
CRYPTOCURRENCY SURVEY ANALYSIS

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ABSTRACT

A Cryptocurrency is a virtual currency where transactions are verified and records organized by a decentralized system namely called cryptography, instead of a centralized authority. Using Likert's Five Point scale, Surveys of Thirty people from each of the Ten countries under study are taken for the analysis. Here, the scope is limited to four most popularly used cryptocurrencies (Ethereum (ETC), Bitcoin (BTC), Bitcoin cash (BCH), Ripple (XRP)). The Top ten countries that have Legalized Cryptocurrencies are taken for this study (USA, China, Japan, Holland, France, Germany, Singapore, Ireland, Spain, Portugal). Simple Linear Regression, Correlation, MLR, ANOVA and some of the Visual Representation Techniques are used to obtain the results for the analysis.

Keywords: Analysis, Likert's Fivepoint scale, decentralized, scope, Legalized.

I. INTRODUCTION

A Cryptocurrency or Crypto is a form of asset made to work as a medium of exchange in which the individual coin ownership records are preserved in a ledger that was created using strong cryptography. Some of the cryptocurrencies existing in the market are Bitcoin, Ethereum, Bitcoin cash, Ripple.

Bitcoin is the first cryptocurrency, to be realised as an open-source software in 2009 which is not having a centralized authority. It was developed by pseudonymous developer Satoshi Nakamoto. It used SHA-256, a cryptographic hash function, in its proof-of-work scheme. Following Bitcoin, Name coin and Litecoin many other cryptocurrencies were realised each one using its own hash functions. Nowadays, the usage of bitcoin has increased exponentially causing the bitcoin developers to create a new cryptocurrency bitcoin cash in 2016 that is much faster, reliable and accurate than its predecessor bitcoin. As of 5th April 2021, the stock market value of cryptos surpassed \$ two trillion USD for the first time.

Not all countries welcome cryptocurrency, those countries that approved the usage of cryptocurrencies to its citizens are said to have legalized cryptocurrencies. This legalization essentially also includes the usage and acceptance of cryptocurrencies in most of the banks in that particular country. In a country like India where the cryptocurrency market has grown up to \$100 billion (2015) the Indian government has banned the cryptocurrencies. But still the Indians thrive to contribute more to the cryptocurrency market. In countries like Japan, China, Germany and especially in Holland, people have started to use cryptos very often that many shareholders and stakeholders are looking to expand the crypto business.

The Cryptocurrency works on the principle of Blockchain. A blockchain is a dynamically increasing list of information, known as blocks, that are connected together and secured by cryptography. Each entity in blockchain generally has a hash pointer, timestamp and transaction information. Blockchains can't be easily modified. Blockchains are designed to provide security to the data and it is an application of distributed computer system.

A cryptocurrency wallet stores the public and private keys or addresses or seeds which can be used to receive or spend the cryptocurrency. There are several cryptocurrency wallets available in the market such as bitcoin wallet, green address, atomic wallet, bit pay and exodus. People have to use at least one of the crypto wallets to exchange or typically use cryptos.

II. METHODOLOGY

The survey dataset contains the respective Likert's scale values given by the respondent. There are thirty respondents in each of the ten countries discussed. The survey questionnaire includes ten questions. They are :

1. State your affinity towards Ethereum.
2. State your affinity towards Bitcoin.

3. State your affinity towards Ripple.
4. State your affinity towards Bitcoin cash.
5. State your interest in investing in crypto shares.
6. State your frequency of using cryptos.
7. State your affinity towards the Brave browser.
8. How do you feel about the security of cryptos?
9. State your interest in the need for further improvement in crypto wallets.
10. How flexible are the laws for cryptos in your country?

The response given by the respondent ranges from one to five points with 1.0 being the lowest rating and 5.0 being the highest rating. The scale is allowed to have one floating point decimal value and not more than that. The survey was answered by the people irrespective of their age group,gender,income and various other factors.

In any analysis, the researcher hopes to better understand about that particular subject he /she has taken. One such way of understanding about the subject is to find out the relationships the subject is involved with. Like how connections are important to people and the society judges a person by his /her connections. From the above discussions, the concept of cryptocurrencies are familiar but to deepen the knowledge about them,the following objectives are mandatory to be answered.

