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Statistical Analysis of Investment Hesitancy of Indian Youth in Cryptocurrency

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***Abstract*: In the recent years, there has been a steady rise in the popularity of cryptocurrency as an investment alternative in India. Yet, cryptocurrency investments make up a very small fraction of the total investment volume in India. The proposed paper aims at finding out Indian youth's confidence and reasons for hesitance in investing in cryptocurrency [5]. It also attempts to understand the various gender-specific and gender-neutral causes leading to distrust or disinterest among the youngsters regarding their engagement in cryptocurrency investing. It further attempts to quantify the impact of these gender-specific and gender-neutral factors on the cryptocurrency investments of youth (or the lack thereof).**

***Keywords*: cryptocurrency, investment hesitancy, gender, statistics, machine learning, logistic regression, random forest.**

1. Introduction

In the recent years, virtual and digital currencies like Bitcoin and Ethereum are widely used in a variety of systems [7]. People's interest in virtual currency like cryptocurrency has skyrocketed and there is tremendous attention and focus being paid to the cryptocurrency industry. The growing ease of access to internet services in India has led to a significant increase in the number of online users who are now exploring digital currencies. Cryptocurrency is a digital representation of valuable and intangible assets that can be utilized in a variety of networks and applications, including online social networks, social games, virtual worlds, and peer-to-peer networks [7]. The use of cryptocurrencies is thought to need a high level of digital literacy because it is a technology-intensive field. Similar to this, their swift exchange rate changes show that strong financial knowledge is needed to invest in cryptocurrencies in order to prevent potentially significant losses. Gender inequality has been prominent in the areas requiring digital and financial literacy [8], [9].

2. Analysis

Based on the responses of an extensive survey conducted by us, we have performed various analyses to ascertain the impact of a multitude of factors on cryptocurrency investments by youth. The most significant of these analyses have been presented in this section.

A. Familiarity of youth with cryptocurrency

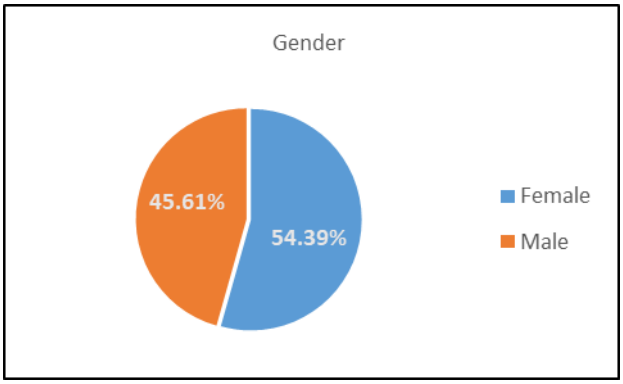

Fig. 1. Gender distribution of the sample

- Female and Male respondents have almost an equal share with 54.39 % females as respondents and 45.61% males as the respondents.

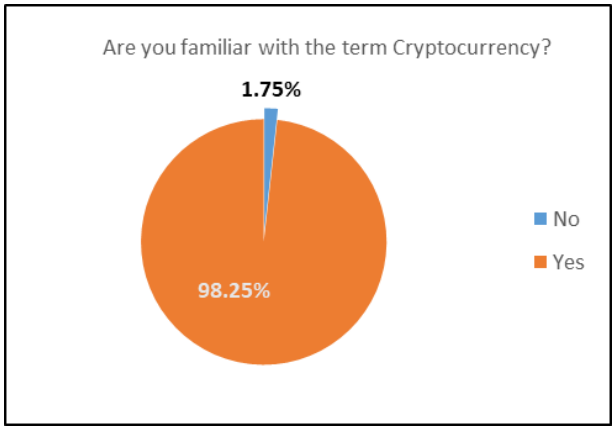

Fig. 2. Familiarity with the term 'cryptocurrency'

- 98.25% out of the entire sample is familiar with the term cryptocurrency. Only 1.75% out of the sample size is unfamiliar with the term cryptocurrency.
- This means that due to the popularity and trend, most of the population has heard of cryptocurrency.
- It must be noted that familiarity with cryptocurrency does not imply having accurate information or correct understanding about cryptocurrency.

