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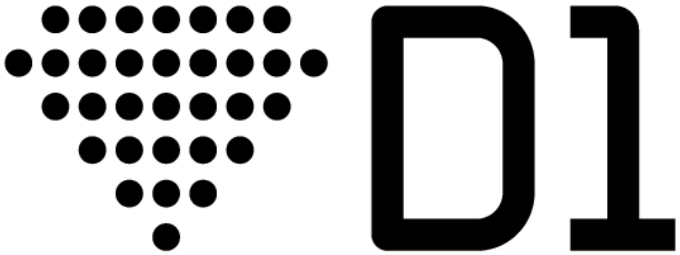

D1 COIN WHITEPAPER

September 29, 2017
Ver. 0.9

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1. INTRODUCTION

Cryptocurrencies and the underlying blockchain technology are increasingly popular amongst individuals, financial institutions and governments, but many still think of cryptocurrencies as objects of speculation. Being subject to potentially huge price corrections, most cryptocurrencies are a poor store of value and means of exchange, giving rise to a need for a more secure alternative.

D1 Coin is designed to address this need, combining the convenience of digital currencies with the stability of traditional assets. D1 Coin is a diamond-backed cryptocurrency, with each D1 coin pegged to the value of a fraction of an authentic, natural diamond, as determined by the proprietary pricing algorithm, D1 Matrix (see appendix 1). Diamonds are an ideal asset backing for a coin since they are rare, taking a billion years to develop, have several millennia of history as a recognized store of value, and are small and therefore easily stored and transported.

Diamonds will be sourced by the D1 Agent, which will adopt a strict approach to diamond sourcing, with all diamonds being obtained from an authorized supplier (a “D1 Diamond Supplier”). Each diamond must have an accompanying Gemological Institute of America (GIA) certification. The initial supply will be procured by Diamundi Pte Ltd, Singapore. This supply is to be obtained from world leading diamond producers, such as Alrosa, and the top diamond polishers, such as KGK Group and Kristall Smolensk. Diamonds will be stored in secured and insured vaults in Singapore, Switzerland, and select global locations with established logistics and storage specialists such as Brinks and Malca-Amit, and will be overseen by D1 Foundation. Users may at any point in time convert their D1 Coins to diamonds at a ratio determined by D1 Matrix, by selecting specific diamonds on the D1 website and arrange with D1 Agent for delivery or collection.

Users who own D1 Coins may use them for a variety of purposes: payments, trading and investing. By being pegged to a fixed amount of investment-grade diamonds, D1 Coin aims to function as a convenient digital currency with limited amounts of speculative trading by having an intrinsic value derived from its asset-backing.

The underlying blockchain technology for D1 Coin is built on the Ethereum blockchain. Transactions made using D1 Coins will be validated using the Proof of Work algorithm, in which miners are rewarded with coins and/or transaction fees. Understanding the security risks of

blockchain technology, D1 Foundation complements the in-house team of software engineers with multiple third-party cybersecurity firms to maintain a spotless track record on security.

To realize its vision of making D1 Coin the globally-trusted, principal diamond-backed cryptocurrency, the core management team at D1 Foundation comprises of professionals with extensive working experience. D1 Foundation is an international, apolitical and transparent non-profit enterprise registered in Switzerland.

2. D1 COIN & TECHNOLOGY

D1 Coin

The D1 Coin is a virtual currency built on the Ethereum blockchain. The goal for D1 Coin is to be a top cryptocurrency on established cryptocurrency exchanges and lead the market by trading volume. With the value of the D1 Coin being a function of not just market forces but also the value of natural diamonds, users who purchase D1 Coins will be protected with a more stable price. In addition to listing on exchanges, D1 Coins are exchangeable for investment-grade diamonds, giving D1 Coin high liquidity, therefore benefitting users with a wide range of uses.

Each D1 Coin backed by 1/1000th of a diamond of the following parameters, as certified by the Gemological Institute of America ("GIA"): round brilliant shape, 1 carat, color F, excellent cut, VS1 clarity.

For every diamond deposited into the vault, a corresponding number of D1 Coins will be minted according to the D1 Matrix. These D1 Coins are then sold by the D1 Mint via D1 Agent to buyers in the market, in exchange for either fiat currencies or cryptocurrencies. D1 Coin will be listed on major cryptocurrency exchanges such as Poloniex, Bitfinex, Bitstamp, bitFlyer, KCOIN, Voskhod and others. D1 Foundation will constantly review major and upcoming exchanges, partnering with these to increase the liquidity of D1 Coin worldwide.

The key advantage of the D1 Coin compared to major cryptocurrencies not backed by assets is that the price of D1 Coin is a function of both the value of underlying diamonds as well as market demand. Every D1 Coin is the same and therefore fungible; D1 Coins give the owner equal rights to select diamonds and redeem for diamonds as priced by the D1 Matrix. Coin redemption may be done at any time. Upon a D1 Coin redemption, the D1 Coin owner selects diamonds with a price valued in D1 coins and the diamonds are moved out of the vault and delivered to the D1 Coin owner, while the corresponding D1 Coins are removed from the ecosystem ("burnt").