- The extent of the relationship between bitcoin and bitcoin cash.
Since both bitcoin and bitcoin cash were designed by the same developers,bitcoin in 2009 and bitcoin cash in 2016. It is significant to understand their correlation.
- The functional relationship between security ratings and improvements in wallets.
It is certain that the security ratings given by the respondent are in regards to the need for further improvements in wallets. But to what extent and by how much are they related that they influence the other's values can be only determined by the ordinary linear regression.
- The functional relationship of interest in shares with frequency and flexibility of laws.
It can be seen and by now it is clearly inevitable for people such as the shareholders, stakeholders to be interested in purchasing the shares of a particular crypto. From the dataset, the two most important factors determining whether a person is someone who is interested in the share market or not are frequency and flexibility of laws. Such a person must frequently be using cryptos and must know all of the affairs related to the crypto market. Thus, Multiple Linear Regression must be employed to get this relationship known.
- The popularity of the cryptocurrencies in various countries around the world.
It is of immense importance to know the popularity of Bitcoin, Ethereum, Bitcoin cash and Ripple across the ten countries taken into consideration. For this task, Multi-Bar Graph must be employed.
- Finding the similarities and differences between people of different countries with their responses in the survey.

To find out whether the two or more countries taken into account are similar to each other or not, ANOVA analysis is performed. To be specific, one-way analysis of variance techniques is used for this task. Both the null hypothesis and alternative hypothesis are formulated and according to the p-value calculated, rejection or the acceptance of the null hypothesis would be decided.

Using the above methods, cryptocurrencies and its popularity and the interest shown by various countries in this subject of discussion is found out.

III. MODELING AND ANALYSIS

SIMPLE/ORDINARY LINEAR CORRELATION:

In any survey conducted, the information gathered would always have many variables which are interrelated. A questionnaire has a lot of details that are definitely correlated with each other. Correlation is used to understand the strength of association between two or more variables. The relationship between two related variables and their joint distribution is known as bivariate normal distribution. In case of a bivariate normal distribution, finding and calculating the magnitude and direction of association between two variables are of at

most importance. Suppose there are two non- discrete variables X and Y and if the difference in X affects Y, then the variables are said to be associated with each other. Here, the ordinary Linear Correlation method is employed to get results. The correlation coefficient r is calculated by dividing covariance of the variables X and Y by the product of the standard deviation of X and Y.

SIMPLE LINEAR REGRESSION:

Linear regression is the most commonly used statistical technique. It is a way to functionalize a association between two sets of variables. The calculated function is a linear regression equation that are used to predict about data. These variables are called dependent and independent variables. If the association is a straight line it is called simple linear regression otherwise simple non-linear regression. When there are more than two variables and one of them is taken to be dependent upon the others, the functional relationship is called Multiple linear Regression. That is MLR is a study of the relationship between three or more numbers of variables. In this analysis, both Simple and Multiple regression techniques are used to find the functional relationship between variables.

The simple linear regression of Y on X in the population is given by the equation:

$$Y = a + bx + e$$

where a is the intercept, b is the slope and e is the error term given by Y-y. For any given value of x the survey of the error term will be zero and the regression equation becomes $Y = a + bx$. The slope may be positive, negative or zero.

MULTIPLE LINEAR REGRESSION:

It is also known as Multiple regression. It is a statistical technique that uses several independent variables to predict the outcome of a dependent variable. Multiple regression is an extension of linear regression that uses just one explanatory variable. Multiple regression is the most common form of linear regression analysis. Multiple regression behaves as a predictive analysis and explains the association between one continuous response variable and two or more explanatory variables. The explanatory variables are continuous or categorical.

Multiple linear regression (MLR) is used to find a mathematical association among a number of random variables. MLR explains how multiple independent variables are related to one response variable. Once all of the independent factors have been found to predict the dependent variable, the information creates a accurate prediction of the range of effect they have on the response variable. The MLR equation is given by:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n$$

Here, a is the intercept and b values are the coefficients of the regression function.

