Multifunctional fintech platform for automated crypto trading, asset management and dApps creation

Whitepaper

Authors

Pavel Pavchenko | Paul Rogov | Alex Zhadaev | Andrew Plotnikov

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Abstract

HyperQuant is a revolutionary multi-tier fintech platform dedicated to the creation of highly effective, decentralized financial services. It opens a new horizon for the developers of algorithmic trading software, providing them with an all-around quantitative framework enhanced by a cutting-edge risk-management AI and blockchain technologies that ensure the stability and the reliability of the system. All market participants, from minor cryptocurrency owners to professional portfolio managers and hedge funds, will have access to a broad variety of intelligent solutions covering all aspects of asset management and crypto-trading processes.

Legal Disclaimer

Please read the following notice carefully before proceeding to read this Whitepaper document issued by HyperQuant OÜ a company incorporated and existing under the laws of the Estonia. We do not act under the laws of USA, UK, Hong Kong and under any other common law. This notice applies to all persons who read this document. Please note this notice may be altered or updated.

The Whitepaper does not constitute any relations between you and the HyperQuant OÜ.

1. To ensure that all the statements and promises specified in the Whitepaper are implemented, the project team will raise funds from institutional investors, development funds, sponsors, banking and investment instruments. The success of the HQT token campaign will show investors the attractiveness of the project for subsequent investments and increased demand from ordinary users.

2. By purchasing HQT token, the buyer understands and acknowledges that He may use the products and services specified in the Whitepaper in the future.

The purchase of HQT token is not an investment in a common enterprise the same as the purchase of a prepaid goods not is be an investment.

The buyer of the HQT token understands and acknowledges that the purchase of the HQT token is not an investment. The only use of the HQT token is to be a payment Protocol within the framework of the platform services.

3. Making a profit is not provided by the documents. In addition, it is impossible to make a profit by technical scenarios implemented on the blockchain.

4. Please note that the ecosystem will be further developed and new services and options will be introduced, even those that are not specified in the Whitepaper at the time of HQT token sale. The buyer will be able to use the HQT token in the future.

5. This is allowed when a Net- or Gross profit of any company will be turned into business development or capitalization. However, in our case, the customer's money was not spent on the company's creation and HQT token production. The HQT token is a real digital good. Thus, the HQT token buyers received not an "Expectations of Profits," rather; they received an actual product — the utility HQT token that can be applied to access the blockchain protocol.

6. Any legal consequences between the parties arise from actual service agreements. The legal basis of relations between the parties is a signed contract. Please provide us with details of the persons authorized to make decisions.

7. We give a legal entity duly organized, validly existing and in good standing in its jurisdiction of incorporation. We has the corporate power and authority to conduct its business as presently conducted and to execute, deliver and perform this Agreement.

8. We are not responsible for any actions of third parties, such as, Exchanges, regulators, government, issuers of digital assets and securities, other third parties.

9. We are not active in attracting investments; all our services are Advisory in nature. The services related to the client's secret and having legal nature are subject to the laws on protection of the client's secret.

10. We do not provide services to companies whose activities are illegal and criminal. We do not provide ICO in jurisdictions where it is prohibited by law.

11. Customers who wish to receive our ICO (initial coin offering) support services should be aware of and agree to the following rules, such as:

To investors who are considering participating in the ICO, we strongly recommend that you read the risk factors and disclaimers in regards to the ICO described herein. Furthermore, residents of United States of America are not permitted to participate in the ICO.

12. The following clauses apply to all countries in the world. Those without forms of identification. Those with association to organized crime. Those who require a legal guardian or an assistant. Those who are at the age of 75 and older. Those who have not owned any cryptocurrency before, or do not have any knowledge regarding cryptocurrencies. Those with less than 1 year of experience in investing in marketable securities including stocks and bonds, and derivatives. Those who are planning on impersonate another person to participate in this ICO. Including representatives who are not recognized in the laws of their countries of residence. Those who are intending to invest 50% and more of their total financial assets in tokens of this ICO. Those who reside in developed countries with less than 100,000 USD in financial assets. Those who reside in developing countries with less than 30,000 USD in financial assets.

13. Price fluctuation risk Token prices are affected by, but not limited to, the issuers' performance, success / failure of business plans, commodity prices, foreign exchange

market, stock market, other market trends, natural disasters, wars, political upheavals, changes in regulations, other cryptocurrencies, and unforeseeable events. Especially with regards to token issuers, things to do not always go according to the original business plan and there is a possibility for the tokens held by clients to significantly decrease in value from the original purchasing price, or for such tokens to lose value all together.

14. Due to the nature of blockchain and the need to verify and authorize exchanges, a certain amount of time may be needed before token exchanges are completed. While the verification is taking place, there is a possibility of the exchange not being reflected at the individual's address, or the trade itself could be cancelled. As tokens are recorded electronically and they are transferred over networks, there is a risk of tokens vanishing away during exchanges.

15. When purchasing tokens, there is a possibility of a third party to impersonate the token issuer and to provide a fake cryptocurrency address to steal cryptocurrency from the purchaser. In this document, we define the words "cryptocurrency" and "virtual currency" as the same in broad sense.

16. Currently, laws and taxes regarding ICOs are not established completely. And in the near future, we can expect governments to make a decision whether to ban, limit or tax ICOs. This could lead to restrictions in token possession and trading and could affect adversely on individuals in ways we could not predict.

We recommend that you seek out independent financial advice before engaging in any sort of business endeavor.

Contents

1. Introduction

Following its invention, the blockchain industry has begun to form new values for the world. Blockchain technology made it possible to digitize any assets – from hard cash to the ownership of stock, property and financial instruments. The creation of Ethereum put decentralized technologies under the world's spotlight. Along with the growth of these technologies, the cryptocurrency markets also began developing. Working with cryptocurrency is becoming the main trend of the financial world.

Generally, people want to increase their capital in order to be financially independent and confident in the future. However, in our contemporary world, building a diversified portfolio of assets is becoming more of a necessity than a luxury or an additional source of income. The foundation of cryptocurrencies is formed by the principles of exchange freedom, lack of strict regulations and availability. These principles provide excellent conditions for investing in a dynamically growing new market.

When entering the enormous financial world now, it is important to concentrate on present technologies in order to secure future success. The development of blockchains allowed for the existence of an apportioned infrastructure for a new generation of financial services. This whitepaper will describe new blockchain-based technologies that solve existing issues for those who operate with cryptocurrencies. These technologies also unlock opportunities for the creation of new fintech services by the members of the blockchain community.

1.1. The Need for a new, decentralized financial platform

Operating in the financial markets should be not only available for most people but also obligatory. In times of instability and financial turbulence, only wise portfolio management can protect capital from high inflation and secure a safe future.
In the contemporary world, centralized financial systems are particularly common. These systems possess the following disadvantages due to their nature:

1. Closed structure and lack of transparency

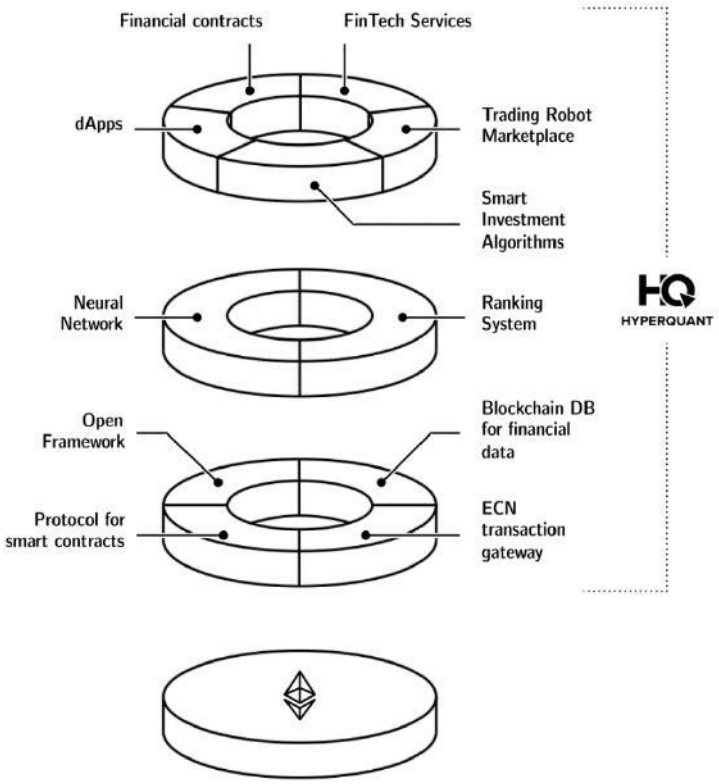
2. Inferior control when transferring funds for management
3. Total dependence on the team managing the capital
4. A limited range of utilized strategies

The creation of blockchain technology led to the rise of a new market, where the issues of centralised systems were partially solved. However, different concerns appeared. These are as follows:

- Cryptocurrency and altcoin prices are too volatile.
- The majority of token holders cannot skilfully manage the risks.
- There is an abundance of untrustworthy coins and altcoins.
- Dozens of cryptocurrency exchanges have limited liquidity.

To solve this issue, a multi-level program architecture, HyperQuant, was designed. HyperQuant is a revolutionary ecosystem for the creation of financial services with the use of blockchain technologies and artificial intelligence. This whitepaper will describe the primary possibilities for the creation of services on this platform as well as the basic services that are part of the system's core.

1.2. Architecture of HyperQuant platform



Picture 1. HyperQuant Platform Architecture

The most important modules of the ecosystem are as follows:

- Operation layer – a mechanism of smart contract realisation (for example, Ethereum Blockchain).
- Core layer – HyperQuant system core that provides the utility for the creation and development of algorithmic trading solutions.
- AI layer – a governing layer with the rating system and artificial intelligence that allows different platform elements to be managed.
- Application layer – contains the final services and solutions for retail and corporate system users.

1.3. Blockchain application in HyperQuant project

1.3.1. Ethereum Blockchain-based Merkle Cryptographic Proof of Operation for Cryptocurrency Exchange Trades

HyperQuant clients must be assured that all trading deals conducted by the robots within the platform are actual. We will show how merkle proofs can provide such knowledge without disclosing anything about other clients' operations. The solution may include cryptocurrency exchange public data (particularly deal public/internal id for anchoring merklized data) and requires secure public blockchain with the ability to store arbitrary hashes in state. We will use Ethereum.

1.3.1.1. Initial Problem

Using user`s cryptocurrency assets bots perform buy/sell operations. Within the HyperQuant platform users can choose to trade on the single one or on several crypto exchanges simultaneously. After some arbitrary period (i.e. one hour), list of operations is formed, looking roughly like this:

#	HQ Account	Exchange	Exchange deal ID	Direction	Pair	Price	Volume	Timestamp
1	Joe	KuCoin	987341	Sell	ETHUSD	693.68	1436	20.04.181 0:18:09

The problem is, how can user (Joe for the case) be sure, that the actual deal has been performed? Essentially client needs a proof, that operation #1 was actually sent to the crypto exchange and was processed there.

