BOnus Question

Permutation and Combination

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Problem Overview

Principle

The problem statement is one of the elegent applications of Permutation and Combination principle of practical mathematics.

THE Question

Problem Statement

There are some number of cups and saucers of same color and we have to arrange the the given system in a unique pattern such that no cup or saucer of the same color are combined and each time the pattern is unique. Show the same using simulator/with graphics.

Prerequisites

Generalisations

The could should work for any number of cups and saucers. This leds to the creation of general formula/algorithm for the same.

Simulations

Simulate the solution using proper python libraries. The one I have used is Pygame which is an interactive python GUI library mainly used to create games as its name suggests.

Algorithm & Example

Taking an array of cups and plates and form all possible permutations with those. Now, we eliminate the permutations which do not follow our rules/conditions.

Example

- if there are 6 cups and saucers such that there are 3 pairs each of same color. The total number of permutation hence formed will be 10 after doing various trails and filtering out the errors.

You can also use the `Recurison` to do the same.

THE CODE

[Python Code]

```python
# total permutation calculating function
def perm(cups,i,n,ans,k):
    if(i>=n):
        ans.add(tuple(cups))
        return
    for m in range(i,n):
        if cups[m]==i//k:
            continue
        swap(cups,i,m)
        perm(cups,i+1,n,ans,k)
        swap(cups,i,m)
```

Figure: Permutation Calculator

The SOLUTION

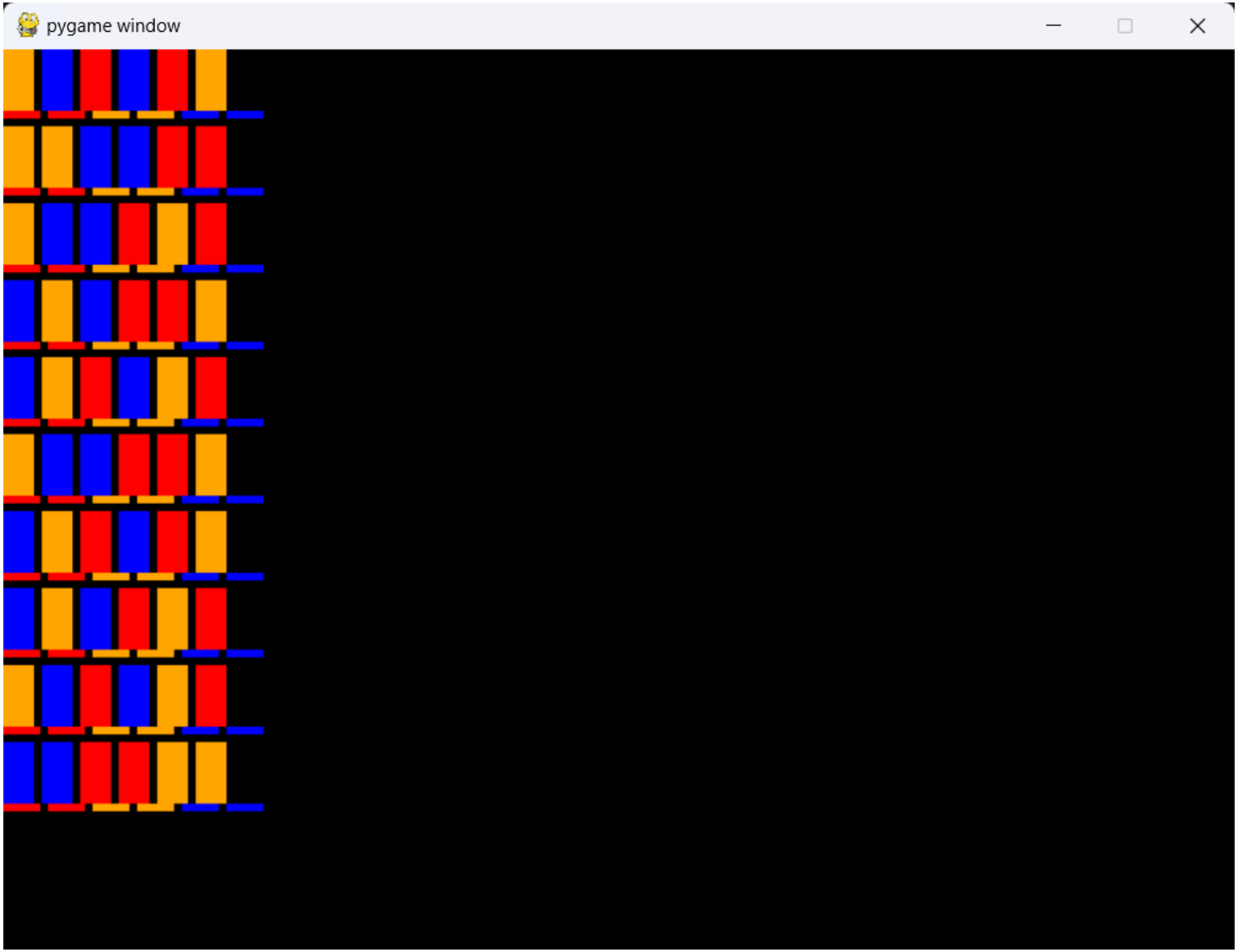

Figure: OUTPUT by PYGAME

Ending

The complete code for the same is attached in the zip file.

The End