MULTI-BAR GRAPH:

A multiple bar graph shows the relationship between different values of data. Each data value is represented by a column in the graph. The list of different kinds of data are given along the horizontal, or x axis. The quantity or amount of data is listed along the vertical, or y, axis. Lastly, the legend, or key, states what each column represents.

SCATTER PLOT:

A scatter plot is a type of chart or mathematical diagram using Cartesian coordinates that is used to display values for typically two variables for a set of data. It is mostly used to find out the relationship between two related variables and often plotted before a regression analysis. It has the explanatory variable in the X-axis and the response variable in the Y-axis. Using this, one can find whether the association is linear or not by observing the clustering of the points in the cartesian plane.

ANOVA(ANALYSIS OF VARIANCE):

Analysis of variance is a collection of techniques for comparing multiple means across different groups. It is a systematic procedure for decomposing or dividing or splitting the overall variance in the responses observed in an experiment into different components. Each component is attributed to an identifiable cause or source of variation. The structure of these components is determined by the ANOVA model. There are widely two types of ANOVA namely one-way ANOVA and two-way ANOVA. In this analysis, one-way ANOVA is employed.

One-way ANOVA has one independent variable to compare between one or more groups. It has the null hypothesis and the alternative hypothesis as well. In the null hypothesis, there is no significant difference between the means of the groups in consideration to the independent variable taken into account. While the alternative hypothesis, states that there is a significant difference between the means of the groups to the independent variable taken into account. In simple words, the alternative hypothesis implies that there must be at least one mean in the groups taken for comparison to be not similar or different from the other groups' means of a particular independent variable under study.

To find out which hypothesis is valid for the case, the F value or the p value is used to solve this ambiguity. If the calculated p value is greater than 0.05 then the null hypothesis is accepted and there is no significant difference between the two or more groups under study. If the calculated P value is less than 0.05 then the null hypothesis is rejected and the alternative hypothesis is accepted and there is significant difference between the two or more groups under study. The above hypotheses are:

$$H_0: \mu_1 = \mu_2 \dots = \mu_n$$

$$H_a: \mu_1 \neq \mu_2 \dots \neq \mu_n$$

IV. RESULTS AND DISCUSSION

	COUNTRY	LIKENESS OF ETHEREUM	LIKENESS OF BITCOIN	LIKENESS OF RIPPLE	LIKENESS OF BITCOIN CASH	INTEREST IN SHARES	FREQUENCY	LIKENESS OF BRAVE	SECURITY RATINGS	NEED FOR IMPROVEMENT IN WALLET	FLEXIBILITY OF LAWS
0	USA	3.1	4.3	1.4	3.0	2.6	2.8	1.5	1.4	4.3	3.3
1	USA	4.0	4.2	2.2	2.6	3.9	3.0	2.8	1.6	3.2	3.9
2	USA	3.6	4.8	1.7	2.8	2.5	2.6	2.8	1.9	3.1	3.1
3	USA	3.9	3.8	1.5	2.9	3.0	2.5	2.9	2.2	3.7	4.2
4	USA	3.6	4.8	1.9	3.0	3.5	2.6	2.5	1.1	4.2	3.9

Figure.1: Dataset taken for study

Figure 1. contains the first few records of the entire dataset. The dataset contains fields that includes the COUNTRY, LIKENESS OF ETHEREUM and other such columns that consists of the questionnaire the respondent answered. Except the COUNTRY field, all the others contain values of the Likert's five-point scale that ranges from 1.0 to 5.0 rating.

	LIKENESS OF ETHEREUM	LIKENESS OF BITCOIN	LIKENESS OF RIPPLE	LIKENESS OF BITCOIN CASH	INTEREST IN SHARES	FREQUENCY	LIKENESS OF BRAVE	SECURITY RATINGS	NEED FOR IMPROVEMENT IN WALLET	FLEXIBILITY OF LAWS
count	300.000000	300.000000	300.000000	300.000000	300.000000	300.000000	300.000000	300.000000	300.000000	300.000000
mean	3.208667	4.211667	2.63000	2.607333	3.529667	3.657000	3.715667	3.138667	3.579333	3.560000
std	0.806780	0.591097	0.85659	0.665047	0.959978	0.693002	0.923597	0.938745	0.737826	0.805043
min	1.500000	2.500000	1.00000	1.000000	1.200000	2.000000	1.000000	1.000000	1.200000	1.500000
25%	2.500000	3.900000	2.00000	2.175000	2.800000	3.175000	3.000000	2.400000	3.200000	3.000000
50%	3.300000	4.300000	2.50000	2.600000	3.800000	3.600000	3.900000	3.100000	3.700000	3.700000
75%	3.800000	4.600000	3.10000	3.000000	4.300000	4.100000	4.500000	3.900000	4.100000	4.125000
max	4.900000	5.000000	4.70000	4.400000	5.000000	5.000000	5.000000	5.000000	4.900000	5.000000