Beyond the central concept of the D1 Coin as a store of value and a medium for transactions, a suite of applications will be created for the D1 ecosystem.

Technology

Blockchain technology was chosen as the platform to digitize physical diamonds, because transactions through cryptocurrency are fast and divisible, presenting a solution to diamonds being an illiquid asset. Through D1 Coins owners can effectively purchase fractional parts of a diamond. Furthermore, blockchain technology will grant D1 Coin users' greater privacy, security and offer lower transaction fees.

D1 Coin is built on Ethereum blockchain (ERC-20 standard), which allows for the creation of customized digital assets and currencies.

3. D1 DIAMONDS

Diamond Description

Every diamond supplied by D1 Diamond Supplier will be checked by professionals for compliance with its characteristics as listed in the accompanying GIA certification. Generally, the range for the carats of diamonds sourced is 0.3 to 6.0. In addition, D1 Agent shall, in due time, establish a Unique Diamonds Acquisition (UDA) group, which will combine mathematical analytics and market intelligence to determine the appropriate acquisition price of unique diamonds. These diamonds will be quantified in D1 Coins on a cost-plus basis.

Diamond Sourcing

Diamonds will be sourced by D1 Agent from D1 Diamond Suppliers, who are subject to stringent requirements. A D1 Diamond Supplier must be an established party in the diamond industry with relevant credentials, and maintain this standing throughout its tenure as a D1 Diamond Supplier. All diamonds sourced, regardless of characteristics or supplier, must have accompanying GIA certification. There will be a clear protocol for the verification of every diamond, including laser marking, in order to eliminate the possibility of individual diamonds not corresponding to its GIA certificate.

To cover the supply of diamonds for the D1 Coin launch and expansion phases, diamonds will be sourced from the original D1 Diamond Supplier - Diamundi Pte Ltd. The diamonds sold to the D1 Foundation by Diamundi will be done at arm's length basis, at current market prices. Diamundi will account for 100% of the diamond supply in 2017, with these diamonds consolidated from major parties in the diamond industry, including Alrosa, KGK Group and Kristall Smolensk.

In 2018, D1 Agent will make an open invitation to large global diamond producers to provide up to 50% of the total supply. This percentage is expected to increase to 67% in 2019, 75% in 2020 and 80% in 2021. After 2021, Diamundi will maintain a maximum limit of 20% of the yearly supply of diamonds supplied. D1 Agent will impose the same terms and conditions regarding diamond sourcing on all D1 Diamond Suppliers.