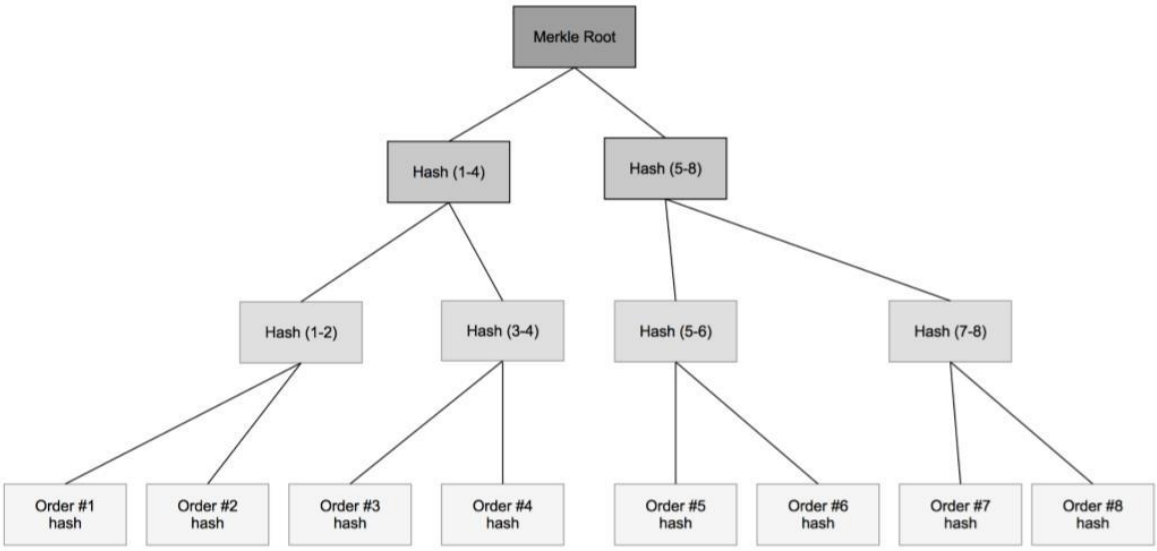
1.3.1.2. Order hash

We define deal hash as a hash function of binary representation of deal data. Data columns can be arbitrary, the only requirement is that one of the columns contains constantly increasing identifier or timestamp to avoid leaks of repetitive deals occurrence.

We pick cryptographic hash function with 256-bit output. Keccak-256 is a natural choice for Ethereum, since Ethereum EVM has built-in operation to calculate keccak-256 for any input.

1.3.1.3. Order list merkle root

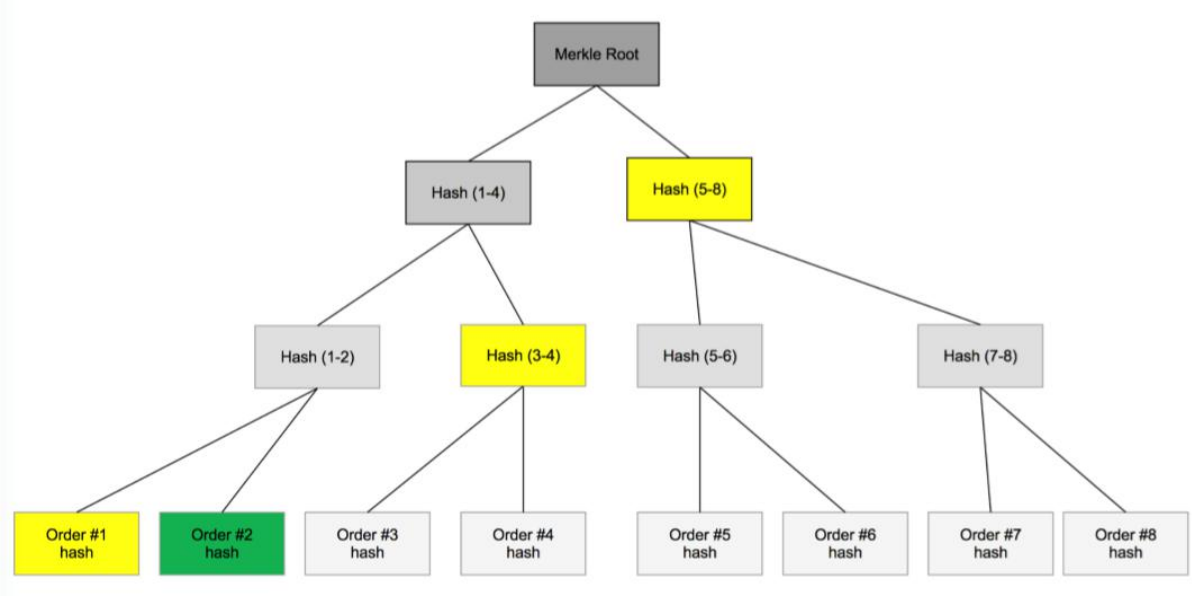
Let`s take the list of 8 orders. We build a merkle tree from the order hashes and assign order list merkle root as a top hash of the tree.



1.3.1.4. Merkle proof of order inclusion

Given the definition of order hash (see Order hash) and the definition of order list merkle tree and root (see Order list merkle root), we can define merkle proof of order inclusion. All the supplementary hashes construct the order list merkle root. For the Order#2 all

the supplementary hashes are marked yellow (see fig.#).



We can construct hash (1-2) from Order#1 hash and Order#2 hash, then we can construct hash (1-4) from previously constructed hash (1-2) and complementary hash (3-4) and finally the root with previously constructed hash (1-4) and complementary hash (5-8). Proof takes $\log_2 n$ space to store and $\log_2 n$ hashing operations to verify, where n is total number of orders forming the root. Proof does not reveal anything but hashes, and hashes provide no insight into actual data, given that we have a constantly increasing nonce column mentioned in order hash section.

1.3.1.5. Commitment of the order list root

After some arbitrary period of time (i.e. at the end of the working day), the order list is formed. The merkle root is calculated and sent to the public Ethereum network for everlasting storage. Since the state of Ethereum network is immutable unless there are observable code to change it, anybody can query the resulting merkle root from Ethereum for free, but nobody can modify it. Wherein anyone might privately hold the full order list. User can get an access to the merkle proof of deal existence. (as described in Merkle proof of order inclusion).

1.3.1.6. Conclusion

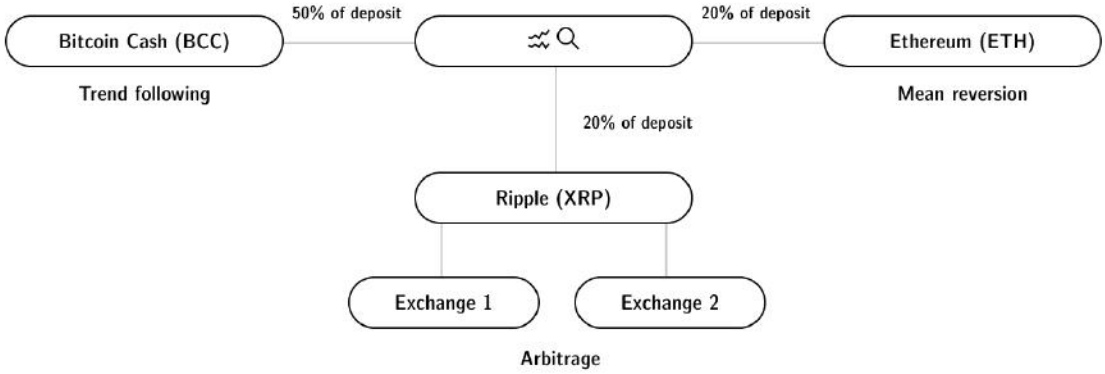
Using the power of immutable Ethereum blockchain and cryptographic proofs of knowledge (merkle proofs), the user of HyperQuant platform can audit his operations and be sure that all his actions were actually taken on the crypto exchange. Such system

is also traffic and computationally efficient, so even if it has 1,000,000,000 orders daily, proofs will take only 1kb in size and require 30 hashing operations.

1.3.2. Blockchain-based smart-contract protocol

Humans make financial decisions influenced by emotions. A chain of wrong decisions while choosing an asset to open for a long or short position or a strategy that is not suitable for the current market environment might lead to serious financial losses.

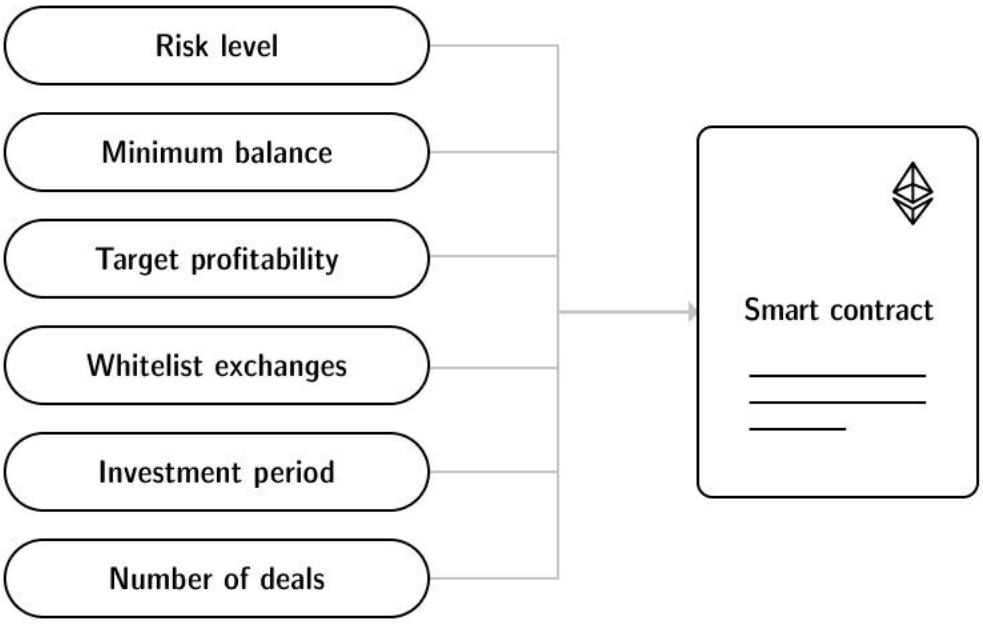
Unlike a traditional portfolio, a quantum strategies portfolio follows this famous principle: don't put all your eggs in one basket. Thus, it is truly diversified.