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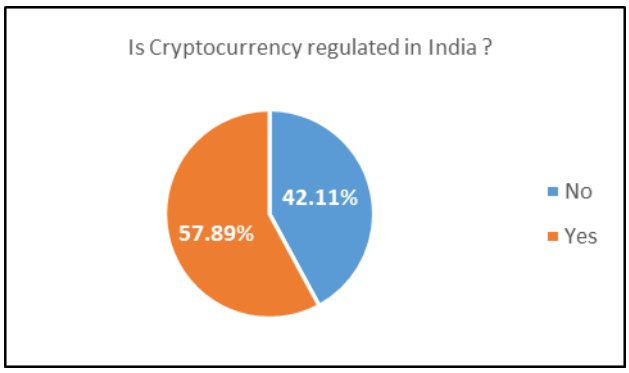

Fig. 3. Knowledge of participants about crypto regulations

- 57.9% of participants believe that cryptocurrency is regulated in India whereas in actuality, this is not the case. Unlike SEBI for Shares market or IRDAI for Insurance Regulation in India, cryptocurrency does not have a regulatory body.
- 42.1% of participants however are known to the fact that cryptocurrency is not regulated in India.

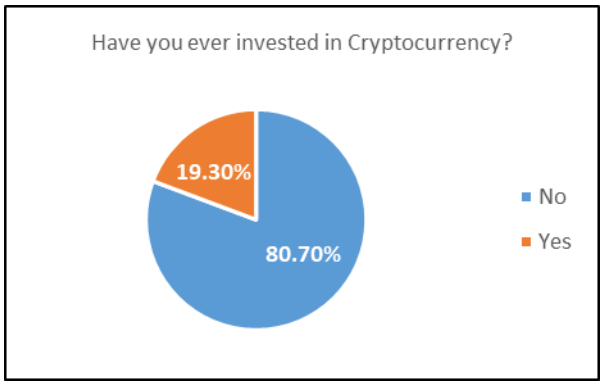

Fig. 4. Participants who invested in cryptocurrency

- According to our data, 80.7% of participants have not invested or traded in cryptocurrency whereas 19.3% has invested/traded or are investing in cryptocurrency.
- The low participation in cryptocurrency investments despite a high degree of self-perceived awareness about cryptocurrency points to the existence of some investment hesitancy.

B. Possible reasons for cryptocurrency investment hesitancy in India

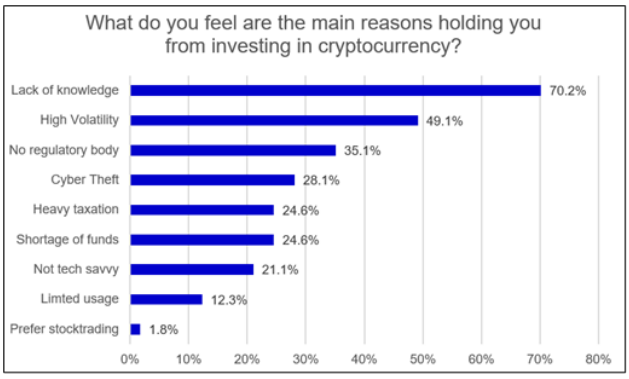

Fig. 5. Reasons for not investing in cryptocurrency

- The responses received showcased that 70.2% of participants have not invested in cryptocurrency or are limiting themselves from doing so due to their "lack of knowledge" regarding the same. Unlike the widespread knowledge available on the internet or webinars being conducted on the regulations and working of the stock markets, information, encouragement or knowledge about cryptocurrency has not been on the plate for young adults. Therefore, it is possible that due to this lack of knowledge, the Indian youth is reluctant to invest or trade in cryptocurrencies.
- 49.1% of the sample has chosen "High Volatility" as their reason for being held back from investing in cryptocurrency. Cryptocurrency is one of the most volatile investment assets to deal in [10]. To define, "Volatility means the liability to change rapidly and unpredictably, especially for the worse" [11]. Due to their highly unpredictable nature, cryptocurrencies, despite a sudden hike in their trend during recent years, have not been able to capture a stronghold in the market as can be seen via our study.
- 35.1% of the sample is reluctant to actively participate in cryptocurrency investment due to it having "No regulatory body". In the absence of an upper body to keep a check on the activities being conducted in crypto space, people could have built an extreme distrust in the same. There is no functional body to keep a check on fraudulent trades or cyber thefts which in turn could lead to reluctance to invest.
- 28.1% of participants have limited themselves from investing in crypto due to "Cyber theft". Due to the absence of a regulatory body, as stated above, the risk of cyber thefts is particularly visible and prominent enough to hold people back from trading in cryptocurrency.
- 24.6% of the sample has chosen "Heavy taxation" and "Shortage of funds" as their reasons for not investing in cryptocurrency, respectively. Young-adult students in India do suffer immensely from lack of funds and heavy taxation policy in the Indian crypto market.
- 21.1% of people claim that they are "Not tech-savvy" enough to engage in cryptocurrency.
- Cryptocurrency can only be used at a limited level at very few places as a medium of exchange. Therefore, 12.3% are reluctant from investing in cryptocurrency due to "Limited usage".'