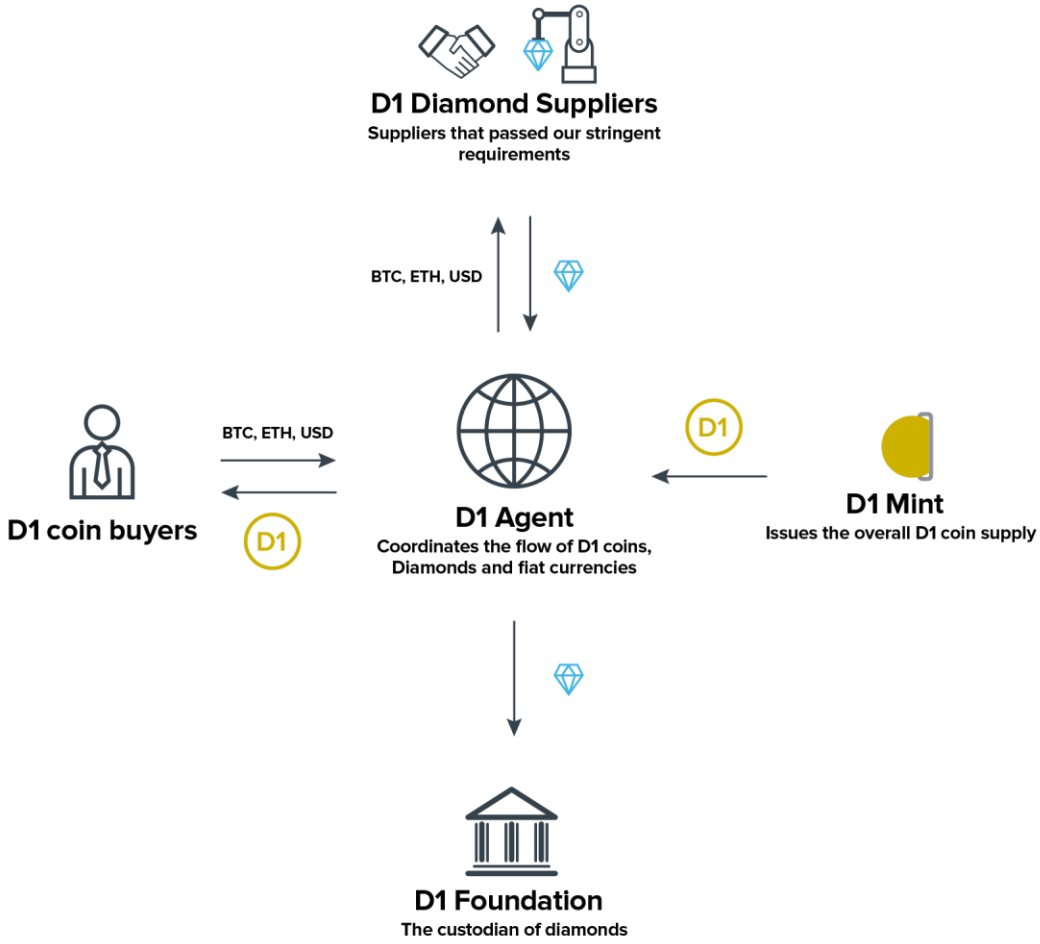
Diamond Custody

D1 Foundation is a separate independent legal entity which is responsible for the custody and safekeeping of the diamonds, as well as receiving diamonds from D1 Diamond Supplier and facilitating the redemption of diamonds. Diamonds will be stored by D1 Foundation at secure vaults in Singapore and Switzerland, maintained by reputable logistics and storage providers such as Brinks and Malca-Amit. In administering its duty to review the inventory of D1 Diamonds, D1 Foundation must make available to the public periodic inventory lists and valuation reports. The inventory of diamonds will be subject to regular audits by an established accounting firm.

4. OPERATIONS

The ecosystem of D1 Coin has five main parties, namely D1 Coin Buyers, D1 Agent, D1 Mint, D1 Foundation, and D1 Diamond Supplier.

The D1 Agent, D1 Mint and D1 Diamond Supplier are overseen and appointed by D1 Foundation, which also acts as a custodian by holding diamond inventory. D1 Mint will issue D1 Coins to D1 Agent, and D1 Coin Buyers are able to purchase and redeem diamonds from D1 Agent. D1 Agent functions as the central party in the D1 ecosystem coordinating the flow of D1 Coins, diamonds and fiat currency.



D1 Foundation

D1 Foundation appoints and oversees D1 Agent, D1 Mint, D1 Diamond Supplier and other service providers to undertake their duties. D1 Foundation is a non-profit enterprise headquartered in Zug, Switzerland with a Board of Directors providing governance. Switzerland was chosen to capitalize on the supportive, yet firm regulatory stance adopted by the Swiss Financial Market Supervisory Authority (FINMA), with which D1 Foundation will work closely with to ensure strict compliance to regulations. D1 Foundation will act as custodian, holding the D1 diamond inventory in vaults in Singapore and Switzerland. To uphold the transparency of operations, D1 Foundation will be responsible for publishing regular reports and publishing periodic valuation reports disclosing the Net Asset Value (NAV) of the inventory of diamond supplies based on latest Rappaport Diamond Report at D1coin.io website.

Periodical reports on the diamond industry will also be published, which may prove beneficial to users, although these reports do not constitute investment advice of any manner by the D1 Foundation to users.

D1 Mint

D1 Foundation will delegate the issuance of D1 Coins to D1 Mint, which is registered in the Cayman Islands. After diamonds provided by D1 Diamond Supplier are checked by professionals for compliance with their characteristics as listed in the GIA certifications, each individual diamond is evaluated using the D1 Matrix.

The D1 Matrix is a proprietary pricing algorithm, comprising of a neuron network which will analyze diamond prices from multiple market participants. The relationship between the 4Cs (carat, color, clarity, cut) plus more 7 characteristics of a diamond and its price is analyzed, determining statistically the appropriate quantity in D1 Coins. D1 Matrix reflects real market conditions and also takes into consideration the liquidity and desirability of a diamond.

The issued D1 Coins are then sold to buyers in exchange for major fiat currencies or cryptocurrencies, and can be traded on major cryptocurrency exchanges.

D1 Mint is responsible for publishing periodic reports of D1 Coins minted and burned at the D1coin.io website.

D1 Agent

D1 Agent is Diamundi Pte Ltd, registered in Singapore, and will function as the central party in the D1 ecosystem coordinating the flow of D1 Coins, diamonds and fiat currency. New diamonds from D1 Diamond Supplier will flow through D1 Agent to D1 Foundation. Subsequently for the redemption of diamonds, the redeemed diamonds will go from the D1 Foundation through the D1 Agent to users redeeming D1 coins.

D1 Agent will charge a fee for both the sourcing and redemption of diamonds. D1 Diamond Suppliers will be charged a fee of 5% of the total value of diamonds in each batch, while users are charged a fee of 2.5% of the value of the diamond(s) to be redeemed plus third party administration and logistics costs. These fees will be used to cover for the costs of storage and insurance of the diamond inventory.