Picture 8. Asset distribution with various strategies

The concept works like this: while managing their strategies portfolio, successful platform traders share analytics with other users. Fundamentally, diversification is the cornerstone of any long-term investment strategy. Combining the blocks, a user can create a truly diversified portfolio of trading algorithms that complement each other.

The HyperQuant team develops a unified protocol with standardized settings for an algorithmic strategies portfolio, which is implemented as a smart contract.



Picture 9. Smart contract

Having a diversified portfolio reduces one's risk level and creates a new market for ready-to-use configurations, which leads to the profession of the future trading bot manager.

2. Algorithmic trading

2.1. Basic concepts

Algorithmic trading is a formalised process of completing trading operations on financial markets with a set algorithm using specialised computer systems (trading robots).
Trading with the help of algorithmic systems has the following advantages:

A trading robot can make decisions with maximum swiftness and complete trading errands at a speed unavailable to humans. It automatically processes the market data and produces trade signals.

The accuracy with which trading signals are processed by setting market requests helps to prevent mistakes.

The majority of cryptocurrency traders and token holders are susceptible to emotions, which lead to irrational decisions. A trading robot works strictly according to the set algorithm and completes trading operations with no emotions.

There are unlimited possibilities for expansion. Trading robots can manage several thousand securities simultaneously. Trading strategies are applicable in any market, with any assets and at any time period.

They provide rating objectivity. The algorithms are scrupulously typified and lack the risk of making a wrong decision due to uncertainty, anger, fear or dissatisfaction.

A trading robot's algorithm is the description of actions for completing purchase and sell bargains with a financial instrument that is adapted to a certain market environment. Thus, the basis of the algorithms is in the division of classes of strategy: from conservative ones, used for securing capital, to aggressive ones, aimed at maximizing profits.

2.2. Classification of trading strategies and models

2.2.1 Trend following strategies

Trend following strategies strive to capture large fluctuations in a financial instrument. Their main purpose is to locate profitable price levels for completing trading operations with the aim of retaining profitable positions in the longest time period possible. Trending strategies based on technical indicators are the most popular ones. A technical indicator is a function based on the values of statistical exchange indicators, for example, the price of a traded instrument. The rules of opening and closing a position in these strategies are formed by indicator derivation and the comparison of calculated values between themselves as well as with price values on the market.

Here is an example of a strategy based on a technical indicator.

SMA (Simple Moving Average) is numerically equal to the average arithmetic value of a financial instrument price in a set period of time. It is calculated with the formula:

$$SMA_i = \frac{1}{N}\sum_{i=1}^{N} P_i$$

where i is an ordinal number of the instrument price and N is the number of values used for calculating the indicator (SMA of the amount of values that are used for the SMA period calculation). The SMA value is calculated for all the price values. The moving average makes the price graph smooth, acting as filter of sharp fluctuations. We calculate two SMAs for the different values of N. Thus, we receive a fast SMA and a slow one, with the former having a lower N value. The higher value the SMA period holds, the smoother the price graph. That is why an SMA with a large period is called "slow". The purchase takes place when the fast SMA crosses the slow one from the bottom to the top. The sale takes place when they cross from the top to the bottom.

2.2.2 Counter trend strategies (mean reversion)

The following strategies are based on the expectation of significant price movement and the consequent position opening in the opposite direction. The assumption is that the price will return to its average value. Counter trend strategies are often appealing for trading, as their final purpose is to buy at the lowest and sell at the highest. The trade in a price range becomes the fulfilment of trading operations for purchase and sale from the price levels of resistance and support. Their lines become the borders of the price range.

2.2.3 Pattern recognition strategies

The aim of pattern and image recognition strategies is to classify the objects in different categories. Let's suppose that all the objects or events are divided into a finite number of classes. For each class, a finite amount if objects is known and studied. The task of image recognition is to distribute a new recognisable object to a certain class. These sorts of strategies use neural networks as a basis for education and are widely used for the recognition of candlestick patterns. A candlestick pattern is a certain combination of candlesticks (models). There are plenty of candlestick models, and the assumption about the price movement continuing or a reverse taking place is based on the appearance of these models. These assumptions are the strategies based on the technical analysis of the image recognition. Such strategies revolve around recognising images on the price graph.

Various technical analysis figures serve as such images. These include horizontal levels, trend lines, channel lines and aggregation lines. The models showcasing the trends of price movement continuation and breakdown are also recognised.

2.2.4 Arbitrage strategies

There are various kinds of strategies united in the one class of arbitrage strategies. In these conditions, the main task of quantitative trading is getting closer to market neutrality.

1.1. Cross-market arbitrage. The same instrument is traded on different exchanges at different prices. The idea behind the trade is to catch a difference between prices on objects or assets on different exchanges. Thus, the trader buys cheaper on one exchange and sells at a higher price on the other.

1.2. Statistical arbitrage. The operations are completed with connected assets that have a similar price formation. The strategy is aimed at making a profit from statistical variations in asset price correlation. These assets are not interconnected directly but have a long-term tendency toward collective movement.

The most common types of statistical arbitrage:

a. Calendar arbitrage. The profit is acquired from the price difference of futures with various fulfilment dates.

b. Futures against a basic asset. The profit is acquired from the difference between expectations of different player groups.

2.2.5Basket trading strategies (trading instrument baskets)

These are the strategies that are used when two or more instruments are being traded. Generally, basket trading consists of trading the difference between two or more instrument baskets. The predominantly used types are a) trading one instrument basket against the other, b) trading the basket against an index, and c) trading the basket with dynamically refreshing coefficient values.

2.2.6Pairs trading strategies

The pairs trading strategies are based on an assumption that the prices of both financial instruments have the same change dynamics. Consequently, the price variation of these two instruments must be relatively stable in the long term. However, in short-term periods the spread can vary from the average value. The algorithms of pairs trading are based on such variations. The strategy is focused on the simultaneous trade of two assets linked with an irreducible correlation force created by the arbitrage actions of market makers and other exchange participants. The pillar of this market correlation is a fundamental balance law, which is unspoken but consciously set by the largest market participants. Their actions soften any sharp price fluctuations arising from the speculative actions of traders and trade algorithms.

There are various methods of pairs trading used to implement the concept.

Let's investigate a remote method. The algorithm of this pairs trading method requires the spread being formed to be a ratio between the prices of two trading instruments:

$$S_i = \frac{P_{A_i}}{P_{B_i}}$$

where i is the price of instrument A in P_{A_i}, and i is the price of instrument B in P_{B_i}.

Next, a standard spread deviation is defined for each pair out of the array of trading instrument pairs.

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(S_i - \frac{1}{N}\sum_{i=1}^{N} S_i\right)}$$

Only those trading instrument pairs that have the lowest standard spread deviation are chosen for the trade. The position opening signal is the spread deviation with two standard variances. Once the zero mark is crossed, the positions are closed.

There is also a cointegration method.

We have two sets of trading instrument prices: P_A и P_B.

Let's use the Dickey-Fuller test to check every trading instrument for a lack of stationarity. From the abundance of trading instruments, we need two non-stationary ones.

Next, let's turn the price sets into an equation:

$$P_A = \alpha + \beta \cdot P_B + \varepsilon$$

where α is a free member of a direct paired linear regression,

β is a coefficient of a direction of a direct paired linear regression, and ε is a random margin.

We find coefficients α и β with a method of least squares:

$$\beta = \frac{\sum_{i=1}^{N} \left(\left(P_{A_i} - \frac{1}{N} \sum_{i=1}^{N} P_{A_i} \right) \left(P_{B_i} - \frac{1}{N} \sum_{i=1}^{N} P_{B_i} \right) \right)}{\sum_{i=1}^{N} \left(P_{A_i} - \frac{1}{N} \sum_{i=1}^{N} P_{A_i} \right)^2}$$

$$\alpha = \frac{1}{N} \sum_{i=1}^{N} P_{B_i} - \beta \cdot \frac{1}{N} \sum_{i=1}^{N} P_{A_i}$$

Let's calculate the random margin of the regression:

$$\varepsilon = P_A - \alpha \cdot P_B - \beta$$

where P_A and P_B are the trading instrument price sets.

The random margin of the regression needs to be stationary.

Next, we calculate the standard margin deviation σ.

We estimate a z-score that shows how many standard deviations are in its spread regarding the average value.

It measures a current value until there is a balance in standard deviations.

$$Z - score = \frac{\varepsilon}{\sigma}$$

If the Z-score ≥ 2, we open a short position for instrument A and a long one for instrument B. The amount of instrument B is determined by coefficient β.

If the Z-score ≤ -2, we open a long position for instrument A and a short one for instrument B. The amount of instrument B is determined by coefficient β.

When the Z-score crosses a zero line, the position is closed.

2.2.7 Strategies based on machine learning

The basis of machine learning is the modelling of historic data and the use of this model for future price forecasting. One of machine learning types is classification, which is when machine learning is used to forecast so-called "categories".

We'll look into the simplest example of machine learning. The direction of a price movement in the next hour can serve as a category. For each hour of the day, we fix the trading instrument price changes as well as the direction of the change (up or down). This way we have a training information set that our algorithm can use for learning. There are plenty of algorithms that can be used to process this set.

Decision trees comprise one of the most popular algorithms of machine learning, as they allow data with statistical noise to be modelled in order to easily identify non-linear trends and find the connection between identifiers. They are also easy to interpret. Decision trees use a descending, "divide and conquer" approach for data analysis.

They look for an indicator and the indicator value that best divides the data into two opposite groups. Then, the algorithm repeats this process on each of the groups, and this continues until each data point is classified or the stop criteria reached. In our case, the data can belong to one of the two groups: "Up" or "Down". Each separation (i.e., a knot) tries to maximise the frequency of resulting branches.

The frequency in this case is the possibility of data belonging to one of the groups. This possibility is characterized by the difficulty parameter of each knot.

Decision trees can easily re-learn on the test data and provide a horrible result on a new data set. There are three ways to solve this issue:

• You can control the growth of the tree by specifying the upper difficulty parameter or the minimal amount of data points in each branch, which is done to fix the subsets. This will create far wider models and will not be focusing on insignificant subsets that can be unique for your data set.

• You can also crop the trees after they are built. Usually, this is done by choosing the size of a tree that minimizes the error of cross check. Cross check is the process that divides the data into several groups and then uses all but one of the groups to create the model. The remaining group is then used to test the model. Afterward, this process is repeated in a way that allows each group to be used for testing. Next, a tree with the lowest average error is chosen. This method also helps to limit re-education if quantity of data sets is limited.

• The most complicated method is to build a number of various trees and combine them together to make decisions.

The Naive Bayes classifier (NBC) is a family of simple probabilistic classifiers based on applying Bayes' theorem with strong (naive) independence assumptions between the features. P (A\B) is the probability of assumption A with the event B taking place a posteriori possibility. P (B\A) is the possibility of event B taking place if assumption A is correct. P (A) is the posterior possibility of assumption A, and P (B) is the full possibility of event B taking place.