C. Gender differences in the youth cryptocurrency investors

- According to the statistical analysis of the collected data, only 3.23% females have invested in crypto whereas in contrast, 38.46% males have invested in cryptocurrency presently.
- This data clearly shows that more males have invested in cryptocurrency as compared to females.
- 96.77% females have never invested in cryptocurrency whereas on the other hand, 61.54% males have never

invested in cryptocurrency.

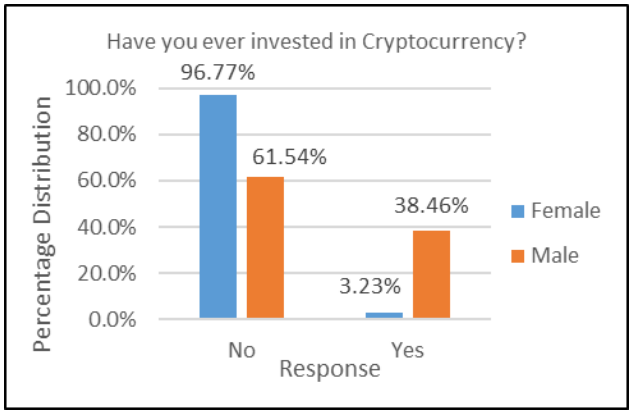

Fig. 6. Gender distribution of cryptocurrency investors

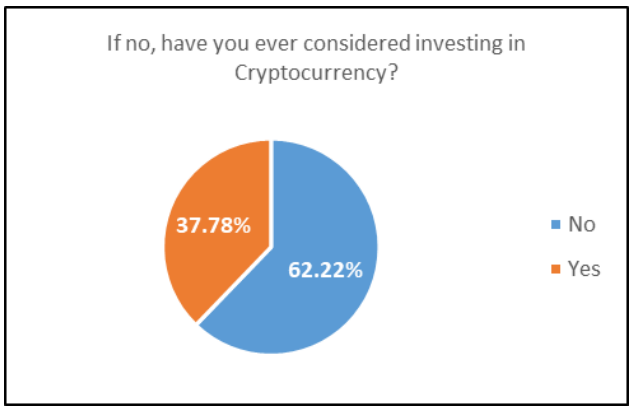

Fig. 7. Participants who have not invested but considered investing

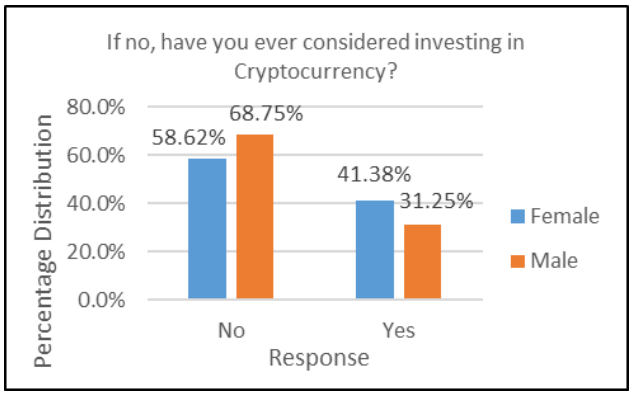

Fig. 8. Gender distribution of participants who considered investing

- A total of 62.22% have not considered investing in cryptocurrency, whereas 37.78% have considered it.
- 41.38% of females have considered to invest in cryptocurrency whereas 31.25% of males have considered to invest in cryptocurrency.
- We see that more percentage of females have considered investing in cryptocurrency in comparison to males.
- In the sample, 41.94% females were never encouraged to trade in cryptocurrency whereas only 26.92% males were not encouraged to trade in cryptocurrency.
- Also, 58.06% females were encouraged to invest in cryptocurrency as compared to 73.08% males.
- This shows that female youth feel less encouraged to invest in cryptocurrency compared to the male youth in India.

