Casey Bladow

CSIS 446 – Decision Support Systems

Date: March 3rd 2015

Due: March 4th 2015

**Monte Carlo Simulation – dice.py**

**Description of Simulation:**  
 I am simulating rolling a 5-sided die and looking for the chances of rolling either a pair, 2 pairs, 3 of a kind, 4 of a kind, a straight, or 5 of a kind (Yahtzee!). Every simulation was ran will the die being rolled 10,000 times, this made it very likely that at least every possibility would have hit at least once.

**Description of Monte Carlo Method/Why it is Appropriate:**

The Monte Carlo method provides an experimental approach that is well suited for estimating a parameter of a static problem. The method utilizes a sequence of individual trials, each with an observable outcome. The trials typically use numbers picked at random on the input side to drive a process that follows a statistical distribution modeling the problem.

It is appropriate because the die problem is exactly what the Monte Carlo was made for. We are taking a die, rolling (or randomly generating) it 5 times, and evaluating the outcome. Thus giving us outcomes X amount of times and then we can show the probability of getting each outcome.

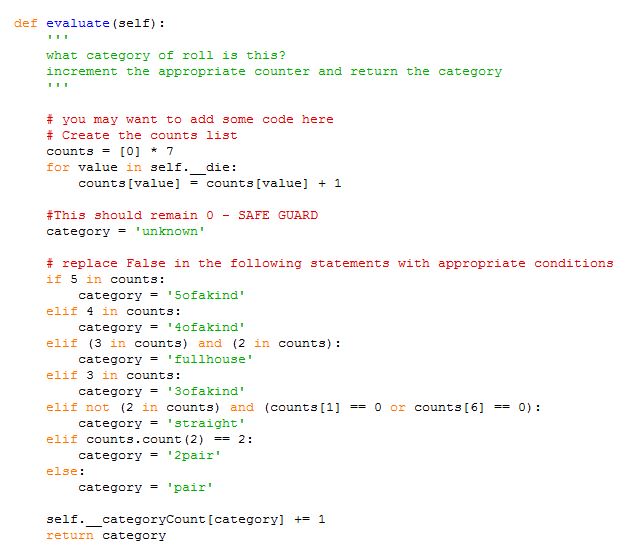
**Statistical Analysis:**

Central limit theorem and Empirical rule

Looking at the results you can see that the more times the die was rolled, the probability of the outcomes being close to what they should be also grows. This is known as the central limit theorem which says that as the number of independent trials grow, the probability of any repeat experiment, such as rolling a die, approaches a curve known as a normal or Gaussian distribution.

Also with these results, I believe the Empirical Rule (68-95-999.7 rule) comes into play. It’s not too hard to distinguish the probabilities of rolling a pair, 2 pairs or 3 of a kind are higher than rolling a full house, or 4 of a kind, or a straight, and falling at the least likely of rolling 5 of a kind. This creates the bell curve 68-95-99.7.

**Source Code:**

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