FPT Software

FRESHER ACADEMY

AI Fresher

# Assignment 3

## Numpy

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VERSION 1.0

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Write a program to create a Numpy array  from a list. Print types of the list and the Numpy array.

## EXERCISE 02 (SHORT)

Write a program to create a Numpy array from a tuple. Print types of the typle and the Numpy array.

## EXERCISE 03 (SHORT)

Create a Numpy array and reshape it in different ways.

Create an array with values from 1 to 18. Reshape that array to 3x6, 6x3 and 3x7.

## EXERCISE 04 (SHORT)

Create an array 3 x 6 and check its shape, dimension, item size, data type, array size.

## EXERCISE 05 (SHORT)

Create arrays of zeros, ones and empty elements with default data type and int16 respectively.

## EXERCISE 06 (SHORT)

Create a Numpy array from two existing lists.

## EXERCISE 07 (SHORT)

Create a Numpy array from two existing arrays.

## EXERCISE 08 (SHORT)

Create an array 3 x 4 from [3 6 9 12 15 18 21 24 27 30 33 36] by using the arange() method.

## EXERCISE 09 (MEDIUM)

Solve list exercises on the lecture by using Numpy arrays.

## EXERCISE 10 (MEDIUM)

Use Numpy to illustrate different situations to copy arrays by assigning, view() or copy() methods.

## EXERCISE 11 (MEDIUM)

Create an array and subset it by indexing, slicing and using a boolean array. You have to illustrate situations.

## EXERCISE 12 (MEDIUM)

Create arrays and select random elements from arrays. Print results each step.

- Create an array (A) having 100 random elements from 1 to 1000
- Select random 10 elements from the array A
- Create an array (B) from 1 to 50
- Shuffle B ten times
- Select 10 random elements that could be duplicated from B. Repeat 5 times
- Select 10 random elements with no duplicate from B. Repeat 5 times

## EXERCISE 13 (MEDIUM)

Use Numpy to calculate element occurrences of an array/list.

- Create an array 100 elements with values from 1 to 50.
- Filter unique elements of the array.
- Filter unique elements of the array and occurrences of each element.
- Find and store elements having occurrences larger than 3 into a dictionary.

## EXERCISE 14 (MEDIUM)

Use Numpy to find the maximum values and the most occurrences of an array.

- Create a random 30 element array from 0 to 5
- Find the most frequent value
- Create a random 20 element array from 40 to 100
- Find 3 maximum values of the array
- Replace the maximum value by -1

## EXERCISE 15 (MEDIUM)

Assume that the road has 100 steps. There are 4 people playing with the dice. Each roll time, players could move by dice scoring. The next player will continue from previous player steps.

For instance, the player A rolls 3 so he moves to 3. The player B will continue from 3 and if he rolls 5, he will move to 8.

The player who reaches 100 first is the winner.

Your mission is to simulate this game.

## EXERCISE 16 (MEDIUM)

List of Billboard Year-End Hot 100 singles of 2018: https://en.wikipedia.org/wiki/Billboard_Year-End_Hot_100_singles_of_2018

You need to collect and store these 100 songs into a list.

Generate numbers of listening for 100 songs and store into another list. Numbers of listening are random from 100 to 1000.

Based on the numbers of listening, define songs as Interested, Normal, Not Interested on a new categorical list:

- Interested: 800-1000
- Normal: 500-800
- Not Interested: 100-500

Count number of songs in each category.

## EXERCISE 17 (LONG)

Random Walk: Multiple players with a dice. The game starts from step 0. It will finish when it reaches 50.

Each player rolls the dice and move as following rules:

Roll 1: Step backward 1 or stay still at step 0

Roll 2, 3, 4 and 5: Step forward 1

Roll 6: The player could roll one more time and step as the new roll number. For instance, the player rolls 4, so he could move forward 4 steps.

Your mission is to simulate this game. Try to run 10 times to see how many turns that games finish.

## EXERCISE 18 (LONG)

Simulate the Pig-Dice Game following the rules in https://en.wikipedia.org/wiki/Pig_(dice_game)

## EXERCISE 19 (LONG)

Design Lottery Game (Rules, How to win, Simulation with Numpy).

## EXERCISE 20 (LONG)

Design the Lucky Draw game (Rules, How to win, Simulation with Numpy)