Figure.2: Basic descriptive statistics of the dataset.

Figure 2. provides the basic descriptive statistics results based on the dataset. The count value of 300 implies that there are 300 rows in the dataset. The figure also contains the measures of central tendency values such as mean, min, max and also the measure of dispersion standard deviation std of all the fields in the dataset. Through the mean, the average rating for a particular field given by the respondent irrespective of their country is known.

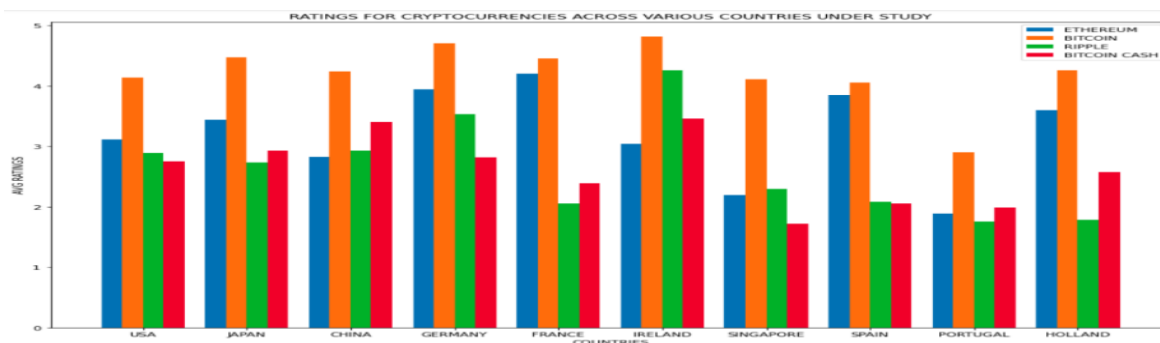
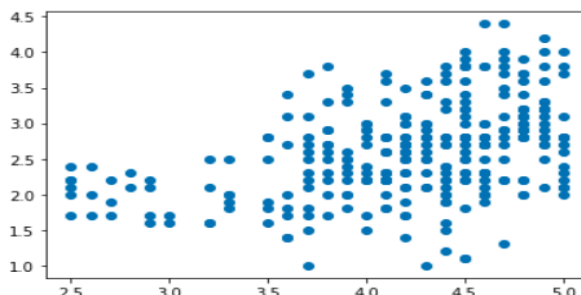


Figure. 3: Average ratings of various cryptos across different countries

Figure 3. is necessary to understand the popularity of the various cryptos Ethereum (ETC), Bitcoin (BTC), Bitcoin cash (BCH) and Ripple (XRP) in various countries around the world. It can be seen or observed from the figure that Bitcoin is very popular and most people in the universe of cryptos use it irrespective of their country. In most of the countries, it is found that Ethereum is second popular to Bitcoin.



Correlation between likeness of bitcoin and bitcoin cash is 0.4187065663109614

Figure.4: Scatter plot and correlation value of likeness of bitcoin and bitcoin cash

The above figure suggests there is a correlation existing among the two variables bitcoin and bitcoin cash but they are not strong and also there is no negative correlation between them. The correlation value is 0.418 validating the former statement. Majority of the people pay no heed to the fact that bitcoin and bitcoin cash were developed by the same set of developers and bitcoin cash is in fact much faster than its predecessor bitcoin.

