**Topics: Descriptive Statistics and Probability**

1. Look at the data given below. Plot the data, find the outliers and find out

|  |  |
| --- | --- |
| **Name of company** | **Measure X** |
| Allied Signal | 24.23% |
| Bankers Trust | 25.53% |
| General Mills | 25.41% |
| ITT Industries | 24.14% |
| J.P. Morgan & Co. | 29.62% |
| Lehman Brothers | 28.25% |
| Marriott | 25.81% |
| MCI | 24.39% |
| Merrill Lynch | 40.26% |
| Microsoft | 32.95% |
| Morgan Stanley | 91.36% |
| Sun Microsystems | 25.99% |
| Travelers | 39.42% |
| US Airways | 26.71% |
| Warner-Lambert | 35.00% |

Answer:

Data is plot in python notebook.

The outlier in given data is: Morgan Stanley 91.36%

Mean = 33.271333

Standard deviation = 16.945401

Variance = 287.1466123809524



Answer the following three questions based on the box-plot above.

1. What is inter-quartile range of this dataset? (please approximate the numbers) In one line, explain what this value implies.

Ans: Inter-Quantile range = Third Quantile(Q3) – First Quantile(Q1)

Approximately (First Quantile Range) Q1 = 5

(Third Quantile Range) Q3 = 12

(Inter-Quartile Range) IQR = Q3 – Q1 = 12 – 5 = 7

The inter-quantile range is the difference between the upper and lower quartiles, representing the spread of the middle 50% of a dataset.

The first quantile (Q1) is the value below which 25% of the data falls, and the third quantile (Q3) is the value below which 75% of the data falls.

1. What can we say about the skewness of this dataset?

Ans: Right-Skewed median is towards the left side it is not normal distribution, also outlier is present at a positive side.

1. If it was found that the data point with the value 25 is actually 2.5, how would the new box-plot be affected?

Ans: In that case there would be no Outliers on the given dataset because of the outlier the data had positive skewness it will reduce and the data will normal distributed and range of data would also be very small.



Answer the following three questions based on the histogram above.

1. Where would the mode of this dataset lie?

Ans: The mode of this data set lies between approximately between 4 to 8.

1. Comment on the skewness of the dataset.

Ans: Positively (Right) Skewed. Mean>Median>Mode

1. Suppose that the above histogram and the box-plot in question 2 are plotted for the same dataset. Explain how these graphs complement each other in providing information about any dataset.

Ans: They both are right-skewed and both have outliers the median can be easily visualized in box plot where as in histogram mode is more visible

1. AT&T was running commercials in 1990 aimed at luring back customers who had switched to one of the other long-distance phone service providers. One such commercial shows a businessman trying to reach Phoenix and mistakenly getting Fiji, where a half-naked native on a beach responds incomprehensibly in Polynesian. When asked about this advertisement, AT&T admitted that the portrayed incident did not actually take place but added that this was an enactment of something that “could happen.” Suppose that one in 200 long-distance telephone calls is misdirected. What is the probability that at least one in five attempted telephone calls reaches the wrong number? (Assume independence of attempts.)

Answer:

This problem involves binomial probability distribution, where each long-distance telephone call has a probability of 1/200 of being misdirected, and you want to find the probability of at least one misdirected call out of five.

Let p be probability of success (misdirected call), which is 1/200, and q be probability of failure (correct call), which is 1 – p

The probability of getting at least one misdirected call in five attempts =

1 – probability of getting no misdirected call in 5 attempts

P (at least one misdirected call in five attempts) = 1 – P (no misdirected call in 5 attempts)

The Probability of no misdirected call in one attempt is q = 1 – (1/200)5

Therefore,

P (at least one misdirected call in five attempts) = 1 – (1 – (1/200))5

P (at least one misdirected call in five attempts) = 1 – 0.9752 = 0.0248.

1. Returns on a certain business venture, to the nearest $1,000, are known to follow the following probability distribution

|  |  |
| --- | --- |
| x | P(x) |
| -2,000 | 0.1 |
| -1,000 | 0.1 |
| 0 | 0.2 |
| 1000 | 0.2 |
| 2000 | 0.3 |
| 3000 | 0.1 |

1. What is the most likely monetary outcome of the business venture?

Ans: The most likely monetary outcome of the business venture is 2000$

As for 2000$ the probability is 0.3 which is maximum as compared to others

1. Is the venture likely to be successful? Explain

Ans: To access if the venture is likely to be successful, we need to consider the cumulative probabilities of positive returns which are greater than $0.

In this case, the cumulative probability of positive return is:

Probability (x > 0) = Probability (x = 1000) + Probability (x = 1000) +

Probability (x = 1000)

= 0.2 + 0.3 + 0.1

= 0.6

Since the cumulative probability of positive return is 0.6, which is greater

than 0.5, the venture is more likely to be successful.

1. What is the long-term average earning of business ventures of this kind? Explain

Ans: The long-term average is Expected value = Sum (X \* P(X)) = 800$ which means on an average the returns will be + 800$

1. What is the good measure of the risk involved in a venture of this kind? Compute this measure

Ans: A good measure of the risk involved in a venture of this kind is standard deviation, which shows the dispersion of return around the mean.

Formula for Standard Deviation:

Σi=1n Probability(xi) (xi - µ)2  
Where:

Probability (xi) is the Probability of the ith outcome.

Xi is the ith outcome.

µ is the mean (expected value).

To find the expected value, you multiply each outcome by its probability and add them:

Expected value = (-2000) (0.1) + (-1000) (0.1) + (1000) (0.2) + (2000) (0.3) +

(3000) (0.1)

= 800

Standard Deviation =

Standard Deviation =

=

Standard Deviation = 1469.7

So, a measure of the risk involved in the venture, is approximately $1469.7.

So, average return of venture is moderately risking.