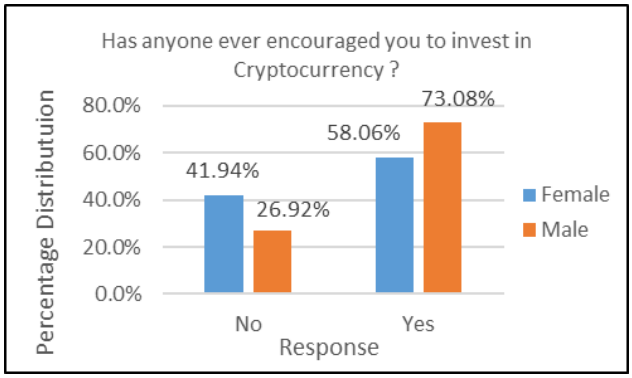

Fig. 9. Gender distribution of participants who were encouraged to invest

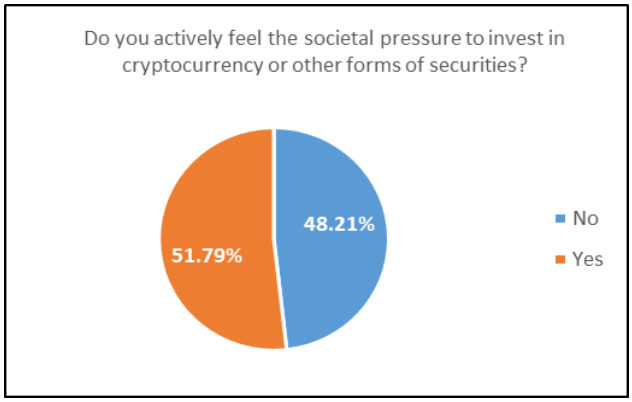

Fig. 10. Societal pressure to invest in cryptocurrency

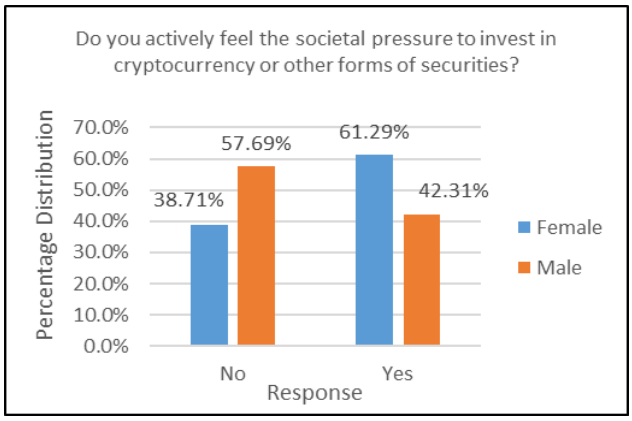

Fig. 11. Gender distribution of societal pressure to invest in cryptocurrency

- 48.21% of the total sample does not feel the societal pressure to engage themselves in investing in cryptocurrency or other forms of security whereas 51.79% of the sample does.
- Moreover, 61.29% females feel the peer and societal pressure to invest in cryptocurrency compared to only 42.31% males feeling the same pressure.
- This shows that even though females feel the pressure to invest in cryptocurrency or other forms of securities more frequently, they still tend not invest.

Table 1
Definition of various factors impacting cryptocurrency investing

Factor	Type	Definition
Invested in Crypto	Boolean	Has the participant invested in cryptocurrency?
Familiar with Crypto	Boolean	Is the participant aware of the term 'cryptocurrency'?
Considered Investing	Boolean	Has the participant ever considered investing in cryptocurrency?
Gender	Categorical	Is the gender of the participant male, female or other?
Considered Investing in IDC	Boolean	Has the participant considered investing in RBI's announced Indian Digital Currency (IDC)?
Encouraged to Invest	Boolean	Was the participant encouraged to invest in cryptocurrency?
Lack of Knowledge	Categorical	Does the participant feel that they lack knowledge about cryptocurrency?
Informed About Regulations	Boolean	Does the participant feel that cryptocurrency is regulated in India or not?
Trading Other Securities	Boolean	Has the participant traded any other security?
Societal and Peer Pressure	Boolean	Has the participant felt peer or societal pressure to invest in cryptocurrency?
Aware of IDC	Boolean	Is the participant aware of Indian Digital Currency (IDC)?