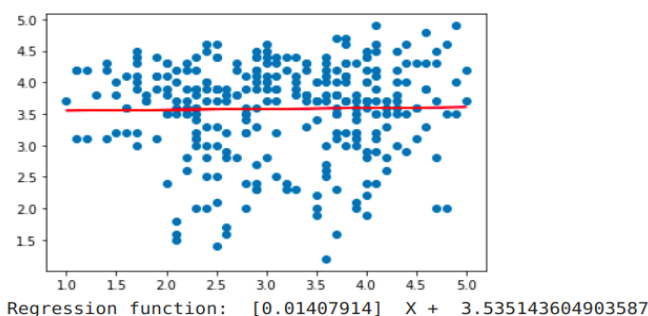


Figure-5: Scatter plot along with the regression function between security and need for improvements in wallets.

From the figure above, the graph indicates no negative association existing between the independent and dependent variables. The intercept is 3.535 and the slope of the function is the coefficient of the explanatory variable X that is 0.014. There is no strong relationship between the Security ratings given by the respondent to the need for improvements in wallets. There may be other factors affecting the ratings given to the need for improvements in wallets other than the security ratings.

MLR model : [0.39014922 -0.34372065] X + 3.326536479689376

Figure.6: MLR model for the interest in shares with frequency and flexibility of laws

In the figure shown above, the MLR model or the Multiple regression model is employed to find the association between the interest in shares shown by the respondents to the frequency of the respondent and the flexibility of laws in that particular respondent's country. The model suggests that the investment of shares of cryptos are not heavily influenced by the frequency of the participant and the favour of laws in that country of the individual but rather on more significant factors such as the income of that particular respondent.

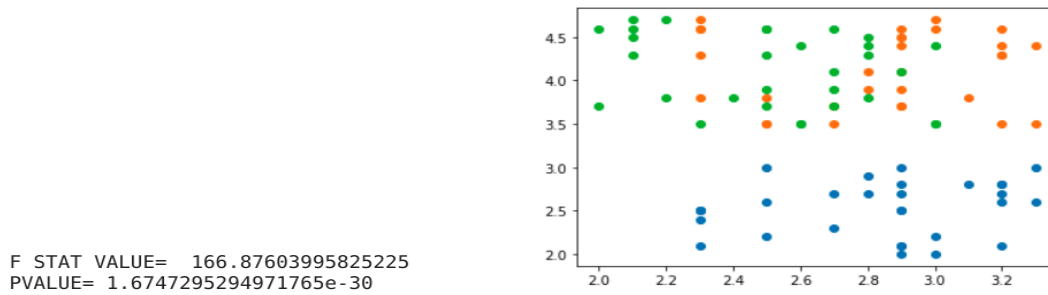


Figure.7: Graph along with one-way ANOVA results of three countries in their interest in shares.

From the above figure, the graph indicates, there is no similarity between the countries France, Spain and Germany in the aspect of interest in crypto shares. The p-value is nearly zero that, since it is less than 0.05, the null hypothesis is rejected and the alternative hypothesis is valid. There is a significant difference between the means of France, Spain and Germany with respect to the interest in shares.

F STAT = 0.3247570569180935
PVALUE = 0.570963612925472

Figure.8: One- way ANOVA results between China and Japan in their affinity towards Ethereum.

In the previous figure, it was found that there was no similarity between France, Spain and Germany with respect to the interest in shares. However, in this figure, it is clearly evident that there is a similarity between the Chinese and Japanese in their likeness towards Ethereum cryptocurrency. The P value is 0.57. The p-value is greater than 0.05 so the null hypothesis is accepted. Therefore, there exists no significant difference between China and Japan in the aspect of the affinity towards Ethereum (ETC).

V. CONCLUSION

The world of cryptos will always tend to progress and give way to bigger markets worldwide. It is found that though the crypto market is already grown it is only the early stages in most of the countries. It is also found that Bitcoin is the most famous and the most used crypto currency in the world right now. People need further provisions to be made so that they can use cryptos at their convenience. The Chinese, the Japanese and the people of Asia seem to have adapted to the cryptocurrency world that they are seen to be more movement of cryptos in these countries. It can also be seen overall that most of the columns in the dataset are independent of each other. Hence it can also be concluded that the people looking forward to investing in the shares of the cryptos should go for Bitcoin followed by Ethereum, Ripple and then Bitcoin cash.

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