A support vector machine is a set of algorithms used for classification and regressive analysis. Considering that in N dimensional space each object belongs to one of the two classes, SVM generates an N-times hyperplane with the aim of dividing these points into two groups. You could illustrate that by putting the dots of two different types on the paper and then dividing them linearly. Except for the method separating the objects, SVM picks a hyperplane based on the criterion of being maximally far away from the nearest element of each group.

2.3. Conclusion

The models described above are a small but popular sample of algorithmic trading models. When building strategies, plenty of instruments are used, including those based on technical indicators and mathematical and statistical methods. The platform's basic set is composed of many functional strategies. Each strategy is a separate block. A block is a ready-to-use functional solution for the cryptocurrency trader. This solution tries to match his/her trading strategy and portfolio.

A portfolio of quant strategies, as opposed to a portfolio of instruments, matches a famous principle of full diversification. Neither a static strategy, nor a set algorithm, based on it, are reliable instruments for long-term investment. The algorithm has a set structure and input parameters, which makes it a closed, standardised formation. Any market is an open, dynamic system with constantly changing parameters (i.e. the number of participants, amount and volume of deals, etc.). Due to its nature, an algorithm can't be adapted to any market condition, or its structure will change too much, and it will stop being able to answer the basic idea upon which the algorithm was originally built. To solve this problem, a method of creation and algorithm portfolio management can be used. Thus, by taking an aggregate of algorithms, users can arrive at a reliable trading system for managing their portfolio. Switching off and/or adding new elements enables traders to change the risk parameters of each strategy, as well as the whole portfolio. The portfolio itself can be optimally balanced to the current market condition.

3. HyperQuant Algorithms & Technologies

3.1. Smart order execution strategies

3.1.1 Basic principles

As new markets appear, the problems of scaling cryptocurrency and altcoin trade play a crucial role in the fast development of the blockchain industry. Institutional investors need to carry out trade operations with a very heavy volume of assets. If the operation volume is larger than the market can "digest" without affecting the price, then operations can lead to a significant price change and slippage. Therefore, it will be impossible to execute the order at the same price. First, all the trades will be at the desired price, but gradually the price will become less profitable.

In order to reduce costs, institutional clients need to use Smart Order execution strategies. This class of strategies is based on the work with the order book. HyperQuant software allows users to dynamically create quoting strategies depending on a particular task.
Execution of large market orders can be divided into several steps and involve a combination of various strategies, including the following:

1. quotation for placing an order at BBO (Best-Bid-Offer)
2. quotation of the given price level
3. quotation of the desired order volume
4. spread quotation

Quotation types may vary significantly. Depending on the necessary configuration, you can use multiple legs and configure each of them individually.
It is possible to create a model configuration, depending on the following parameters:
whether the leg will be used for quotation or not
quote one level or multiple levels in the leg
In case of hedging, grab liquidity from down in the order book or use the current BBO.

HyperQuant platform users will be able to configure different custom fields of quotation strategies. For example:

- Instrument
- Volume
- Minimum volume
- Maximum volume
- Maximum BBO distance
- Internal quotation levels
- Hedging
    - Hedging type
    - Hedging settings

3.1.2 TWAP algorithmic order

For every specified interval, buy/sell transactions with the given volume are carried out for a defined number of iterations at the weighted average price or with an intended price divergence from BBO. The overall order volume is executed evenly within the given interval. The even volume order execution is ensured by dividing the interval by N iterations.

a. Here, we explain how the order parameters are calculated. In each i-th iteration, the order is placed with the following parameters: order volume and order price.

The order volume is calculated as follows:

$$V_i = \frac{V}{N} + V_{i-1}^{left}$$

where V is the overall order volume, N is the number of iterations, and V_{i-1}^{left} is the unexecuted volume of the previous iteration.

The buy limit order price is calculated as follows:

$$P_i = A \cdot (1 + \frac{Lim}{100})$$

where A is the best bid price and Lim is the tolerable price divergence from the best bid price in per cent.

The sell limit order price is calculated as follows:

$$P_i = B \cdot (1 - \frac{Lim}{100})$$

where B is the best offer price and Lim is the tolerable price divergence from the best offer price in per cent.

Buy/sell order market price. In this case, the orders are executed at BBO, taking into account the price change as the volume of the *i-th* iteration is fulfilled.

b. Order placement. If the place order transaction is rejected by the stock exchange's trading system, then the order is withdrawn.

Otherwise, the unexecuted volume is calculated as follows:

$$V_i^{left} = V_i - V_i^{exec}$$

where V_i^{exec} is the executed volume.

If the unexecuted volume equals zero, one should proceed to clause (a) execution for the *i-th+1* iteration.

If the unexecuted volume does not equal zero, then+

one should decide whether to transfer the unexecuted volume to the next interval or not.

If the interval (*i-th* iteration) is over, then the unexecuted volume is transferred to the next interval (*i-th+1* iteration).

When the unexecuted volume is transferred to the next iteration, provided that the current iteration is not the last one, the order is withdrawn.

3.1.3 «VWAP» algorithmic order

For a defined number of iterations during a specified interval, a certain volume is bought/sold at the volume weighted average price, not exceeding the intended price divergence. Maximum and minimum price limits are established so that the price stays within that range during each iteration. The order is executed evenly during the given interval.

The overall time interval is limited by t_s and t_E (time of the interval start and time of the interval ending) and is divided by N intervals. The execution order is placed at each interval, and the order volume equals the given percentage $(Perc_v)$ of the executed volume for the previous interval. The order volume is also limited by the upper limit $1/N$. If there is unexecuted volume from the previous iteration, then the current iteration limits the volume with the upper limit $1/\mathrm{N}$ + unexecuted volume from previous iterations.

a. In each i-th iteration, the order is placed with the following parameters: order volume and order price.

The order volume is calculated as follows:

$$V_i = Min((V_{i-1}^{exec} \cdot \frac{Perc_v}{100} + V_{i-1}^{left}), (\frac{V}{N} + V_{lim}^{left}))$$

where V_{i-1}^{exec} is the executed volume from the previous iteration, V_{i-1}^{left} is the unexecuted volume from the previous iteration, V is the total volume, and V_{lim}^{left} is the total unexecuted volume left until the exceeded limit in the previous iterations. With that,

$$V_{lim}^{left} = \frac{V \cdot i}{N} - V^{exec}$$

where V^{exec} is the total unexecuted volume in all iterations.

The weighted average price is calculated for all trades until t moment:

$$P_t^W = \frac{\sum_j P_j \cdot Q_j}{\sum_j Q_j}$$

where P_j is the price of each trade until t moment, and Q_j is the quantity in each trade.

The weighted average price is calculated for all trades until t moment, taking into account ΔP_{max}^W as the given maximum divergence of the weighted average price of execution.

For a buy order:

$$Plim_t^W = P_t^W \cdot (1 + \frac{\Delta P_{max}^W}{100})$$

For a sell order:

$$Plim_t^W = P_t^W \cdot (1 - \frac{\Delta P_{max}^W}{100})$$

The buy order price is calculated as follows:

$$P_i = MAX(A, Plim_t^W{}_i)$$

The sell order price is calculated as follows:

$$P_i = MIN(B, Plim_t^W{}_i)$$

where A is the best bid price, and B is the best offer price.

b. Order placement: In case the placing order transaction is rejected by the trading system of the stock exchange, then the order is withdrawn.

Otherwise, the unexecuted volume is calculated as follows:

$$V_{lim}^{left} = V_i - V_i^{exec}$$

If the unexecuted volume equals zero, one should proceed to clause (a) (execution for the *i-th+1* iteration). If the current iteration is the last one, then the order awaits t_E.
If the unexecuted volume does not equal zero, then one should decide whether to transfer the unexecuted volume to the next interval or not.
If the interval (*i-th* iteration) is over, then the unexecuted volume is transferred to the next interval (*i-th+1* iteration).
When the unexecuted volume is transferred to the next iteration, provided that the current iteration is the last one, the order is cancelled.

3.2 Market-making algorithms

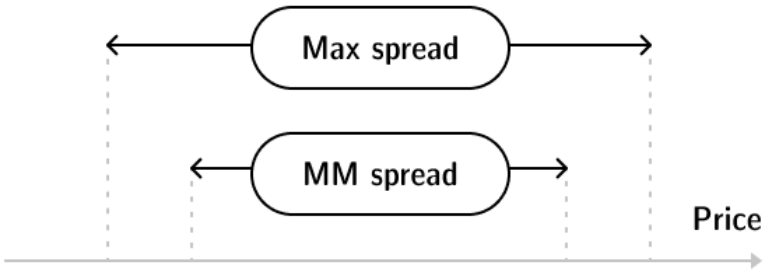
Providing liquidity is of paramount importance for further development of the trading industry. Liquidity provision mechanisms are widely spread in the largest stock markets: NYSE, NASDAQ and CME.

A market maker must support two-way quotations in the orderbook and comply with the following requirements:

Support of the two-way quotations spread: maximum difference between best bid price and best offer price for the given market maker's orders in relation to a particular instrument.

Minimum volume of orders: total volume of all buy and sell orders according to the market maker's data in relation to a particular instrument within the two-way quotations spread.

Minimum quotation period: Market maker must support two-way quotations with the established spread and volume of orders placed during the given time period.



Picture 2. Market-making spread

Execution of market-making algorithms leads to a boost of liquidity of trading instruments while the spread is being reduced. It also results in a lower volatility of the trading instruments.

One of the market-making strategies involves the simultaneous placement of buy and sell orders. This strategy carries a risk of failure of one of the two orders if the price goes in the opposite direction of the working order direction. In order to reduce the risk, one should use a neutral average price that will depend on the quantity of the market maker's open position.

Neutral average price is calculated as follows:

$$P_n = P_{last} - Q \cdot \gamma \cdot \sigma^2 (T - t)$$

where P_{last} is the last trade price,
Q is the quantity of the open position,
γ is the constant index (chosen during the algorithm testing),
σ is the standard divergence of the asset price,
T is the trading period, and
t is the current time (in T fractions).

Buy and sell orders are placed at distances $\Delta b \; and \; \Delta a$ from the price P_n. The given quantities will depend on the intensity of order execution λ, which, in its turn, depends on distance δ to the average price.

The average price equals (best bid price + best offer price)/2. Therefore,

$$\lambda(\delta) = A \cdot e^{(-k\delta)}$$

where $A = \frac{\Lambda}{\alpha}$, Λ is the frequency of buy and sell market orders, $\alpha = 1{,}5$

$$\Delta b + \Delta a = \gamma \cdot \sigma^2(T-t) + \frac{2}{\gamma} ln(1 + \frac{\gamma}{k})$$

3.3 Risk Management

3.3.1Common risk factors

Any trading and investment activity poses certain risks.
The risk in this case is the possibility of unforeseen financial losses in an uncertain environment.

