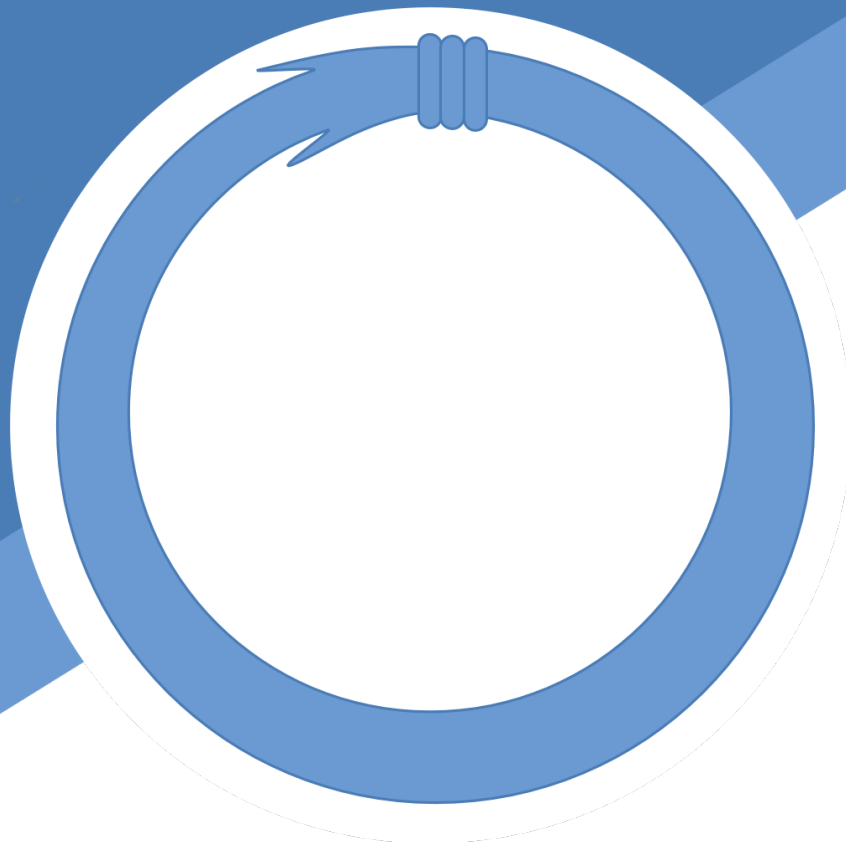


**"AI and blockchain together, rewarding talent,
creating jobs and building communities"**

LushCoin White paper

Asame Imoni Obiomah

<https://github.com/grand-axe/lushcoin>



Empowering
the future with
blockchain
and artificial
intelligence



Abstract

LushCoin is a cryptocurrency based on Satoshi Nakamoto's invention, Bitcoin that is aimed at community building through reward for innovation and invention. A new, equitable intellectual property protection model is laid out that adequately rewards inventors or innovators and enhances rapid spread of knowledge. Inventions or innovations (both of which can be open source) are evaluated by artificial intelligence, then funds of a value proportional to their economic growth potential are generated for projects that realise the concept and create jobs. The blockchain acts as proof of originality record for inventions and innovations. Proof of Work is replaced with an *economic growth vector* (EVec), which is computed by an artificial intelligence algorithm; new money is generated only as a proportion of the resulting EVec. The artificial intelligence agents adhere to a publicly owned ethical standard and can be overridden with a community vote.

Introduction

Satoshi Nakamoto's blockchain is an exceptional network phenomenon. In the original version and derived cryptocurrencies, Proof of Work (PoW), a computationally expensive task, is the prevailing means for securing the network as well as regulating new money creation (mining). Profits achievable from mining have led to consumption of vast quantities of electricity and an arms race for exponentially more specialised and expensive mining hardware, yet mining produces no assets. PoW is not fungible, as the work done to calculate its hashes can neither be sold nor bartered.

This is one of the problems LushCoin solves. LushCoin is backed by intellectual property similar to the way conventional currencies are traditionally backed by gold. Every innovation or invention has monetary value and so is fungible; LushCoin employs artificial intelligence to measure the potential monetary value of an innovation or invention as a EVec, then generates a proportional amount of money.

