

Lab #1: Basic Python + NumPy

This lab is the first step to getting familiar with Python and a common Machine Learning library, named **NumPy**.

Deadline: 23:59, 11/03/2024.

Task 1. Python Programming

Task 1.1. Develop a Python program to perform the following tasks:

- Input an integer number **n**.
- Input **n** integer numbers **x₁, x₂,..., x_n** and append them into a list **L**.
- Find the max/min element in **L**.
- Compute the sum of elements in **L**.
- Sort the list **L** in ascending order.
- Show how many positive and negative numbers are in the list **L**.

Hint: Use **min()**, **max()**, **sum()** functions to find max, min, and sum of the list **L**; **print()** to display values to the console.

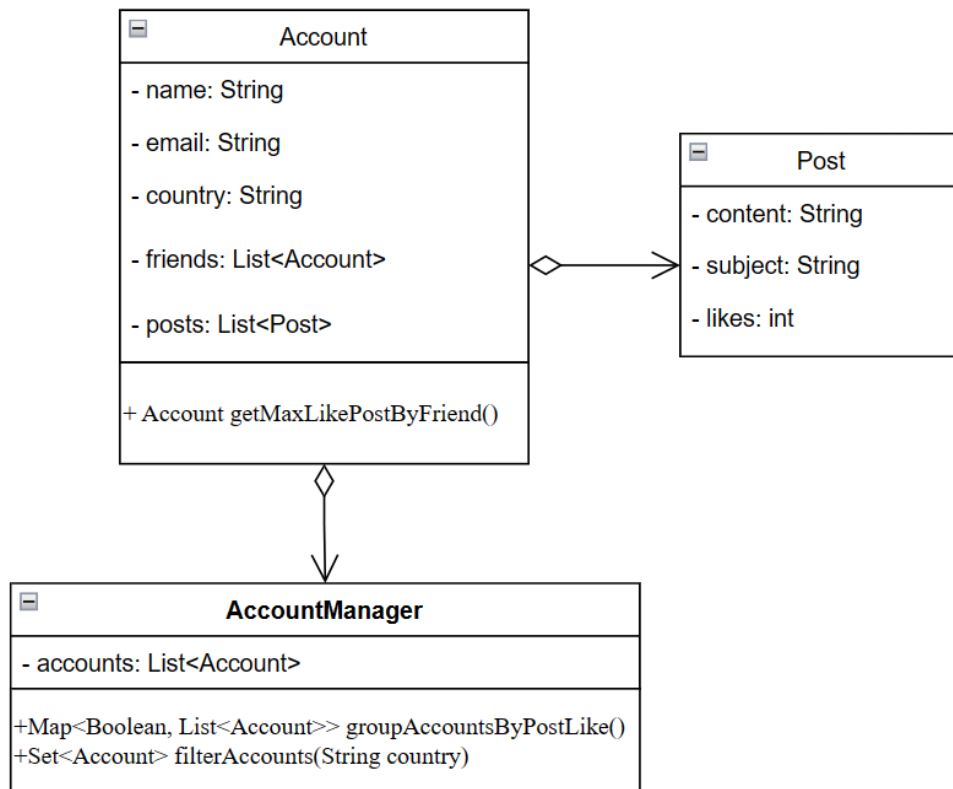
Task 1.2. Implement a Python function to compute **S(n)** as follows:

$$S(n)=1+1.2+1.2.3+\dots+1.2.3\dots n, \quad n>0$$

Task 1.3. Implement the methods in **Account**, and **AccountManager** classes in below figure:

- 1) **getMaxLikePostByFriend()** to find the account having the post with the highest likes from the list of friends.
- 2) **groupAccountsByPostLike()** to group accounts by the number of posts. Where key=false for accounts having less than 10 posts, otherwise key=true (using dictionary).
- 3) **filterAccounts(String country)** to get all accounts from a given country. The results are sorted by the number of posts (descending order), and then by name (ascending order).
- 4) Expand the problem by taking into account two kinds of accounts, called **VerifiedAccount** and **NormalProduct**. **VerifiedAccount** has an additional attribute

named **fromDate** representing the date when the account is verified. Then, modify the implemented code and test it.



Task 2. NumPy API

Task 2.1. Develop a NumPy program to create an array with values ranging from 10 to 25, then reverse the array (the first element becomes last).

Task 2.2. Develop a NumPy program that constructs an array by repeating.

Input: [1, 2, 3, 4]

Expected Output:

Original array: [1, 2, 3, 4]

Repeating 2 times: [1 2 3 4 1 2 3 4]

Repeating 3 times: [1 2 3 4 1 2 3 4 1 2 3 4]

Task 2.3. Develop a NumPy program to replace all elements of the NumPy array that are less than a specified value by this specified value.

Input:

[[0.42 0.48 0.32]

[0.74 0.58 0.38]

[0.51 0.34 0.15]]

Expected Output:

Original array:

```
[[ 0.42 0.48 0.32]
```

```
 [ 0.74 0.58 0.38]
```

```
 [ 0.51 0.34 0.15 ]]
```

Replace all elements of the original array with .5 for values which are greater than .5

```
[[ 0.42 0.48 0.32]
```

```
 [ 0.5 0.5 0.38]
```

```
 [ 0.5 0.34 0.15 ]]
```