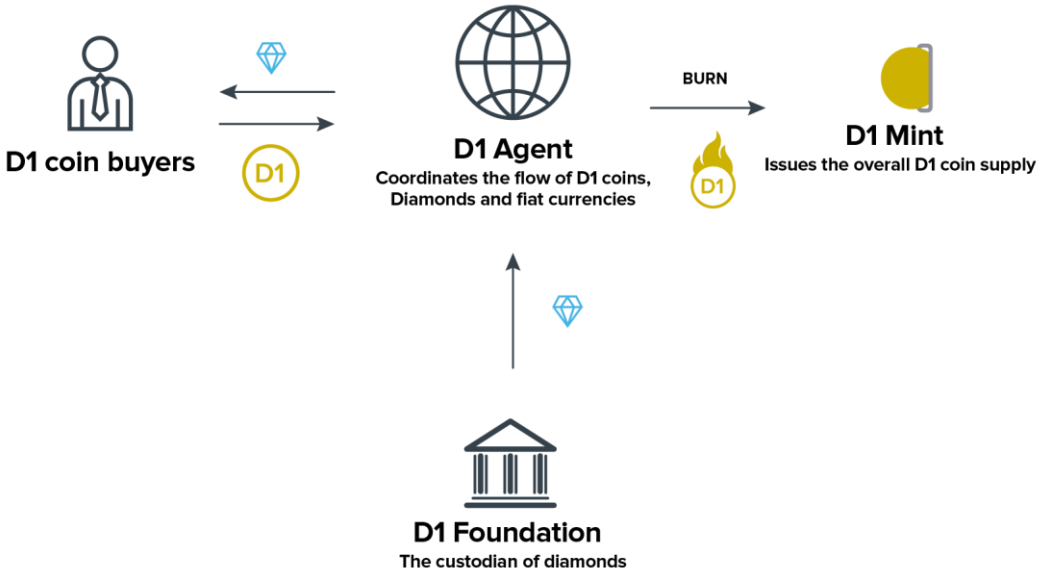
D1 Coin – Diamond Exchange

D1 Coin owners may redeem their D1 Coins for specific diamonds in the inventory maintained by the D1 Foundation by redeeming a quantity of D1 Coins that corresponds to the value of the diamonds as priced by D1 Matrix.

The protocol for a D1 Coin-to-Diamond exchange starts with the user browsing the current inventory via the D1coin.io website, and selecting particular diamonds. Next, the user must send the corresponding quantity of D1 Coins to D1 Agent, after which the diamonds will be marked as reserved and removed from the D1 Foundation inventory.

Once receipt of the D1 Coins is confirmed by D1 Agent, these D1 Coins are burnt, and ownership of the selected diamonds will be transferred to the user. After obtaining ownership of a specific diamond, the user must obtain an appointment with D1 Agent for redemption of the physical diamond within 30 days of acquiring ownership of the diamond.

The user may choose to either collect the diamond from storage locations determined by D1 Agent, or arrange for delivery. Delivery services will be provided by leading providers such as Brinks, Malca-Amit and FedEx, with all costs incurred to be borne by the user.



5. Applications & Future Developments

For Users

D1 Coin provides a safe alternative for individuals who are interested in cryptocurrencies, as it has actual intrinsic value from being backed by physical diamonds. Cryptocurrencies work as an investment when backed by demand from participants in the network. However, there are no safeguards for non-asset-backed cryptocurrencies to cushion abrupt and drastic drops in prices. As D1 Coin is backed by physical diamonds which can be redeemed at any time, users are assured of stability and security. Therefore, D1 Coin is much less likely to be subject to the same degree of price volatility which characterizes the cryptocurrency market.

For Merchants

Merchants benefit from D1 Coin being a more stable payment medium as compared to other non-asset-backed cryptocurrencies. Merchants can participate in the growth of cryptocurrency payments, enjoying the benefits of transacting with cryptocurrencies. These include cheaper processing fees, faster payouts, no chargebacks and feasible micro transactions, while avoiding the risk of large price fluctuations in some cryptocurrencies.

For Exchanges

D1 Coin augments the utility of current cryptocurrency exchanges by addressing the need for more safe-haven assets with tangible, intrinsic value. Compared to other cryptocurrencies which are priced almost entirely through speculation, D1 Coin complements current cryptocurrency markets characterized by an oversupply of high-risk coins. Additionally, D1 Coin presents an alternative liquid cash-out option for users of exchange platforms, compared to the traditional fiat currency cash-out option. By being able to convert D1 Coins to diamonds at all times, users do not have to solely rely on fiat currency cash-out.

Future Developments

Many future applications for D1 Coins are planned to enhance the minting, trading, storage and redemption of D Coins. Amongst the new developments will be: a high security coin vault for D1 Coins and other cryptocurrencies, providing individual offline servers for coins owners located

geographically remote secured locations; D1 Coin investment programs to enable investment in the diamonds as an asset class; Diamond-specific D1 Coins that represent ownership in individual single high value diamonds; Diamond Hearts which enable D1 Coin owners to anonymously reward people and charities of their choice.