Every trader faces a market risk, which is essentially the possibility of the change of asset prices due to market rate fluctuations. There are also other risks that investors may not even be aware of:

- Operational risk is the possibility of financial losses due to technical errors during transactions, failures of information systems, equipment and computers, security breaches, etc.
- Functional risk is the possibility of financial losses due to mistakes in building and managing an investment portfolio of financial instruments.
- Selective risk is the possibility of the wrong choice of investment object as compared to other options.

- Liquidity risk is the possibility of losses caused by the inability to free up the necessary amount of trading capital without any losses in a very short period of time due to market conjuncture conditions.

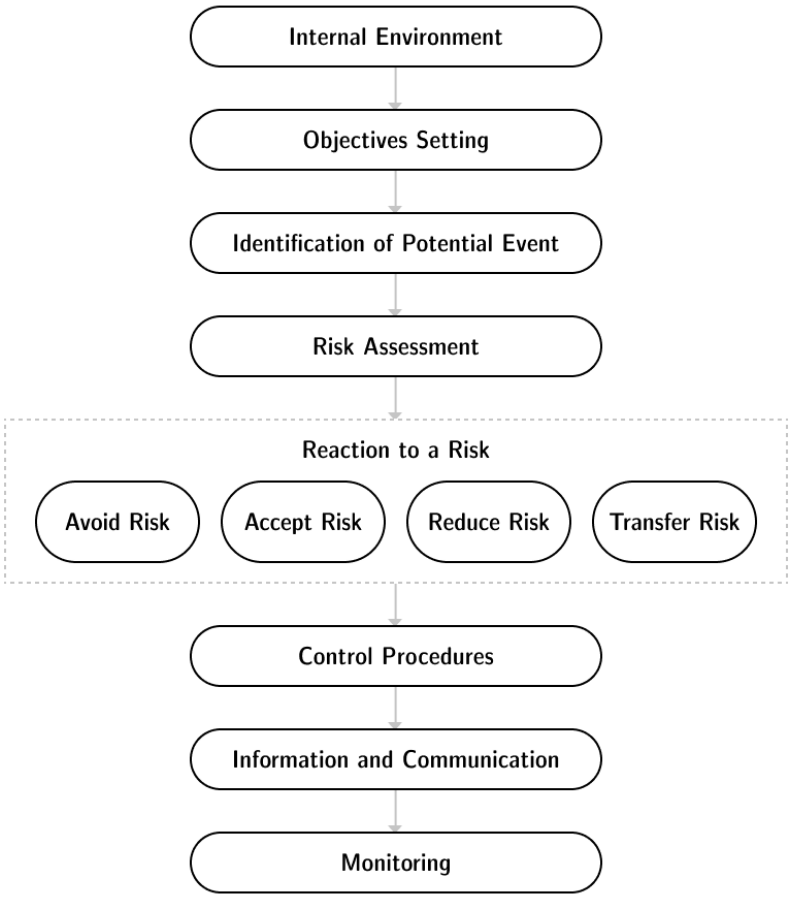
Risk management is the process of adopting and fulfilling a complex set of actions aimed at mitigating possible unfavourable results and minimizing possible losses.

3.3.2Overview of the HyperQuant risk management system

The HyperQuant risk management system is a SaaS solution. It is a unique system of professional risk control for financial markets' transactions.

System features are divided into separate components and can control and perform simultaneous operations for all attached accounts. Risk management strategies ensure the most flexible approach to the token holder's account asset management. Depending on the goals, the appropriate choice of strategy enables the best possible risk and yield ratio for a long-term period.

As part of a systematic approach to financial risk management, HyperQuant uses the best practices in risk management, which consist of the following elements:



Picture 3. Risk management system based on COSO ERM methodology

3.3.3Risk management trading strategies provided by HyperQuant platform

The main task of risk management strategies is to save one's money to a maximum extent in loss-making transactions in order to use them in consequent profitable trades.

Today, risk management and control systems get as much attention as trading systems and methods.

There are several risk management strategies to choose from, depending on the investor's risk tolerance; for example:

1. Conservative strategy

2. Combined strategy

3. Aggressive strategy

Let us take a look at an example with average conditions:

Conditions:

a) Maximum investment risk of a portfolio is 1.

b) Initial position size is 10 contracts.

The strategy earns +10% of profit to the account (1 risk step = max risk):

All three strategies transfer the risk to a zero-point. The position size does not change.

The strategy earns +20% of profit to the account (2 risk step = max risk):

- The conservative strategy transfers the loss risk of +10% to the deposit. The size does not change and amounts to 10 contracts.

- The combined strategy transfers the loss risk of +5% to the deposit. The size is raised to 15 contracts.

- The aggressive strategy does not transfer the risk. It equals 20% of the deposit. The size is raised to 20 contracts.

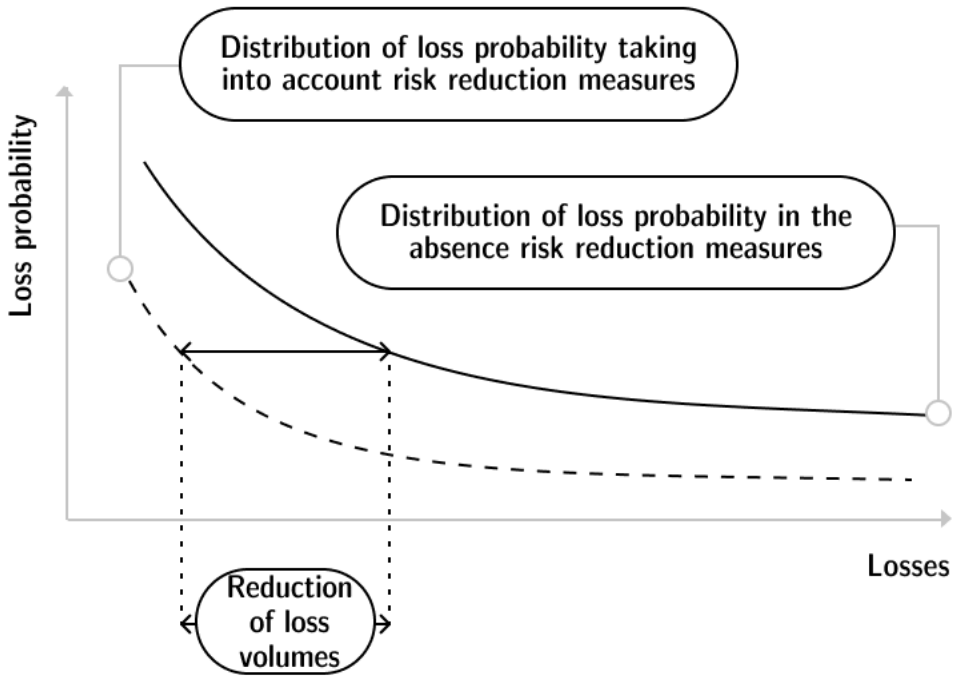
The strategy earns +30% of profit to the account (3 risk step = max risk):

- The conservative strategy transfers the loss risk of +10% to the deposit. The size does not change and amounts to 10 contracts.

- The combined strategy transfers the loss risk of +10% to the deposit. The size is raised to 20 contracts.

- The aggressive strategy does not transfer the risk. It equals 30% of the deposit. The size is raised to 30 contracts.

These conditions allow for the distribution of the loss probability, taking into account risk reduction measures, which is demonstrated in pic.4:



Picture 4. The risk management strategy

3.4 Hedging

3.4.1 Professional hedging in the cryptocurrency market

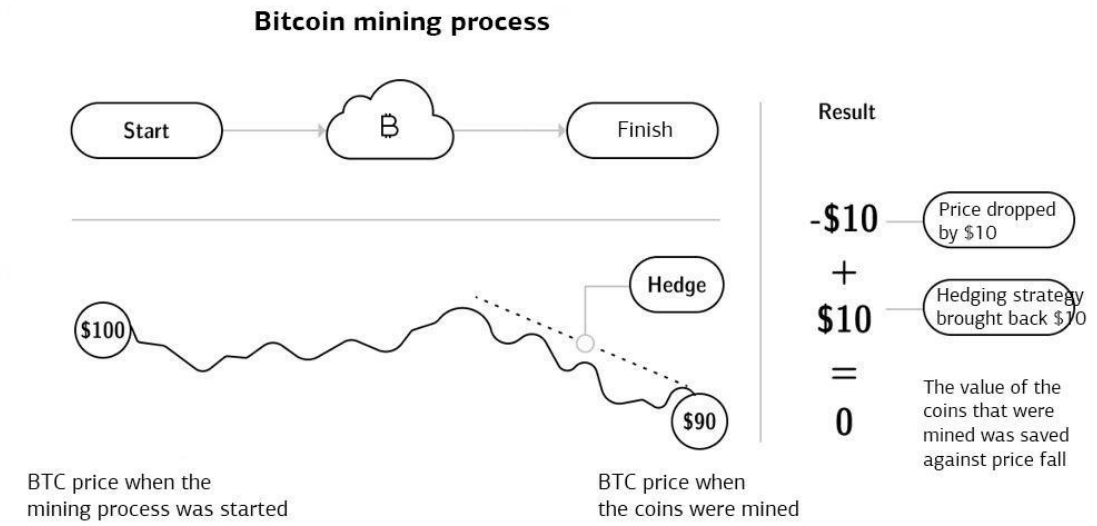
The newly formed market for cryptocurrencies is an example of an unstable and highly volatile market. In 2017, the average daily volatility of Bitcoin was 7,69%, as calculated using the following formula:

$$Vol_{mid} = \frac{1}{N} \sum_{i=0}^{N-1} \left(\frac{High_i - Low_i}{Open_i}\right)$$

where $High_i$ is the maximum price of i-th day, Low_i is the minimum price of i-th day, and $Open_i$ is the opening price of i-th day.

It is complicated for miners and cryptocurrency owners to forecast and plan basic financial ratios and also avoid financial losses in cases of adverse fluctuations in exchange rates; for instance, the biggest price collapse for Bitcoin in 2017 was more than 46%.

Hedging (pic.5) is neutralizing the risk of future price fluctuations in an asset by performing certain financial transactions. The most basic understanding of hedging is insurance. We all use insurance if we build a house, care about our health, etc. Insurance is aimed at reimbursing our expenses in case of an unpleasant or unforeseen situation. Likewise, big corporations use hedging to protect themselves from a collapse in the prices of produced goods or a significant increase in the prices of the raw materials needed for production. Insurance is not about pursuing profit; instead, it helps mitigate the impact of difficult situations.



