ROBOTICS– Python Development – Lab 3 Homework

1. We are going to monitor a robot that can go through 100 various locations identified by an integer in the interval 0 .. 9. The robot stores 1000 liters of fuel in its fuel tank at the start.

We can receive up to 100 measurements of robot movements repesented as a tuple as follows:

- First element: the previous location as an integer value being the identifier of the location;
- Second element: the current location as an integer value being the identifier of the location;
- Third element: the fuel consumption associated with the movement;
- Fourth element: the quantity of fuel remaining in the fuel tank.

Please implement the following:

A. Generate a fuel consumption matrix when robot moves between different locations according to the following rules:
   - The fuel consumption between two locations is the same irellevant of direction; ○ If both the start and end locations are the same, the fuel consumption is 0; ○ The values in the matrix must ensure at least 100 robot moves;
   - The higher the difference in absolute value between location identifiers, the higher the fuel consumption.

B. Generate surrogate robot movements data according to the following rules:
   - No successive locations are the same; ○ The robot consumes the fuel quantity according to the fuel consumption matrix.

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2. In our product improvement initiative we decided to monitor customer reviews through a robotic process automation process. The robot will monitor reviews by checking the presence of several keywords that we consider of interest.

Please implement the following, considering a list of keyowrds of interest and considering customer reviews represented by a list of strings:

A. Generate a keywords set for each review, the set contains all the keywords that appear in the review. Store these sets in a list;
B. Select all the user reviews which have at least 3 keywords of interest and store them in a separate list for later inspection.

Challenge problem

3. Considering the robot from the previous lab challenge, we have have updated specifications:

- Each object on the assembly line has a certain volume, there is no direct relation between object's mass and volume;
- When the robot picks an object it puts it into an internal container. The container can carry on up to 100 kgs and up to 3 m3.

Implement the following:

A. Generate a list of objects on the assembly line, objects weighing between 5 and 15 kg and with a volume between between 0.1 and 0.5 m3 .
There should be at least 10 objects on the assembly line;
B. Write a function that receives the list of objects from the assembly line and generates a list of commands for the robot to execute according to the following constraints:
    - The robot must pick the objects from the assembly line in the order they originally appear in the list;
    - Assuming the robot can pick the object and it can still carry the object in the container and has enough space for it – it must pick the object;
    - If the robot cannot pick the object, due to any condition, it must mark it.
C. Determine an approach where the robot will pick the maximum possible number of objects from the assembly line given the mass and volume constraints. If there are objects that it can pick but doing so will prevent picking up the maximum number of objects, it will not pick these objects, instead it will mark them.