6. DIAMOND INDUSTRY

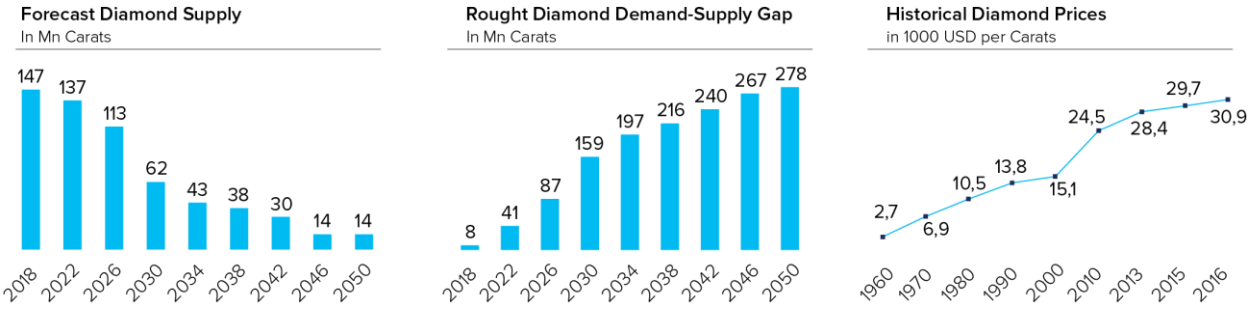
Diamond Value Chain

The diamond industry consists of players in three broad categories, differentiated by the stages of the diamond value chain – upstream, midstream and downstream. Upstream players are diamond producers comprising of mine operators and/or owners, while midstream players are diamond processors who polish and cut diamonds. Downstream players comprise of retailers and jewelry stores which sell the finished product to end consumers.

Upstream producers are diamond mine operators and/or owners conduct on-site mining activities to mine kimberlite which contains diamonds. Rough gem-grade diamonds are sold either through auctions, short term or long-term contracts. Long term contracts are the preferred choice for large producers as this ensures client selectivity and margin control. Upstream companies include Alrosa, De Beers, Petra Diamonds and Rio Tinto. At the midstream stage, the rough diamonds undergo cutting and polishing which transforms them into polished diamonds that have proper cuts to ensure brilliance. The diamonds are also assembled into jewelry pieces. Here, diamonds may change hands via wholesale trading. There are about 5,000 midstream companies, with approximately 72% of the cutting and polishing being done in India. Finally, at the downstream stage, jewelry retailers such as Tiffany & Co, Harry Winston and Cartier retail diamond jewelry pieces to end consumers. The D1 Coin is positioned between the midstream and downstream of the value chain, giving users easy access to diamonds which have been processed, but not yet assembled into jewelry pieces.

Diamond Price Trends

Overall, the long-term outlook for the diamond market is positive, with demand for raw diamonds expected to grow at about 2% to 5% every year in the long term[1]. Much of this is driven by strong demand by the middle-class in the US, China and India.



Furthermore, global diamond supply is constrained as diamonds are a finite natural resource, and the demand-supply gap is thus projected to widen over time with a forecasted decrease in diamond production.[2] As the value of the D1 Coin is to a certain extent tied to that of diamonds, the D1 Coin could thus appreciate in value over time as diamonds continue to benefit from positive pricing forces, continuing the historical trend from 1960 to 2016[3]. This signifies the potential of the D1 Coin as a strong store of wealth with capital gains.

60% of High Net Worth Individuals (HNWI) in China currently invest in luxury jewelry. Within jewelry investing, diamonds remain a crowd favorite as the preferred choice for over 70% of Chinese investors[4]. Traditionally, investors seeking to invest in precious gems would acquire the physical gem at a discount to retail prices. Investors can earn a margin by reselling the gem to an acquirer who has indicated interest in the gem's qualities and/or at a later time when the gem's price has appreciated.

However, this investment method has 2 problems. Firstly, due to the natural scarcity of diamonds and the tedious extraction process, there are limited rough diamonds available for sale &

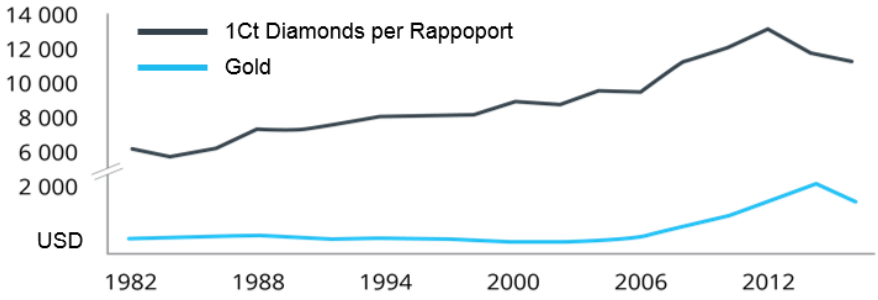
[1] The Global Diamond Industry 2016: The Enduring Allure of Timeless Gems. http://www.bain.com/publications/articles/global-diamond-industry-report-2016.aspx
[2] A 278 million carats Demand-Supply Gap by 2050: Frost & Sullivan. http://betterdiamondinitiative.org/a-278-million-carats-demand-supply-gap-by-2050-frost-sullivan/
[3] Statista Historical diamond prices per carat from 1960 to 2016 (in U.S. dollars). https://www.statista.com/statistics/279053/worldwide-sales-of-polished-diamonds/
[4] Dezan Shira & Associates (China Briefing Business Intelligence) Alternative Investments: China's Rich Looking to Art, Wine and Jewelry. http://www.china-briefing.com/news/2014/07/29/alternative-investments-chinas-rich-looking-to-art-wine-and-jewelry.html

investment. The world's rough diamond shortage is forecasted to be around 8 million carats in 2018 and expected to exacerbate until 2050. Secondly, diamond investment has traditionally been constrained by the indivisibility of physical diamonds, as bulk gem purchases represent a significant cash outlay which means that investors with insufficient capital are left out of the investment opportunity. Unlike equities for which investors can invest in *n* number of shares out of the company's total outstanding shares, investors cannot simply invest in *n* shares of a diamond.