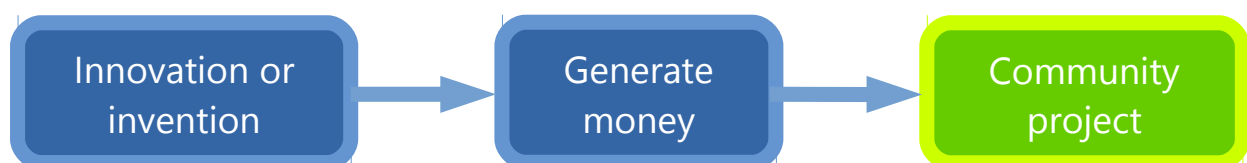


Fig.1: An overview of LushCoins goal.

LushCoin is derived from the NBitcoin library, an almost complete port of Bitcoin Core written in C#.

A single coin is called a *Lush*.

The term project as used here refers to startup and early-stage phases of a business.

Money is generated in direct exchange for innovation or invention. The generated money funds projects that increase local skills, reduce employment and increase development and control over destiny. Other benefits are; strengthened intra-community links, and increased trust. This synergy of blockchain and artificial intelligence proves that modern technology is not all doom and gloom, it can breed social responsibility and growth.

A community as used in this text is a testbed that denotes an economically viable group. A community must be identifiable with a geographical location.

"Instead of relying on traditional top-down decision making procedures, the blockchain allows for such procedures to be entirely crowdsourced, delegating to the community's collective intelligence the responsibility to monitor and evaluate its own achievements."

- Primavera de Filippi

Innovation as used in this text, can be any idea that can generate jobs, growth and dignity. All projects will have the oversight of the community.

EVec translates to the potential of an innovation or invention to generate jobs as well as social and business links within the community. LushCoin replaces the nonfungible Proof of Work with the fungible EVec.

The calculation of EVec can be carried out on ordinary home computers, it does not require vast amounts of electricity or specialised, expensive hardware.

LushCoin keeps records of innovations and inventions on the blockchain. This is a movement from the current centralised, exclusive right model for intellectual property to a decentralised reward model in which communities have a voting stake.

Every community has a capacity to do physical work as well as individuals with the talent to invent or innovate, but despite the transformative growth potential of such ideas, some communities might not have the finances to materialise inventive or innovative ideas, due to the prohibitive costs of current methods of intellectual property protection.

This problem is further intensified by the disadvantages of over centralisation, such as; inflexibility, bureaucracy, unrepresentative governance, corruption, lack of reward for open source work and real or perceived exploitation. A local, low cost, trustworthy means is needed to correct this.

Intellectual property protection methods (particularly the patent system) are prohibitively expensive, complex, involve lengthy waits and vary in term validity from country to country (meaning that processes must be repeated to gain coverage). Also, aside from the several billion Dollars that patent trolls cost the world economy annually, patent litigation can cost several million Dollars per case.

These problems actively disenfranchises solo inventors, the young, students, the poor, the infirm as well as many from less developed territories who do not have the financial might of a conglomerate. This disenfranchisement, in addition to money lost to patent trolls and litigation, leads to huge losses of economic opportunity for the community.

Approximately two percent of any population has an IQ level above 125, which would make them potential geniuses; in perfect conditions, there should be two geniuses for every hundred people. However the number of geniuses in any community (even the most advanced) is far less than two percent.

Because possession of zeal and persistence are as important as a high IQ level for an individual to achieve genius, the present unnecessarily formidable methods serve as an artificial barrier to attainment of genius, wearing out the many who are close to the mark.

