

School Nova Computer Science 201

Save your code as lastname_homework4.py and submit on Google Classroom

Introduction

Consider the following problem. Imagine there is 1000 planes on the ground. Each plane has a unique ID (for example, an integer value). When a plane departs, its ID is added to a list. When the plane arrives, the same ID is added to the same list. Imagine that one plane is missing (did not return). We need to find the ID of the missing plane. (Basically, find the only number in the list which does not have a duplicate).

Task 1

Generate a list of values from 0 to 999. These are the planes' IDs. Let's call it X.

Generate a list of departures and arrivals; let's call it Y. One plane did not arrive. Therefore, in Y, there will be 999 *duplicate* values (IDs) and one *unique* value (ID) -- the ID of the plane that is missing. There will be a total of 1999 elements.

There are multiple ways to complete this task. It's your choice but consider using `random.sample()` to generate random values without replacement.

Task 2

Find the missing plane in Y using any approach that you like, except for using a dictionary.

Task 3

Find the missing plane using a dictionary.

Task 4

Compare which is faster: your solution from Task 2 or the dictionary-based solution from Task 3. Test on a large number of planes, if necessary, to see the difference. Can you explain the difference in speed (if there is any)?

Task 4* (optional)

Find the missing plane using NumPy (hint: take a closer look at `numpy.unique()` function).