Diamonds prices have experienced steady growth due to growing global wealth and are stable when compared with other investment instruments. Investment-grade diamonds have appreciated from around $6,100 per carat in 1982 to approximately $11,200 per carat today.

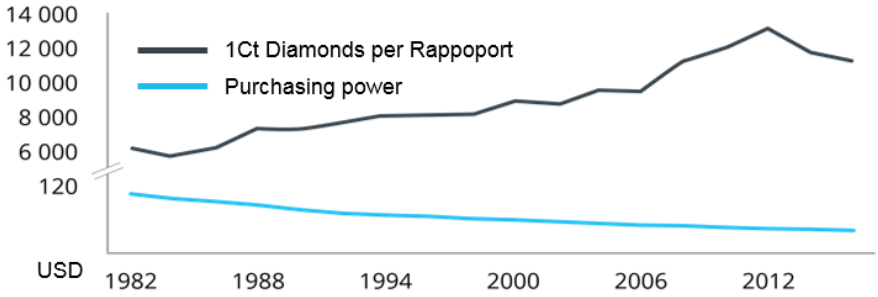
3.4%
Diamond CAGR

3.1%
Gold CAGR



3.4%
Diamond CAGR

(4.9)%
USD purchasing power CAGR



7. TEAM

Hogi Hyun

Director

Hogi founded Abacus Capital in 1995 and is currently the managing director overseeing all investment and advisory activities. Abacus Capital is an investment, asset management and advisory group headquartered in Singapore with operations in Indonesia and affiliates in Southeast Asia.

Prior to Abacus Capital, Hogi was formerly the Managing Director at Bankers Trust Company in Singapore where he established and managed its corporate finance, risk management and investment management businesses for Southeast Asia. While in Singapore, Hogi conceived and ran the Bankers Trust Regional Currency Funds and Global Guaranteed Funds. Before moving to Singapore, Hogi was based in Bankers Trust Company's Hong Kong office where he established its Capital Markets Division for Southeast Asia. Hogi has been a member of the Investment Panel of The Enterprise Challenge, a venture fund backed by the Singapore Prime Minister's Office; a member of the Board of Directors of the Singapore Civil Service College; and a member of the Board of Directors of the Singapore National Library Board.

Hogi graduated Magna cum laude from Yale University in 1985 with a Bachelor of Arts degree in East Asian Studies. He studied at the Beijing Foreign Languages Institute and Fudan University in Shanghai, and holds the Grand Diplôme from La Varenne Ecole de Cuisine in Paris. In addition, he holds the Diplôme Universitaire d'Aptitude à la Dégustation des vins from the University of Bordeaux.

Bill Claxton

Operations Director

Bill is a seasoned entrepreneur with more than 15 years of experience in the technology industry. He is currently the operations director at Ledgeris, a new partnership focused on blockchain technology. Ledgeris helps companies refine their blockchain business strategy and secure funding via ICO, and is a subsidiary of Iterate. Founded by Bill in 1999, Iterate is a specialist in Internet video webcasting solutions and services, based in Singapore.

Bill holds a certificate in Blockchain for Technical Executives and Analysts from B9Lab Academy in the UK and has spoken at various blockchain events. Bill has been active in the IT scene in Singapore for more than 20 years, was an early Bitcoin investor and most recently served as operations director for fintech startup KYC Chain, including writing their ICO whitepaper. KYC Chain is a company based in Hong Kong, which uses distributed ledger technology to allow users to manage their digital identity securely.

Jeff Wentworth

Technical Advisor

Curvegrid

Jeff is a Co-Founder of Curvegrid. Previously, Jeff spent six years at Goldman Sachs as a Vice President and global product owner of block and object storage. Prior to that, Jeff was a technology consultant and customer engineer at EMC. He graduated from the University of Waterloo with a degree in Computer Engineering.

Curvegrid is a blockchain tooling company based in Tokyo, Japan, providing technology services for the Diamundi project.

William Metcalfe

Technical Advisor

Curvegrid

William is a Co-Founder of Curvegrid. Previously, William was the Chief Technology Officer of Gilt Japan, after joining in New York City as an early employee. William helped grow Gilt from its first order to become one of the leading ecommerce sites. He graduated from the University of Waterloo with a degree in Computer Science.

8. CONCLUSION

The cryptocurrency market has developed at light speed, and is yet poised for more growth as a result of the many potential use cases of blockchain technology. However, institutional and high net worth investors are still largely skeptical of the worth of cryptocurrencies due to the fluctuating prices and the lack of intrinsic value, and thus withhold investments into the crypto space.