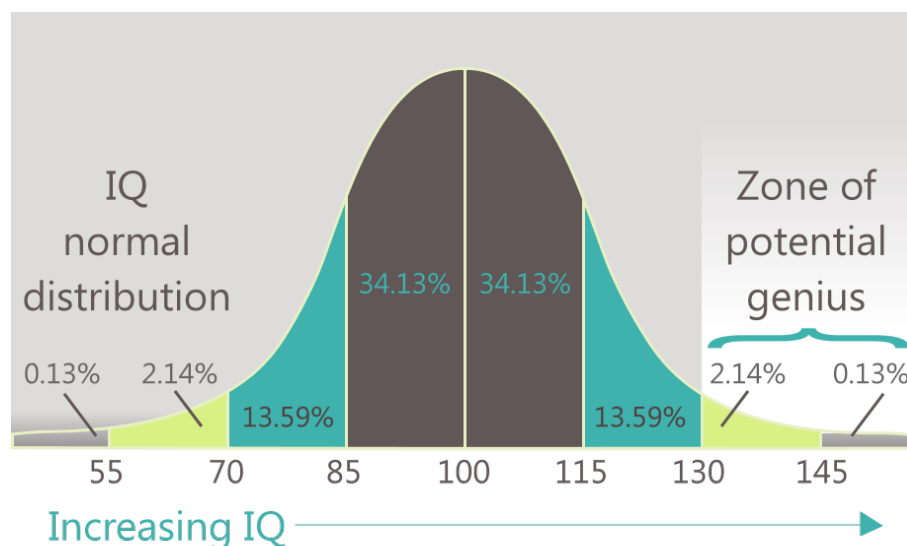


Fig. 2: There should be two geniuses for every hundred people in ideal conditions.

It can be argued that while disenfranchisement by current systems plays a role in the number of geniuses recorded by both their achievements and intellectual property protection systems, the distinct lack of incentives that might drive a person to possess persistence and zeal is just as strong a contributor.

The genius not only has to create, but seems to be further punished by having to endure huge costs, technical complexities, minefields of legal knots and lengthy time commitments. These things increasingly make intellectual property rights a monopoly of the wealthy (particularly technology giants), therefore threatening new class divides.

The LushCoin process maximises potential for genius by offering intensives to encourage zeal and persistence in inventors and innovators; by calculating an EVec that will be used to reward them, fund the realisation of their work (quick, pain-free reward if work is viable and novel), and by providing a blockchain record for their proof of originality.

The blockchain offers a natural solution for proof of originality. It is immutable. Records once entered, are indelible, unchanging; a single database covers the world and entries will not require lawyers to validate their worthiness. A proof of originality record will require only a moment for the filling of a single form – in a process that is uncomplicated, free off monetary charge and free off third parties.

Registration of a Community

Individuals that aspire to register a community will be required to create an invitation only list, such that it forms a graph with a single person as its root node. They would then create the communities public key, after which they would pay a colored coin, the *community application coin*, to an address called *registration address*.

The community application coin is coloured with:

- a description of the community's geographic location;
- its latitude and longitude;
- the public key and membership graph;
- and an optional list of its local incubators.

The payment of the community application coin to the registration address adds the new community to the *community registration address list*. This enables the referencing of a community through its public key.

The geographic location, latitude and longitude will aid the verification of a community by individuals who live in that particular geographic location.

Removal of a person from the community will remove the member that invited the affected person (called parent node) as well as the subgraph that has the parent node as its root. This is to maximise removal of tainted members, since bad members are more likely to invite those like themselves.

Community Size

A community is a network that consists of its skills base, businesses, infrastructure and demography (for instance, its population and literacy rate). If a community is viewed as a subgraph, then for it to be viable for registration, the strength of its connections within itself must be greater than the strength of its connections to its supergraph. This is observed with economically viable locations such as; villages, towns, cities and countries.

Funding Invention or Innovation

Inventors or innovators are rewarded each time a community accepts itself as testbed or production area for their work (including open source projects that are original ideas) or a work that is derived from theirs. The project will be managed by an incubator that both the community and the inventor or innovator find to be suitably qualified. The management will be carried out according to a contract agreed to by the community, the incubator and the inventor or innovator.

The intent of the contract is to ensure that members of the community get first shot at all jobs that accrue from the project, as well as binding incubator, inventor or innovator and community to the execution to conclusion of the project. The incubator must structure the project so that it can continue if the inventor or innovator dies or becomes otherwise incapacitated.