Picture 5. Risk hedging on the cryptocurrency market

Cryptocurrency miners depend on stock exchange venues where cryptocurrencies are sold. Selling cryptocurrency is vital for covering infrastructure expenses, replacing hardware and creating new mining software. A miner has no idea what the market price of a cryptocurrency will be in the future, when he is ready to sell it (for instance, a month after mining N coins); thus, he will look for a solution to fix the exchange rate.

3.4.2 Classification of hedging strategies

According to its structure, hedging can be divided into a selling hedge and a buying hedge. A buying hedge is used when a trader plans to buy an asset in the future and strives to reduce the risks connected with increasing prices. A selling hedge is used when a seller wants to establish a fixed price for himself in order to hedge the risk of falling prices in the future.

The different classes of hedging strategies are as follows:
1. full hedging (also known as risk-free hedging)
2. selective hedging
3. active hedging

Full (risk-free) hedging allows a trader to fully hedge the risks of adverse price fluctuations when dealing with the same volume and specifications.

Selective strategy hedging is hedging either a commodity with an analogous but not identical commodity on the stock exchange or with an identical commodity but not to the full extent. Selective hedging requires constant market analysis and studying the market trends; thus, it is a more risky strategy than full hedging.

Active strategy hedging implies that the decision whether to hedge or not is taken based on the current market conditions, forecasts and personal opinion. This is a highly risky strategy.

Derivatives are often used as hedging instruments. A derivative is a contract according to which the parties have the right to perform certain operations in relation to the underlying asset. As a rule, a derivative allows traders to buy, sell, provide or get a certain commodity, security or digital asset. The derivative price and the character of its fluctuations are usually closely connected with the price of the underlying asset, but they are not necessarily the same.

On the financial market, derivatives are futures contracts on the underlying asset. In the case of hedging with futures contracts and price growth, sold futures contracts will generate losses, but at the same time, the underlying asset will compensate for those losses, and the seller will make more profit by selling it at a higher price. In the case of falling prices, the sold futures contracts will generate profit, but the underlying asset will be sold at a lower price. As a result, the commodity price remains fixed, while the price fluctuations risk is limited and controlled.

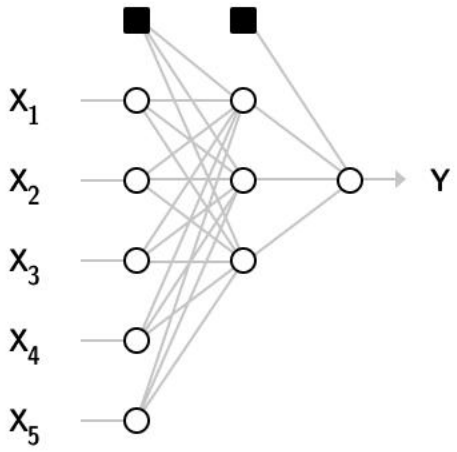
Hedging will allow crypto-community members to reduce risks connected with operating in the cryptocurrencies market.

3.5 AI-based financial advisor

3.5.1Basic concepts

The majority of investments fail because of incorrect risk management and insufficient control by the user.

To solve this problem, we use artificial intelligence, which learns on the data gathered from the users of the HyperQuant platform.



Picture 6. An example of a neural network module based on a three-layer perceptron.

Let's investigate how neural networks with direct connection are used in classification tasks. In any classification task, existing images of, for example, a financial condition, must be matched with specific classes. Classification and regression are the main areas of neural networks' practical implementation.

In structural image recognition, the objects are described by the way they are constructed from their components; in other words, they are described by their structure.

Networks with a direct connection are universal means of function approximation, which allows them to be used for solving classification tasks. Generally, neural networks are the most effective classification method, as they factually generate a large number of regression models. These models are used in solving classification tasks with statistical methods.

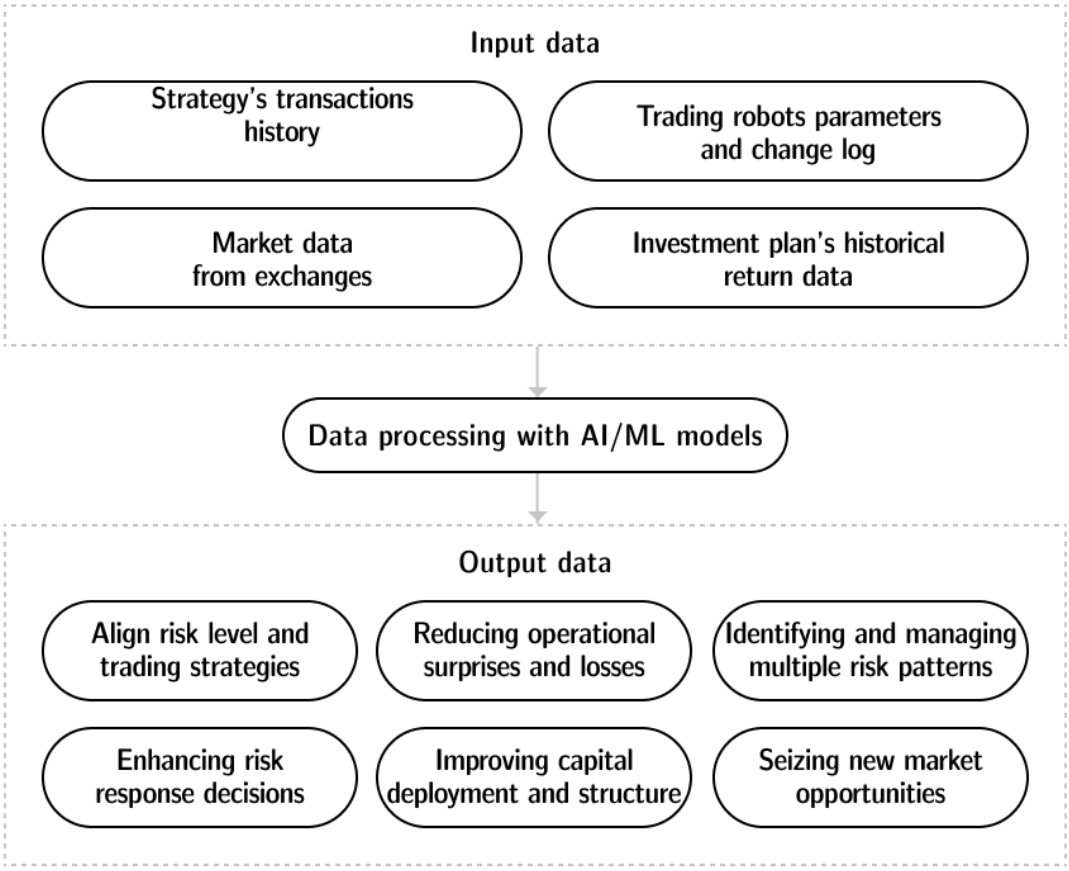
3.5.2 Classical rating systems

The rating system is the right choice for a financial platform. The rating expresses the instrument's potential over a certain time period, depending on the combination of

qualitative and quantitative characteristics summarized in the final digital assessment. The rating can be calculated using different statistical methods. In the global financial system, ratings are made by the following independent rating agencies: Moody's, Standard and Poor's and Fitch Ratings. They are used to assess companies' creditworthiness. With the help of this rating, a potential owner of assets can understand whether it is worth buying and how reliable it is.

3.5.3 AI-based rating

Artificial intelligence sets the rating for tokenized assets based on its own grading system. For a user, it can be presented in any comprehensive graphical way. Success is analysed on the basis of a wide range of criteria that exceeds the simple risk-profitability assessment methods.



Picture 7. Neural network data processing

In cases when a rating decreases, HyperQuant's neural network has a built-in notification system. If a user performs risky actions that will or might lead to losses or the portfolio and asset diversification is not high enough, the system warns the user. Like a traffic light, it varies depending on the criticality of the situation. In the worst-case scenario, the system can block any access to a problematic item in order to prevent total financial collapse.

4. HyperQuant use cases & solutions

4.1 HyperQuant's ECN (Electronic Communication Network)

HyperQuant's ECN (Electronic Communication Network) is a technology deployed in the cloud architecture that enables the placing of private clients' buy and sell orders for the trading instruments and the distribution of the orders via the liquidity pools of the large traders. One of the most significant arguments in favour of an ECN account is that the client positions are routed straight to liquidity providers (Straight Through Processing or STP), and the ECN system does not interfere with the trading process. In the US market, the ECN list includes both separate stock exchanges and market centres that can be private trading companies, which ensures liquidity in the market.

In order to understand better the principles of ECN-system functioning, one may look at this system within the framework of trading on several exchanges at once. Cryptocurrency exchanges do not have a common price regulator or an order-processing centre. They provide almost identical sets of instruments, but the prices may differ significantly at any time. This is best demonstrated by the leaps in coin market value. It is easy for a cryptocurrency newbie to get frustrated and start performing unprofitable buy and sell transactions. Moreover, one big order from a trader may lead to a sudden flare-up in or plummeting of exchange rates, which results in a chaotic trading session. With ECN an order could be executed on several cryptocurrency exchanges due to the smart order routing.

4.2 SOR — smart order routing

Technological innovations have led to a boost in various trading systems and the necessity of optimized order routing for better execution. Thus, SOR is one of the most essential solutions.

If all trading systems were open, order routing based on the liquidity disclosed by the marketplaces would probably be a heavy but simple process. SOR is a technological complex that allows orders to be routed dynamically in the trading systems' network and manages their optimized execution by taking into account the best prices of the open market, estimates of the hidden liquidity volume at the price levels of the best bid/offer on the public market and inside the spread, and the execution probability. Following the principle of the best execution, decentralization of orders becomes possible, which complies with the principle of using blockchain-based technologies.

The main advantage of order decentralization is the reduction of a counterparty's risk. If a system outage occurs at one of the crypto exchanges, all orders will be evenly distributed among the other crypto exchanges, which will not result in a loss in a force majeure event. It is equally important that with a sharp price jump, especially in a series of erroneous transactions of a large trader, orders will also be transferred to other sites. The participant can automatically or manually select the crypto exchanges in which to trade at any given time.

The ECN system allows users to establish dynamic limits for margin trades; in other words, users can execute buy and sell orders using minimum amounts in the trading account. In the case of a successful trade, the user might raise the frequency and volume of orders and earn much more. However, trading with minimum amounts leads the user to higher market risks. In order to control risks and prevent the user from going bankrupt, HyperQuant's ECN turns on risk limiting of the trading and does not allow the user to grow the positions that are in the loss zone in relation to the established limits.