With the offering of a stable cryptocurrency through the introduction of D1 Coin, the backing of physical and natural diamonds will alleviate these concerns. D1 Coin is positioned to be the new global standard of cryptocurrencies: stable, safe and valuable. This will be achieved by maintaining high standards of transparency in operations, while taking innovative approaches towards developing and promoting the D1 ecosystem, thus always benefitting users in an accountable manner. D1 Coin is poised to attract huge investments from untapped institutional and high net worth funds, as well as being highly sought after by users on global exchanges. Just as the invention of the Bitcoin revolutionized the concept of currencies, D1 Coin shall revolutionize the concept of cryptocurrencies.

9. APPENDIX 1

D1 MATRIX

Introduction

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of **intelligent machines that work and react like humans**. One the core part of AI is machine learning – it requires an ability to identify patterns in steams of inputs, whereas learning with adequate supervision involves classification and numerical regression. Methods based on binary trees, which will be discussed, are ones of the most effective and recognized techniques that can provide people accurate predictions in understandable form.

Decision Trees (DTs) were studied by the scientists Morgan and Sandqvist in 1963. They first proposed a method based on trees and named the Automatic Interaction Detector (AID). The same method was proposed by several authoritative scholars: Messenger and Mundell (1972), Gillo (1972). Their algorithms were developed independently of each other, but nevertheless, had very similar characteristics. DTs is a non-parametric supervised learning method used for classification and regression. The goal is to create a model that predicts value of a target variable by learning simple decision rules inferred from the data features.

The success of the Decision Trees (DTs) is explained by the several basic factors:

1. Decision Trees are not parametric. They can model extremely complex dependencies between input and output data without a priori judgments;
2. Decision Trees are not susceptible to emissions and errors;
3. Decision Trees are resistant to irrelevant and "noisy" variables.

It is important to understand that Decision Trees (DTs) is basic and major algorithm for many modern and complex algorithms, including "random forest". Random Forest algorithm is a key technique in our prediction model.

Random Forest Regression

Random Forests create a type of methods that consist of **constructing a "forest" from the Decision Trees (DTs)** growing from a randomized version of induction of decision trees. Such structures have a low level of bias and high dispersion, which allow them to win exactly in the

averaging process. The **Random Forest** model is a type of **additive model that makes predictions by combining decisions from a sequence of base models.**

Random forest is a method invented by Leo Breiman in co-authorship with Adele Cutler, which is based on the use of a decision tree committee (ensemble).

The essence of the algorithm is random selection of variables made at each iteration, after which a decision tree is built on this new sample. In this case, "bagging" is performed - a sample of two-thirds random observations is used for training, and the remaining third is used to evaluate the result. Such operation is done hundreds or thousands of times. The resulting model will be the result of "voting" a set of trees obtained from the simulation.

Advantages of using Random Forest algorithm:

1. High quality of the result, especially for the data with large number of variables and with small number of observations;
2. The ability to parallelize;
3. No test sample required.

Random Forest Regression for Diamonds Price Prediction

On the basis of the described methods – Random Forest - we predict the diamond price. Prediction model is based on the sample of 250,000 diamonds. Prediction model consists of the 11 characteristics: Carat Weight, Depth, Table, Shape, Cut, Culet, Symmetry, Fluorescence, Polish, Clarity, and Color.

Data preprocessing

Note that many parameters have text values. Using the One-Hot Encoding algorithm, we moved all text values to vectors from 0 and 1. For example, if the Shape parameter has 3 states, then each state will be encoded as follows: (1, 0, 0), (0, 1, 0), (0, 0, 1). It turned out that out of 11 columns of parameters we got 62 columns, the dimension of the matrix increased, which allowed the regression algorithm to increase the accuracy of predictions.

Diamonds specification	
Carat	0.5, 1.0, 1.5, 2.0, 3.0
Cut	Very Good – Excellent
Clarity	VVS2 – IF
Color	D – F
Shape Type	Round, Princess, Oval, Marquise, Pear, Cushion, Emerald, Asscher, Radiant, Heat
Depth	55-65
Table	50-65
Polish	Very Good – Excellent
Symmetry	Very Good – Excellent
Cullet	None
Fiuorescence	None

Also, to improve the results of the Random Forest Regression algorithm, when preparing data from the table, all emissions were removed. It is worth noting that only 0.095% of the data was filtered out, which did not significantly affect the sample size.

At this stage, the data was divided into 2 parts: the price vector Y and the matrix of characteristics X.

The most important step for increasing the accuracy of predictions was Data Scaling. Using the Scikit-learn preprocessing library, the characteristics were scaled so that they were uniformly distributed. Note that the vector with prices remained unchanged.

After that, the sample was divided into Training data and Testing data in the proportion of 80 to 20, respectively, which is the standard among machine learning experts, including the one recommended by Stanford University Professor Andrew Ng.

