ]
7
8 for a, b, c in zip(*grades):
9     print(a, b, c)
10
11 """
12 1 5 7
13 2 6 8
14
15 unpacking + zip Allowing us to iterate on columns
16 """
```

Let's unzip

```
3 grades = [[50, 33, 40, 30],
4           [35, 50, 44, 17],
5           [30, 35, 50, 37],
6           [50, 35, 44, 22],
7           [50, 44, 50, 30],
8           [50, 36, 18, 50],
9           [35, 30, 47, 16]]
0
1 # assume equal columns / at least 1 seq
2 def compute_col_avg(lst_of_lsts):
3     col_avg = []
4
5     for tup in zip(*lst_of_lsts):
6         col_avg.append(sum(tup) / len(tup))
7     return col_avg
8
9 print(compute_col_avg(grades))
0 #[42.85, 37.5, 41.85, 28.85]
```

Let's unzip

```
3 grades = [ [50, 33, 40, 30],
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7             [50, 44, 50, 30],
8             [50, 36, 18, 50],
9             [35, 30, 47, 16]]
10
11 # assume equal columns / at least 1 seq
12 def compute_col_avg(lst_of_lsts):
13     return [sum(tup) / len(tup) for tup in zip(*lst_of_lsts)]
14
15 print(compute_col_avg(grades))
16 #[42.85, 37.5, 41.85, 28.85]
```

Tip

- Want to iterate row by row?
 - **for row in lists**
- Want to iterate col by col?
 - **for col in zip(*lists)**
 - Remember it stops based on the shortest

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”