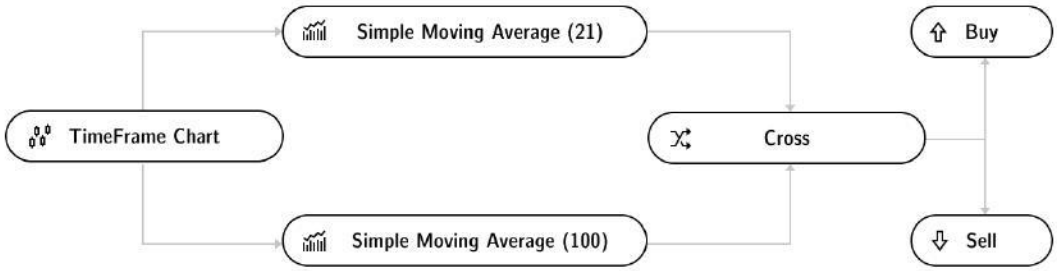
4.3 Trading bot constructor

Traders who are no longer new to the market sooner or later arrive at the conclusion that they need to automatize their trading strategies in order to ensure efficient trading.

It is evident that manual trading results in the human factor influencing the efficiency of the trading strategy, which, in particular, concerns the strategies that require a flash entry into a position without delay.

Learning a programming language is an arduous task for a newbie. The time spent on studying programming may never pay off.

A web-based online bot constructor allows the user to implement any strategy with no effort by employing the ready-to-use program components. It helps create strategies without requiring any programming knowledge, because it includes more than 100 build-in indicators along with community indicators and use-ready templates for strategies. Additionally, it will test the strategies according to the history data and provide advice from more experienced community members. Finally, users can employ the formula editor to create their own indicators.



Picture 10. Building a strategy with ready-to-use components

4.4 Quantitative framework and SDK

4.4.1 HyperQuant quantitative framework

Programming and quantitative research of statistical market patterns is a complex process that is hard to put into practice without professional instruments. The majority of services for the developers of algorithmic strategies give only a basic set for researching, testing and, later, launching these strategies. Usually, with these services, it is only possible to develop strategies based on technical indicators with a very limited risk management capabilities.

HyperQuant's Quantitative Framework is a cloud service (SaaS) for full-stack research and development of trading strategies.

It includes the following components:

1. the libraries of mathematical and statistical functions
2. the data flow engine through complex event processing and time series manipulation
3. powerful SDK for C# and Python
4. automated analysis and efficiency check of trading system signals executed in previous periods (historical data) and with the help of cloud technologies presented in a form of a specific financial strategy result
5. strategy optimization with the help of a broad range of tools

Framework tools include the following modules:

- Multi Back Test – the possibility of testing a strategy in any time period with the addition of plenty of settings, and the possibility of using any benchmark for comparison purchases.
- Optimizer – optimize a strategy using HyperQuant's server power; the possibility of using random asset prices.

A broad variety of framework utilities are also available:

a. Basket price emulation – an application that calculates a price index as an average weighted price value for the basket components. It can also calculate the weighted average of prices in the basket's constituents. Additionally, it is capable of determining implied prices and volumes for any option combination, including delta neutrals.
b. Spread tester - tests arbitrage and pairs trading strategies.
c. Portfolio stress tester – a strategy basket stress test.
d. Portfolio optimizer – a strategy basket optimizer.
e. Depth visualizer – emulates an order book

4.4.2 HyperQuant SDK for automated trading systems

SDK is a set of open libraries for algorithmic trading professionals. These allow for the creation of absolutely any strategy. From position strategies with a long-term time frame to extremely short-term, high frequency strategies (HFT), HyperQuant's framework allows the implementation of three main rules for algorithmic trading:

1. Universality – oriented at private algorithmic traders, small teams and banks.
2. Unlimited output capacity - simultaneous execution of hundreds of strategies with any tools.
3. High-speed transactions – request processing takes no more than several microseconds.

SDK is multi-lingual and allows strategies to be realised in the most popular languages for algorithmic traders: C# and Python.

Here is a sample code of a simple trading strategy in C# language:

```
public static void OnNewBar()
{var ema1 = new ExponentialMovingAverage
{Length = 10};
var ema2 = new ExponentialMovingAverage
{Length = 100};
if (CrossAbove(sma1, sma2, 1))
{EnterLong();}
if (CrossOver(sma1, sma2, 1))
{EnterShort();}  }
```

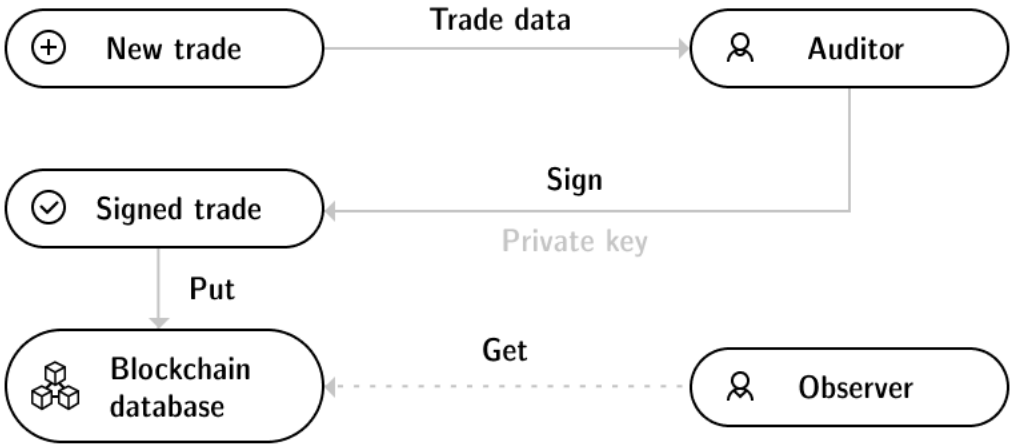
And in Python language:

```
strategy = MAStrategy(symbol, bars,
short=100, long_=400)
signals = strategy.generate_signals()
# Create a portfolio
portfolio = MarketOnClosePortfolio(symbol,
bars, signals)
returns = portfolio.backtest_portfolio()
```

4.5 Crypto hedge-fund infrastructure

Many crypto hedge funds are not transparent in their structure and activities. It takes a lot of effort to develop high-quality software that secures a fully functional fund operation.

Keeping the performance reports in an open blockchain allows the community to audit it at any time. HyperQuant's software provides ready-to-use modules for a swift hedge fund start.



Picture 11. Saving and tracking the trade history in a public blockchain

The path from the creation of your trading strategy and its offer to the community to building your own hedge fund has been shortened significantly. The creation of the fund in the existing financial system requires an expensive infrastructure. The cost of maintaining such a large infrastructure is from dozens to usually hundreds of thousands of dollars per year. However, building a fund based on the HyperQuant ecosystem greatly minimizes those required resources.

4.6 Trading signal marketplace

Platform users can build automated trading strategies for themselves. They can combine widely used technical indicators available in HyperQuant's quantitative framework with indicators from the marketplace or construct their own. Before being accessible in the data marketplace, new technical indicators or automated trading signals are reviewed by professional and qualified portfolio managers. They run series of backtests to ensure the quality, legitimacy and reliability of the trading signals or algorithms. The author of the

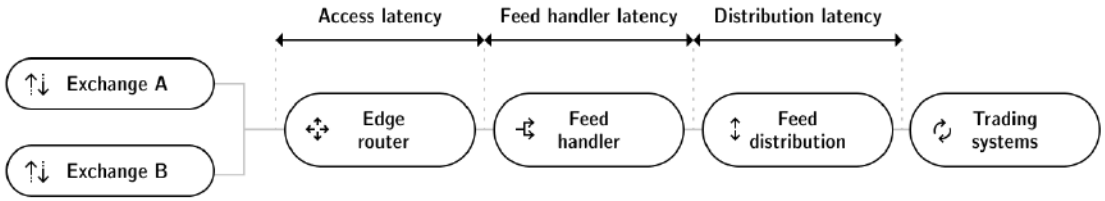
trading strategy may ensure the privacy and confidentiality of his know-how. He can specify the conditions for the distribution of his data and set certain restrictions.

Trading with algorithmic strategies is dedicated to providing a sufficient risk-reward ratio, but it does not reveal the platform's full potential. Any long-term strategy is based on proper diversification. By combining various assets and algorithmic and quantum trading strategies, the user will be able to create a well-balanced portfolio that can survive different market phases and minimize risks.

4.7 Market data vendor

There are lots of cryptocurrency exchanges in the industry, with varying rates of trading activity. Developers of trading strategies have to program many connectors to different APIs in such exchanges.

Using the HyperQuant platform, traders get access to a single unified protocol for receiving market data, and it features data aggregation from different exchanges.



Picture 12. The use of a unified protocol for receiving market data from different sources

HyperQuant's market data vendor has the following capabilities:

- Optimized streaming updates for minimal load on your consuming applications
- Normalized referential data with intraday instrument creation
- Normalized quotation data
- Level 1 (Best Bid, Best Offer, Trades, Trading Status)

- Level 2 Market By Prices (also known as Market By Level)

4.8 Market Data Storage

Storing and accessing data from different exchanges is a complicated task both for independent traders and trader teams of family offices and hedge funds.

HyperQuant offers a streamlined solution for receiving historical data, fully aggregated and configured for a specific problem.
Storing data in a decentralized database provides the following advantages:

- Transparency
- Persistence and reliability
- High-quality data

Picture 13. A unified solution for receiving historical data

5. Revolutionary fintech ecosystem

5.1 Synergy of disrupting concepts

HyperQuant builds a unified platform with a complex architecture that will bring all the business systems together. We utilized SaaS for a set of platform services. This multi-purpose solution with an open framework will allow third-party developers to constantly improve and further develop the platform.

The problem of creating new program solutions is of vital importance for the development of the blockchain community. Many project solutions come from the traditional finance industry and are built by people whose previous experience does not include the use of new blockchain technologies and principles of decentralization. HyperQuant will help to change that.

The creation of innovative platform services comes with a combination of utilities and technological solutions. The unity of technologies produces a synergistic effect and gives birth to innovation.

Many trader technologies are simply out-dated. In 2018 plenty of users need a whole set of smart services for trading.

The most desired are as follows:

1. Gamification
2. Artificial intelligence
3. Smart portfolios
4. Chat bots

By combining different platform modules, HyperQuant offers a new concept for the future of trading.

5.2 Next-level asset management software

The concept of asset management software (both web- and mobile-based) consists of the following levels:

- The completion of the user's risk profile. Attitude toward risk is the main indicator that defines a person's risk orientation and, thus, impacts their portfolio structure.
- The creation of a balanced strategy portfolio. Strategy diversification implies distributing assets in different tools and strategies of various risk levels with minimal correlation between them. This happens by separating all strategies into classes: small, medium and high profit-to-risk ratios. Due to diversification, each user can form a custom portfolio by combining safe and risky strategies.
- Strategy management. Thanks to a developed marketplace, users can rebalance their personal portfolio and change or add a strategy. This will create a portfolio that is less susceptible to external market changes.
- Increase in the skills of strategy management. The app has a built-in gamification module that works in 2 modes:

- Robot fight. This mode compares the management quality of one trading algorithm and another randomly picked one.
- Portfolio strategy management. In this mode, the management of the whole portfolio strategy takes place. Here, users need to show off their ability to handle various market conditions.