To create the Random Forest Regression model, the Keras library was used. The following settings were used:

```
RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=None,
           max_features='auto', max_leaf_nodes=None,
           min_impurity_split=1e-07, min_samples_leaf=1,
           min_samples_split=2, min_weight_fraction_leaf=0.0,
           n_estimators=100, n_jobs=1, oob_score=True, random_state=42,
```

```
            verbose=0, warm_start=False)
```

In the course of the algorithm, we evaluated the error and "grown" new trees, which will help reduce the error. This is the formula for calculating the error "Mean Squared Error":

$$E_{\mathbf{X},Y}(Y-h(\mathbf{X}))^2$$

Since the number of trees in the algorithm can be increased to infinity, although this is not necessary in practice, we get that the size of the error tends to zero.

$$E_{\mathbf{X},Y}(Y-av_k h(\mathbf{X},\Theta_k))^2 \rightarrow E_{\mathbf{X},Y}(Y-E_{\Theta}h(\mathbf{X},\Theta))^2$$

(https://www.stat.berkeley.edu/~breiman/randomforest2001.pdf)

This once again proves that the Random Forrest Regression algorithm can't fail to work, and the accuracy of predictions depends only on the number of trees which is limited only by processing power. In our case, 100 trees were used and this, as shown below, is quite enough.

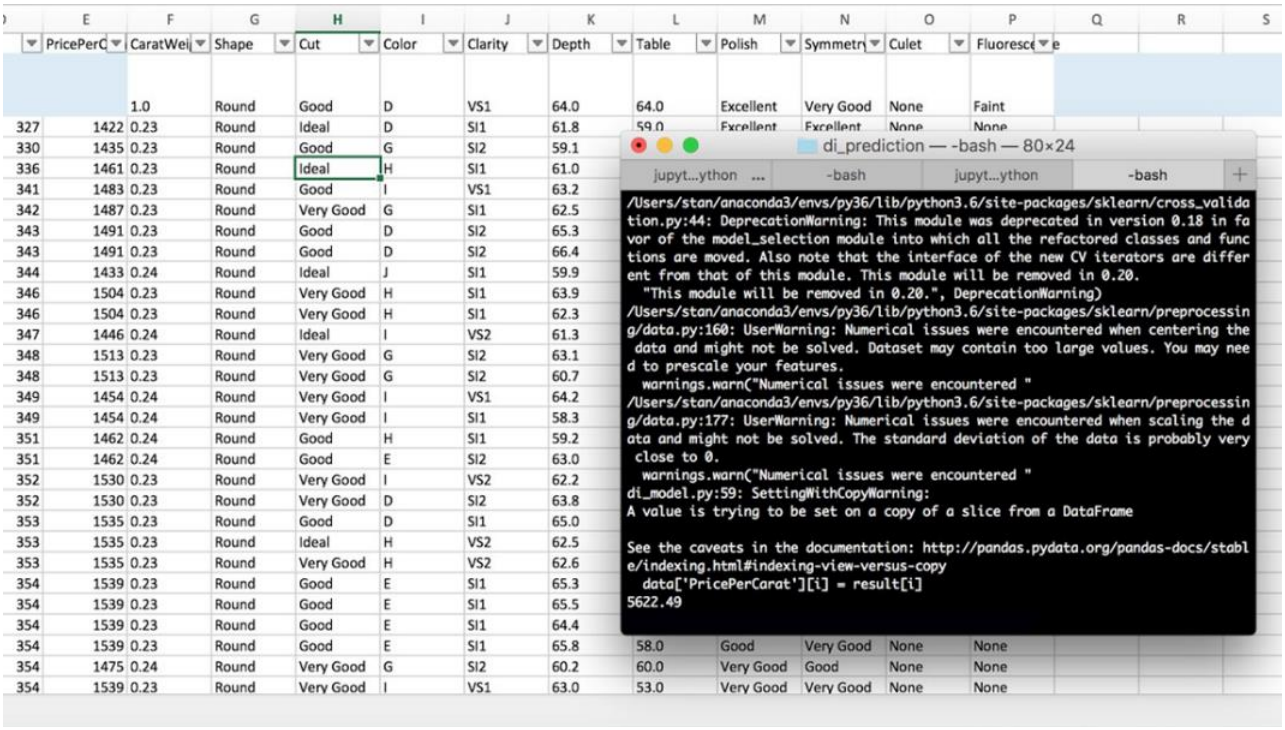
The model was evaluated using the Scikit-learn library:

1. median_absolute_error (description)
2. mean_absolute_error (description)
3. r2_score (description)

The following indicators were obtained:

```
Abs_error: 81.6996801691
Median_abs_error: 48.35
R2 Score: 0.978748147454
```

R2 score estimates the accuracy of our model, based on a maximum of 1.0 score.



Thus, we can conclude that the algorithm works with sufficient accuracy, and therefore the training was successful.

References to get familiar with the algorithm of Random Forest

1. “Classification and Regression Trees”. Breiman L., Friedman J. H., Olshen R. A, Stone C. J.
2. “Random Forests”. Breiman L.

References to scientific articles, which provide evidence of the effectiveness of the algorithm Random Forest

1. https://www.stat.berkeley.edu/~breiman/randomforest2001.pdf
2. http://www.biostat.ucsf.edu/cbmb/publications/bench.rf.regn.pdf
3. http://www.lsta.upmc.fr/BIAU/b6.pdf
4. https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/decisionForests_MSR_TR_2011_114.pdf