Even though LushCoins AI will test for prior art, it is the responsibility of the inventor or innovator to check that their work is novel and new.

Applications for consideration of inventions or innovations are submitted as a colored coin, called *application coin* by an *applicant* (usually the inventor or innovator). All applications will include an intellectual form ([described later](#)) of the invention or innovation.

Where a firm or individual wishes to set up or invest in a business based on an innovation or invention on the LushCoin blockchain, they will act as both the incubator and the applicant. This is called *third party application*.

The detail of the invention or innovation, called application template, is attached to the application coin in machine readable format.

Some items the application template holds are:

- the applicants details;
- business proposals, if a third party application is being made;
- the innovation or invention details;
- the address of the community the applicant wishes their project to be situated in;
- a set of one or more incubators (arranged in order of preference) from the community that the applicant would like to work with;
- a Ricardian contract that will govern the execution phase of the invention or innovation is also created and signed by the applicant;

The topmost incubator in the set chosen by the applicant has the right of first refusal on the option to accept any project that might accrue from the inventor or innovators application.

The application coin is paid to an address for identifying proof of originality records of intellectual property and innovation called, *proof of originality address* (POA). The date of storage and immutability of the blockchain provide robust proof of originality for the work. The BitTorrent storage provides availability of the document as well as assuring its integrity through cryptographic methods (SHA1), LushCoin provides further security against attack by enforcing storage on the blockchain of the colored coins optional SHA-256 hash of the torrents metadata.

The miners can then retrieve the invention or innovation details and apply artificial intelligence algorithms to test for novelty, dependency and originality, before calculating the EVec. The first miner to calculate the EVec reached by the majority of miners as well as fulfilling the other requirements of miner consensus, wins the bid to add their block to the blockchain.

For brevity, we will refer to the algorithm that adds a new block to the blockchain as *appendBlock*.

If the test for originality fails, a colored coin called *unsuccessful coin* that holds the reason for failure of the application is paid to the inventor or innovator and further processing by `appendBlock` is abandoned. This happens after miner payment.

If the originality test is passed then, two colored coins (called *mock project coin*) are created by `appendBlock`, the primary purpose of the mock project coin is to act as a record of the EVec value. At this stage, money for the project has not yet been created.

The mock project coin is coloured with the public key of the miner, the public key of the inventor, the reference to the Ricardian contract attached to the application coin, the SHA-256 hash of the metadata belonging to the torrent that holds the details of the invention or innovation; a list of inventions or innovations on which the current invention or innovation is based (called parents); as well as a value for novelty and a boolean value for originality of the invention or innovation.

One mock project coin is then paid by `appendBlock` to the applicant and the other to the address of the community that the applicant had previously identified as the preferred location of their project; this address is called, *vote ratification address* (VRA). Each community has its own unique VRA.

The community then has a fixed period called *ratification stage* within which to ratify the project by a simple vote mechanism and sign the Ricardian contract for the project. Voting is carried out by spending two amounts that signify "yes" or "no" in coins that have been colored with the SHA-256 hash of the metadata belonging to the torrent that holds the details of the invention or innovation.

For third party applications by investors there is no ratification stage. The investor will also sign the Ricardian contract instead of the community.

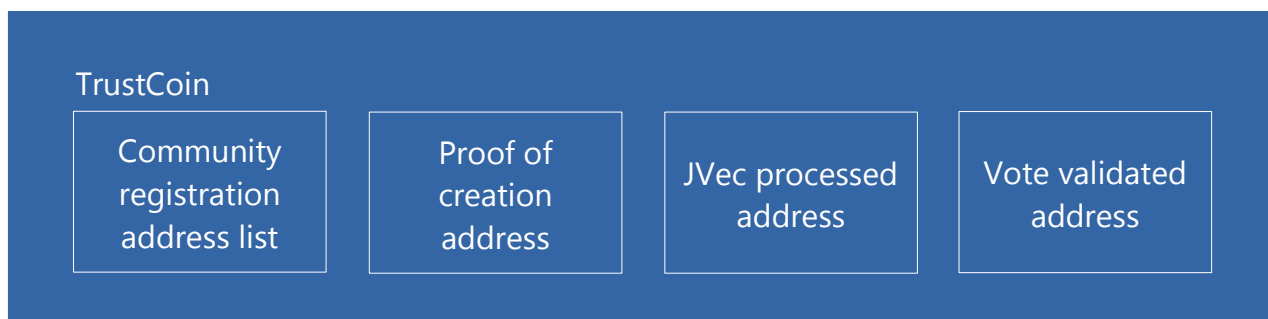


Fig. 3: Primary addresses in LushCoin.