This concept fully involves users in their management strategy. At the same time, it helps the system of risk management based on AI to continuously gain big data along with constant self-development.

5.3 Ecosystem for AI-based fintech dApps

The HyperQuant platform will allow developers to create a custom application based on any program architecture (operating system, programming language), and that will be added to the HyperQuant ecosystem. The creation of apps on HyperQuant's platform has the following advantages:

- Developers have no need to create various connectors to the exchanges, to follow their performance, update them, etc.
- Developers can place their trading systems on the HyperQuant marketplace. Thus, their transparency and risk management strategy are guaranteed through an independent evaluation.
- Access to a large HyperQuant community will allow developers to check their model with maximum speed and efficiently gain new users.

HyperQuant's platform automatically balances and sorts out the flow of orders on crypto-exchanges, thus stabilizing the pressure on them. The utilized quoting strategies enable the exchange positions to be boosted many times over without causing sudden rate fluctuations. With these operations, HyperQuant's platform deals with the main activity load, allowing the central AI to focus only on its primary function, which is transferring the most reliable data to the user.

6. Token Economy

HyperQuant issues utility tokens to create an internal economy inside the platform ecosystem. The HyperQuant economy leads to transparent and fair relations between all platform users. By issuing HyperQuant tokens (HQT), we offer all customers a chance to become users of a revolutionary platform, enabling them to efficiently manage their capital. Every holder of the HQT Token will get different levels of access to products and solutions based on the HyperQuant platform. Level of access and available features of a particular product will be defined by the number of tokens in their possession.

6.1 HyperQuant economic model

6.1.1 Efficient motivation for all platform participants

HyperQuant platform design presumes the development of a new decentralized blockchain-based economic ecosystem along with a fair economic motivation system.

To create truly fair relationships, the HyperQuant economic model takes the interests of all participants into account, including developers, users, analysts, financial institutions and the HyperQuant team.

6.1.2 B2C Solutions

The relationship between developers and active users of HyperQuant-based services builds on the principle of rewarding the best developers while protecting the users' interests. The economic value of human effort is reflected through the developer's creation of an entity on the platform (like a trading robot). This is going to take the developer N hours and K efforts to create it, for which the platform users should reward him/her.

6.1.3 Incentivizing the developer

The developer receives a reward for providing data, indicators and signals to the platform. This approach to incentivizing developers will stimulate them not only to create quality entities but also to modify and improve them.

6.1.4 Protecting the interests of active users

Certain measures are being taken to reduce the risks when acquiring a new platform entity. Users should be fully informed about entity properties and related potential risks. The platform also protects the interests of users by offering a levelled system of payment. In other words, it provides full functionality with a limited amount of funds, thus turning it into a classic software demo mode.

6.2 Platform use cases

1. The user installs the HyperQuant application to test the robot with a small amount of funds. It is possible with 2400 HQT (the fees and numbers here are given as a sample).
   The token holder chooses any entry-level robot (for instance, the "Trend Hunter") and obtains it for 400 HQT, holding 2000 HQT. Then, he can use this software with capital range of 0.1 – 0.5 BTC and test it for a couple of weeks.
2. If the user is satisfied with the result, he may want to increase the trusted amount of cryptocurrency. To get the second-level "Trend Hunter" software license (level 2), he needs to use 4000 HQT, holding 20,000 HQT.

6.3 A sample of software pricing calculation

Trend Hunter Level 1

Bot license price: 400 HQT (developer's reward, one-off payment when adding the bot to the collection)

Token hold: 2000 HQT (this amount will be held in the platform while the robot is being used)

Maximum managed capital: 0.5 BTC

Monthly subscription cost: 0.16% * managed capital

Trend Hunter Level 2

License price: 4000 HQT

Token hold: 20,000 HQT

Maximum managed capital: 5 BTC

Monthly subscription cost: 0.16% * managed capital

Calculation formula:

$$\mathrm{T}_{sum} = \sum_{k=0}^{k<L} N(k) \cdot hold(k)$$

where **L** is the maximum bot level, **N(k)** is the number of k-level bots on the platform at the moment, and **hold(k)**is the amount of tokens required to keep a single k-level bot running.

6.4 Creating a levelled payment system on the HyperQuant platform

Users love when payment conditions are clear and simple. People get annoyed by hidden, dynamic and changing commissions and prices. To streamline the operation, all robots have identical conditions on various levels:

Level 1 – Max capital up to 0.5 BTC – Bot license price: 400 HQT – Hold: 2000 HQT – Subscription 0.16% * Managed capital – max users: 20

Level 2 – Max capital up to 5 BTC – Bot license price: 4000 HQT – Hold: 20,000 HQT – Subscription 0.16% * Managed capital – max users: 10

Level 3 – Max capital up to 25 BTC – Bot license price: 20,000 HQT – Hold: 100,000 HQT – Subscription 0.16% * Managed capital – max users: 3

Level 4 – Max capital up to 100+ BTC – Bot license price: 80,000 HQT – Hold: 400,000 HQT – Subscription 0.16% * Managed capital – max users: 1

Bot license prices vary from robot to robot and are determined by the maximum capital, track record over the past month, maximum drawdown and risk levels.

6.5 The HyperQuant's role in user-software developer interactions

A built-in AI analyses users' risk profiles and coin/altcoin preferences.

The system limits the number of users per marketplace software entity. When it reaches the user limit or the amount of managed capital, the entity disappears from the marketplace until the current users stop using it.

At the same time, we take care of the HyperQuant software developers and data providers. The most efficient software appears on the marketplace more often.

The platform is designed in the way to provide the best algorithms with the most liquidity and assets.

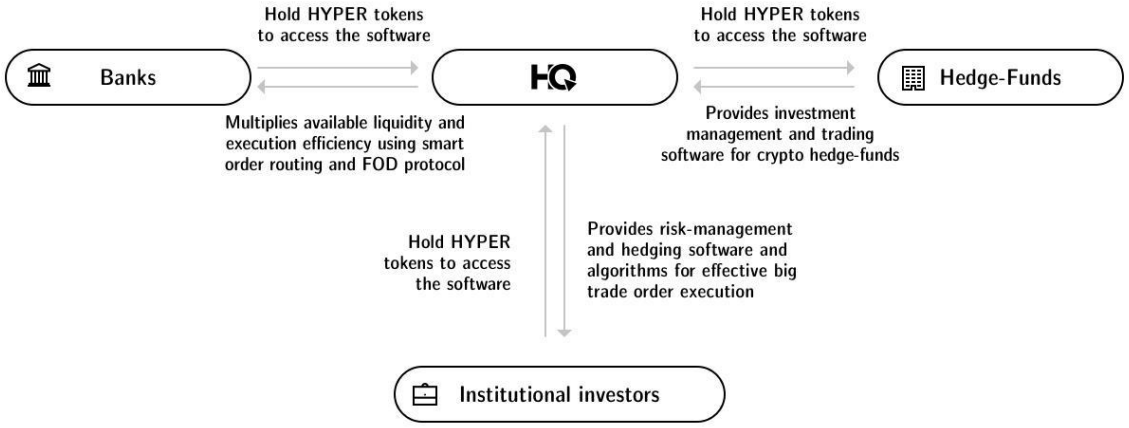
6.6 C2C Creating new platform entities: by users, for users

A unique feature of HyperQuant is the interaction between AI, blockchain technology and users. It gives users a chance to create new products and entities for the platform, like configuring a Megabot, a portfolio of automatic trading systems. Having a new economic model and a new position in place, the automated bot portfolio manager, means we are creating a new market. In other words, users creating their portfolios, which contain configuration parameters, bot identification numbers and other required system data, add up to the value of the new entity that itself becomes a balanced solution.

6.7 B2B solutions

HyperQuant has incredible potential for the B2B sector, as it provides lots of services that are in high demand in the industry. We witness the platform being actively developed through cooperation with both new and mature market players. Pricing for the B2B sector will be defined by both market and competition, so the

HyperQuant platform has a competitive edge because of its flexibility and scalable technology.



Picture 14. HQ token use schematic in the B2B segment

Implementation of the technological innovation may require a lot of resources for the HyperQuant team. With that in mind and to preserve maximum autonomy of the system, access for companies will be limited through holding large numbers of tokens.

7. Conclusion

HyperQuant's ecosystem provides solutions to a wide range of problems that blockchain community enthusiasts and blockchain newcomers encounter. HyperQuant's ecosystem is not just today's much-needed financial instruments; it is also a new venue intended for global distribution.

Cutting-edge AI-based technologies are rapidly evolving and flourishing these days. It is going to be the next "Big Thing", projected to be a new trillion-dollar industry by many experts. But, here at HyperQuant, we are not just developing yet another smart algorithm or a neural network; we are building a huge platform, a future home for thousands of AI-based systems.

HyperQuant's business model is based on an innovative approach that determines what is important and necessary for the user. The concept of this business model relies on identifying high-profit zones, determining the methods of obtaining market share and ensuring its protection from competitors. HyperQuant's ecosystem creates an architecture that allows pioneering technologies to be transformed into actual economic value. Services created in HyperQuant's ecosystem have a huge potential for growth.

8. Risk disclosure

This document is provided for informational purposes only, in order to present the HyperQuant project; it does not constitute an offer of tokens or, more generally, a sales or service offer, nor is it a solicitation of an offer to acquire securities. Anyone interested in the content of this whitepaper should be able to fully grasp the consequences of token ownership and the possible risk of a partial or total loss of its value.

The data or figures contained herein are purely indicative and provisional. The information contained may, under no circumstances, be deemed to be contractual stipulations related to the operating methods of token distribution.

This presentation has in no way been approved or endorsed by an administrative or regulatory authority and is not subject to any particular laws regulating its content or its form.

The Ethereum Smart Contract concept and the underlying software platform are still under development. There is no warranty or assurance that the process for creating tokens will be fault-free. Therefore, there is a risk that the software could contain defects, vulnerabilities or bugs causing the complete loss of contributions to the project or tokens. Besides that, there can be other risks associated with your acquisition, storage, transfer and use of tokens that HyperQuant may not be able to anticipate. Certain jurisdictions may apply new regulations addressing blockchain technology and its applications, which may be contrary to the current smart contract mechanism and will lead to substantial modifications, including HQT token loss and termination. It is the user's responsibility to ensure that his or her contributions to the project and operations with HQT tokens are not in contravention of any law and legislation in the jurisdiction in which the user resides.