Santino Celebre FEB2022

2nd Project Bundle

The first program is called **StatsLibrary** and the package includes **StatsLib and StatsLibTest**. This program is designed to implement mean, median, mode, Standard Deviation, intersection, union, permutation, and combinations of two given sets. Set 1 = {1,2,3} and Set 2 = {2,3,4,5}. StatsLibTest is responsible for creating two sets and calling various methods. StatsLib is responsible for implementing all formulas. For project two I added a handful of distributions as well including binomial, geometric, and hypergeometric. You need to know when to use certain distributions in specific situations and I will explain. Binomial Distribution is used for when you have a fixed number (n), there is one of two outcomes, the probability is always the same, and trials are independent. Geometric Distribution is used for when you are trying to determine the likeliness of a success given a limited number of trials, only defined as a success or failure. For Hypergeometric Distribution you use this when It is used when you want to determine the probability of obtaining a certain number of successes without replacement from a specific sample size.

Median, this method was fairly simple to design as you take listX and go through the array which is already in order from least to greatest until you get to the middle number. In this case set [1,2,3] median is 2

Mean, the mean uses a for loop and adds up all values in the set and divides that number by the size of the set. [1,2,3] is (1+2+3)/3

Mode, is referred to as the most recurring number in the set so for set [1,2,3] since there is no recurring number the output is 0.

Standard Deviation, for this you need to utilize the mean and follow the formula. Subtract each number by the mean, square that number, and add up all the numbers. Find the variance and then square root the variance, you are then left with the Standard Deviation. In this case [1,2,3] the standard deviation is .8.

Intersection, using set 1 and set 2 you need to find which numbers both sets share. In this case [1,2,3] and [2,3,4,5] the intersection is 2,3.

Union, this is the combination of both sets without repeats, [1,2,3] and [2,3,4,5] so you end with [1,2,3,4,5].

Permutation, This is defined by doing factorial N! Divided by (n-r). In the program we find the permutation of Set1 and Set2.

Combination,

Binomial, is based on number of trials, probability of success, probability of failure and X which is defined as the number of successes.

Geometric, using q, p, and n we subtract q-1, then square q by n trials and multiply everything by p.

Hypergeometric, using definition 3.10 I was able to go through the formula and convert it into a handful of factorial solutions.

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Following StatsLibrary was the program called Programs and the package includes FunctionPlotter, FunctionPlotterTest, Salter, SalterTest, Smoother, SmootherTest, PokerHand, and PokerHandTester. FunctionPlotter was designed to pick a formula which in my case was Y=MX+B write program that plots output in csv open in excel/create graph. The salter program accepts the CSV file of x, y values, the program loops through y values and adds or subtracts a random number from the value. Then I opened Excel and created graphs. The smoother program consists of Smoother and SmootherTest and loops through the values and replaces y values with the average of the y values around it. For the Function Plotter I was able to use the previous CSV model from project 1 to create a CSV file with X and Y values follow the Y=MX+B layout and then transfer the information to an excel sheet and graph. When it came to the Salter program you edit the CSV file and go down the list and for each Y value subtract or add a random number between 1 and 10. Open the CSV file on excel and graph. With the Smoother class it is basically going back to the original graph. You take the average of the 2 Y values associated with the same X value and use the average as the new Y value, which starts straightening out the graph once you convert to CSV and open in Excel. In the PokerHand Program there are 3 classes, PokerHandTest class, Deck class, and Card class. Each class has it's own purpose. Deck Class which consists of an array list of cards that constructs 52 cards. This deck is then run through a shuffle method that randomly draws 52 cards and puts them in a new arraylist. After the deck is shuffled and cards are ready to be drawn the draw method selects 5 of those cards at random. Now that the user has his five randomly selected cards the handEvaluator class desiphers whether the hand you got was a pair, three of a kind, four of a kind, straight, or a flush. This is all controlled through the PokerHandTester class which tests 10000 hands where each output is recorded separately and then after all hands are evaluated pulls the probability of each of these events.