3. Statistical Inference

The research methodology used for this study is descriptive based on primary data, collected through a survey conducted across random individuals belonging to the young-adult age group. The questionnaire contained questions related to cryptocurrency, knowledge about investing in cryptocurrency, hurdles faced in investing in cryptocurrency, possible causes for hesitance/disinterest in cryptocurrency investments, etc. Since we wanted to study the current state of cryptocurrency investment hesitancy in the youth of India, we have taken our sample from the young students of Delhi University. Students of Delhi University comprise of students of India as students from different parts of the country come to study at Delhi University. A sample size of a minimum of 50 individuals was used to analyze the objective and draw outcomes.

The various questions in the survey have been represented as factors along with their definitions in Table 1.

A. Cramer's V Test

We want to gauge the impact of all the factors on whether a participant invested in cryptocurrency or not. We start by using Cramer's V as a measure to estimate the strength of association between our target variable – 'Invested in Crypto' and all other factors. Table 2 provides a summary of the possible interpretation of the strength of association between two variables based on various ranges of Cramer's V [2].

Table 2
Interpretation of Cramer's V values

Cramer's V	Interpretation
>0.25	Very Strong Association
>0.15 and <= 0.25	Strong Association
>0.10 and <= 0.15	Moderate Association
>0.05 and <=0.10	Weak Association
>0.00 and <= 0.05	No or Very Weak Association

Table 3
Cramer's V values for various factors impacting cryptocurrency investing

Factor 1	Factor 2	Cramer's V
Considered Investing	Invested in Crypto	0.43
Gender	Invested in Crypto	0.38
Considered Investing in IDC	Invested in Crypto	0.25
Trading Other Securities	Invested in Crypto	0.21
Encouraged to Invest	Invested in Crypto	0.18
Lack of Knowledge	Invested in Crypto	0.17
Informed About Regulations	Invested in Crypto	0.00

We must note that Cramer's V values are unsigned and between 0 and 1 (both included). Table 3 summarizes our analysis of the collected data. We can see that the factors 'Considered Investing', 'Gender' and 'Considered Investing in IDC' have a very strong association with our target variable 'Invested in Crypto'. Factors 'Trading Other Securities', 'Encouraged to Invest' and 'Lack of Knowledge' have a strong association with 'Invested in Crypto'.

B. Logistic Regression

We used L1 regularized logistic regression to predict the probability of a participant investing in cryptocurrency based on their responses to survey questions for all other factors. L1 regularized logistic regression penalizes the feature regression coefficients with L1 norm and also compresses some feature regression coefficients to zero. Table 4 presents the overview of the performance evaluation for our modelling activity.

Table 4
Logistic regression performance metrics

Performance Metric	Train Sample Value	Test Sample Value
Accuracy	97.62%	86.67%
Precision	97.92%	86.67%
Recall	97.62%	86.67%
F-score	97.68%	86.67%

Table 5 presents the results of our modelling activity. We note that the factors 'Considered Investing', 'Gender', 'Considered Investing in IDC' and 'Trading Other Securities' have a strong coefficient and hence a strong impact on predicting whether a participant invested in cryptocurrency.

Table 5
Logistic regression coefficients for factors impacting crypto investing

Independent Variables	Target Variable	Coefficient
Considered Investing	Invested in Crypto	0.58
Gender	Invested in Crypto	1.05
Considered Investing in IDC	Invested in Crypto	0.77
Trading Other Securities	Invested in Crypto	0.60
Encouraged to Invest	Invested in Crypto	0.00
Lack of Knowledge	Invested in Crypto	-0.14
Informed About Regulations	Invested in Crypto	-0.08

To make a proper comparison between all regression coefficients, we have taken the standardized absolute coefficients so that they have a standardized base [1]. Table 6 presents the results of this standardization. We note that the relative order of the absolute strength of coefficients remains the same.

Table 6
Absolute standardized logistic regression coefficients for factors impacting crypto investing

Independent Variable	Target Variable	Absolute Standardized Coefficient (ASC)
Considered Investing	Invested in Crypto	0.15
Gender	Invested in Crypto	0.27
Considered Investing in IDC	Invested in Crypto	0.20
Trading Other Securities	Invested in Crypto	0.16
Encouraged to Invest	Invested in Crypto	0.00
Lack of Knowledge	Invested in Crypto	0.04
Informed About Regulations	Invested in Crypto	0.02

Table 7
Random forest performance metrics

Performance Metric	Train Sample Value	Test Sample Value
Accuracy	100.00%	80.00%
Precision	100.00%	83.89%
Recall	100.00%	80.00%
F-score	100.00%	81.60%

