Report on Kalaha python Project

### Problem statement:

To create a simulation of the kalaha board game where the goal is to determine which strategy of 2 predefines strategies, is more successful at playing the game. The strategies:

1. Select the bowl randomly, with uniform distribution over non-empty bowls
2. choose bowl randomly and uniformly among those that have the most beads.

### Program Structure

The main program is run through a Game class instance which uses composition to interleave 2 components i.e.

1. The Board – implements a data structure to create a logical abstraction of the code. The data structure chosen is a list containing custom objects working as bowls
2. The player – implements methods and rules of what constitutes a legal move

### Execution

To run the program, open terminal; (Make sure matplotlib and NumPy is installed globally or in a virtual environment). Then execute

>>> python engine.py

#### Sample exexution

>>> python engine.py

>>> Which strategy should player 1 use {1, 2}?: 1

>>> Which strategy should player 2 use {1, 2}?: 2

>>> How many balls in each bowl {3, 4, 5, 6}?: 4

>>> Simulate how many games?: 100

player 2 has won 62 out of 100

### Results

The program prints to console a simple message showing the ration of what player using what strategy had the most success. Furthermore, there is an automatically generated file ‘outfall.pdf’, containing a graphical representation of the results

### Guidance and References

* Python documentation on debugging techniques
* Stack overflow on implementing a simple patch for unit testing, and plotting on matplotlib, as well as generation of pdf containing graph

**Testing**

I used unit tests for utility functions to make sure that they ran without errors for valid input. For the most important function which is how players make their move I performed an integration tests that uses a cut down version of the experiment to check that user’s moves have the desired mutative effects on the board.

The test functions can be found in 2 files: test\_board.py and test\_player.py.

To run the test, I recommend:

Pip install pytest

Then run

>>> pytest <test file name>