The purpose of ratification is to positively identify the applicant, prevent fraud, the financing of frivolous inventions or innovations, to prevent the blockchain equivalent of patent trolling and to gauge the suitability of the project to the community's circumstances.

The ratification vote forms the communities signature on the Ricardian contract and is referenced by the SHA-256 hash of the metadata belonging to the torrent that holds the details of the invention or innovation.

In a variation of appendBlock, a Proof of burn address can be generated as the projects address, this address is unique to the project and is used only for its ratification vote.

On successful ratification, if the applicant is the inventor or innovator making a first application for the invention or innovation in consideration:

- the full amount of money is created to fund the project, if it is not a third party application, otherwise only a token amount is generated;
- a third of the reward due to the inventor or innovator is paid to them;
- a reward is paid to parents – where a parent is a patent, the inventor or innovator will be responsible for negotiating proper settlement with the patent holder – the settlement must not be less than the reward offered by LushCoin;
- a reward is paid to the miner whose public key is in the mock project coin;
- the money for the project (full if not a third party application, otherwise only a token) is paid into a multisig account consisting of the public keys of the community, the inventor or innovator and two public keys from the topmost incubator in the list. The multisig account will be 4-of-4, except for third party applications made by investors, in which case it will be a 2-of-2 consisting of the public keys of the investor and the inventor or innovator.

The money in the 4-of-4 multisig account (minus two thirds of the reward due the inventor or innovator) will be paid to the incubator for the management of the project.

The balance of voting power for the 4-of-4 multisig account is to ensure that the incubator has enough votes to ensure that payments from the account (minus two thirds of the reward due the inventor or innovator) go only to itself, while giving the inventor or innovator and the community enough voting power to fire an unsatisfactory incubator. The selection of the incubator by the inventor or innovator, the business opportunity and the balance of voting power give the incubator enough stake in the inventor or innovator to be vested in the process.

If the project is still running after two years, another third of the reward due to the inventor or innovator is paid. The final third is paid at the end of the third year if the project is still running. This piece payment method locks in the inventor or innovator and ensures that their work gets thoroughly tried, tested and debugged.

After inventors or innovators have been declined ratification by the community they initially nominated, they can submit an application coin that references their mock project coin to other communities until they find a testbed that can prove their invention or innovation.

After inventors or innovators have either received the third payment by the community they initially nominated, they can submit third party applications to take advantage of their invention or innovation.

To prevent round tripping fraud, inventors or innovators will not get rewards after the ratification process for third party applications that they make for their own invention or innovation. Rewards will also not be paid out in third party applications made by investors.

In one variation of appendBlock, instead of paying a single miner for the EVec, grading on a curve is used to create a Gaussian distribution of rewards for miners according their position in the order of resolution of the EVec, with the winning miner at the head. This ensures that miners get paid for time spent providing their services to the system.

A strong likelihood of payment above the normal transaction fee is incentive for miners keep processing transactions even in times when inventions or innovations are far between.

Application Template

In order to ease digital processing (such as, originality and novelty tests) the application template is a machine readable property graph.

The machine readable format makes it easy for digital methods to transform, process and extract data from the application template.

Drawings are hashed so that the hashes can be used as id's for referencing them as objects. For the same reason, single alphanumeric characters used for labelling have standard hashes.

Concepts are hashed with a locality sensitive hashing scheme and are polymorphic. This makes it possible to use them in an object oriented manner, as well as self debugging.

What is Money?