Table 8
Random forest feature importance for factors impacting crypto investing

Independent Variable	Target Variable	Feature Importance (RF-FI)
Considered Investing	Invested in Crypto	0.10
Gender	Invested in Crypto	0.18
Considered Investing in IDC	Invested in Crypto	0.09
Trading Other Securities	Invested in Crypto	0.07
Encouraged to Invest	Invested in Crypto	0.03
Lack of Knowledge	Invested in Crypto	0.08
Informed About Regulations	Invested in Crypto	0.06

Table 9
Random forest feature importance for factors impacting crypto investing

Independent Variable	ASC	RF-FI	Cramer's V
Considered Investing	0.15	0.10	0.43
Gender	0.27	0.18	0.38
Considered Investing in IDC	0.20	0.09	0.25
Trading Other Securities	0.16	0.07	0.21
Encouraged to Invest	0.00	0.03	0.18
Lack of Knowledge	0.04	0.08	0.17
Informed About Regulations	0.02	0.06	0.00

Table 10
Comparison of random forest and feature importance for factors impacting crypto investing

Independent Variable	ASC	RF-FI	Cramer's V
Considered Investing	Very Strong	Very Strong	Very Strong
Gender	Very Strong	Very Strong	Very Strong
Considered Investing in IDC	Very Strong	Strong	Very Strong
Trading Other Securities	Very Strong	Strong	Strong
Encouraged to Invest	Very Weak	Weak	Strong
Lack of Knowledge	Weak	Strong	Strong
Informed About Regulations	Weak	Strong	Very Weak

C. Random Forest

Random forest is a non-linear classification algorithm based on building an ensemble of decision trees. Random forests inherently provide some interpretability despite their non-linearity – in the form of feature importance for each of the independent variables. Table 7 presents an overview of the performance evaluation of our modelling activity.

Feature importance can be used as a method to explain the results of machine learning models. It is advised to use feature importance in conjunction with other interpretation techniques to get more reliable and trustworthy results [3]. Table 8 presents an overview of the various feature importance values for the independent variables considered in our modelling activity. We note that 'Considered Investing', 'Gender' and 'Lack of Knowledge' are features with the highest importance for the target variable 'Invested in Crypto'.

Table 9 provides a summary of the various interpretability and explanation metrics that we have used throughout this paper.

Table 10 presents a comparison of random forest and feature importance for factors impacting cryptocurrency investing. We note that 'Considered Investing', 'Gender', 'Considered Investing in IDC' and 'Trading other Securities' are important factors for the target variable 'Invested in Crypto'. It must be noted that table 10 only represents the values that are strongly or weakly affecting our dependent variable 'Invested in crypto'

4. Conclusion

These days, the youth is more inclined towards the use of new advanced technology such as cryptocurrency. In this research paper, we have aimed to identify the causes of

hesitancy to invest and gender-based differences among the youth in the country regarding cryptocurrency as well as the factors that influence the youth's cryptocurrency investments or the lack thereof.

The primary data collected finds that almost all of the respondents are aware of the term cryptocurrency [98.2%]. However, many individuals have no direct experience in using cryptocurrency as a means of transaction [80.70%]. Lack of knowledge [70.2%], high volatility [49.10%] and no presence of a regulatory body [35.10%] emerged to be the main reasons holding the youth back from investing in cryptocurrency. The study also found out a contrast between males and females investing in cryptocurrency. Based on the study of Cramer's V Test, Logistic Regression and Random Forest, we find that the most important factors influencing the investment in cryptocurrency by the youth are: (1) if they have ever considered investing in cryptocurrency, (2) the gender of the person, (3) if they have considered investing in Indian Digital Currency and (4) if they are trading in other forms of Securities. The values of these tests have been standardized, which enables us to compare them with each other. According to the analysis, the most influencing factors are Considered Investing and Gender.

There may be a possibility that Female's behavioral pattern of taking a low risk in circumstantial events [6] limits them from extending their hands forth in cryptocurrency, as vividly as males. It's possible that differences in digital literacy between men and women are contributing to the disparity in attitudes about cryptocurrency [4].

A future extension of the research could look into gender differences in digital abilities that lead to variances in attitudes regarding cryptocurrencies. It must also be noted that the lack of a regulatory body increases the risk of trading in cryptocurrency, which if countered, might create an influx of Digital Currency in the Indian market as well.

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