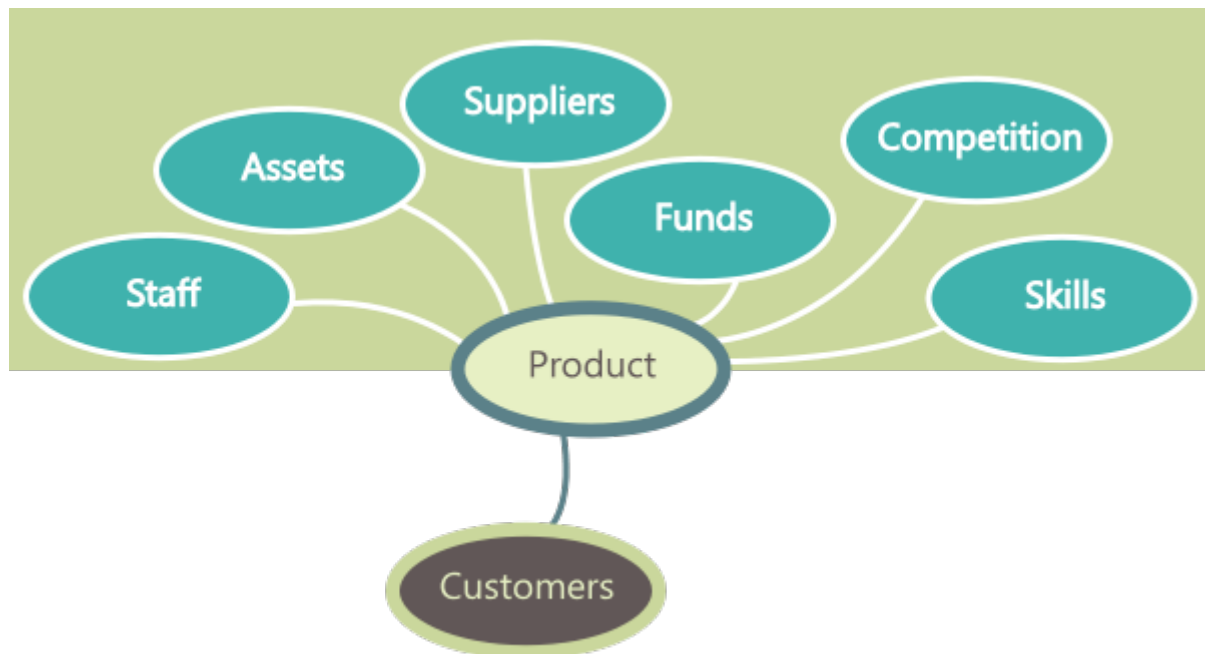


Fig. 4 Overview of the components of a project whose product is the realisation of the invention or innovation.

LushCoin recognises an idea as a network phenomenon. A monetary value is the measure of the strength of influence that a concept can exert on the economic growth of a network.

The items in large blue text in Table 1 are some of the essential nodes of a community (relative to a business).

The amount by which a project can influence economic growth in a community is proportional to the strength of its connections to the essential nodes of the community.

The economic growth that an idea can potentially influence is demonstrated by the strength of its connections to one or more communities. Frivolous inventions or innovations can be pruned in the very early stages of EVec evaluation before any trolling starts; they will be recognised by the sparsity (therefore, weakness) of their connections to any community.

The items in bullet lists in Table 1 are some of the components of the essential nodes. The essential node and component lists are for illustrative purposes only; as an example, the item, Competition consists of the quality of products produced by the competition and their price, but it omits volume of production. Indeed, the set of essential nodes is relative to both the community and the invention or innovation.

<p>Product</p> <ul style="list-style-type: none">• Novelty• Parts list• Seasonality <p>Community</p> <ul style="list-style-type: none">• Legality• Market growth• Available workforce• Available skills• Number of staff per product• Individuals• Power supply <p>Infrastructure</p> <ul style="list-style-type: none">• Roads• Rail• Shipping• Air	<p>Competition</p> <ul style="list-style-type: none">• Quality of products• Price <p>Suppliers</p> <ul style="list-style-type: none">• Quality of supplies• Price <p>Workforce</p> <ul style="list-style-type: none">• University courses connected to product• Number of graduates for each course since course began• Literary rate• Brain drain rate <p>Costumers</p> <ul style="list-style-type: none">• Wealth level• Demand
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Table 1. Some essential nodes of a business network

The preferred metric with which to measure the economic influence that a business can exert on a community is the *accessibility* measure from random walks.

The business is represented as the *seed node* in a network whose other vertices are essential nodes.

Accessibility is a measure of of the variety of paths for each walk where all walks are self-avoiding, with each vertex visited not more than once.

The business, which is the seed node i of the network, can reach a finite number of nodes by performing walks of length h . The probabilities of reaching each neighbouring node from i for a constant h yields a vector of probabilities $p_j^{(h)}$, the accessibility $k_i(h)$, of i for walk length h is

$$k_i(h) = \exp\left(-\sum_j p_j^{(h)} \log p_j^{(h)}\right) \quad (1)$$

$$EVec = \delta k_i(h) \quad (2)$$

where δ is a constant.

AI Test for Originality

The test for originality is used to establish the uniqueness of the solutions proposed by the invention or innovation.

If an inventor or innovator has started a project (which can be an open source project) that proffered original solutions at the time they created it, but at a time previous to registration on the LushCoin blockchain, the date of creation of that project can be used as the earliest creation date in lieu of the date of registration on the LushCoin blockchain.

There is no test for originality for third party applications, rather reference is made to any record of proof of originality in the application coin. If no record of proof of originality can be found, then the third party application will fail.

Third party applications can be distinguished by the property that the applicant is the same as the preferred incubator.

The inventor or innovators application is called the *reference document*, while applications by previous innovators and inventors are called *IP documents*.

The parent node of a cluster that is unique to the reference document is called an *origin node*. A node that is identical to an origin node, except for the fact that it exists in a IP document, is called a *target node*. The test for originality only compares origin and target nodes.

A new idea can be represented as unique pattern of semantic relationships between clusters and their hierarchies. This pattern is called the *intellectual form*.

Thanks to artificial intelligence, the properties of the intellectual form are all measurable and form a tangible map of the arrangements and interactions of existing concepts as they give birth to one that did not previously exist.

An intellectual form is idempotent, it represents an original expression of idea's in a way that can never change. The idea becomes a pattern that completely expresses an intellectual property.

Each intellectual form is unique across the world.

Intellectual form can robustly differentiate concepts by digital algorithms, thus rendering current methods archaic, because they rely on error prone judgement and expensive litigation for their validation instead.

Like any piece of text, an intellectual form can represent an indisputably logical arrangement and can be hashed (including cryptographically) to provide a signature that is unique within a narrow range, such that every concept can be uniquely identifiable by its hash.

The intellectual form is a piece of code.

Every piece of code is eligible for copyright, and therefore, licensing.

All works to be compared are clustered according to Is-a relations and then the clusters are compared to extract any that are unique to the invention or innovation being processed.

The algorithm to test inventions or innovations for originality is listed below. Formal concept analysis is the preferred clustering method.

Get concept hierarchy of the IP documents and their properties.

Find similar IP documents to reference document using locality sensitive hashing.

Search the similar IP documents found for concepts that do not exist in any of them, but exist in reference document.

If one or more unique concept hierarchies unique to reference document are found
{

Gather potential precursors as parents.

If any precursor is the same as reference document

{

Get parents, found concepts from precursor.

Report invention or innovation to be potentially new.

}

Discard any found concepts with trivial hierarchies.

Extract relationships between clusters

Return the parents, found concepts and report invention or innovation to be potentially new.

}

Else

{

Originality test failed.

}

The result of the test for originality will be posted to a website where it can be further checked by a humans to ensure consensus with its logic (or disapproval if there is lack of). Other network influence metrics can be used in place of accessibility if they are capable of accounting for differing strengths across the nodes in a network.

The Is-a relations are used to create locality sensitive hashes for each cluster. The resulting locality sensitive hashes form a vector space that enables easier searches. A locality sensitive hash is computed for the reference document as part of the originality test; at the conclusion of which it is added to the vector space.

AI Test for Degree of Novelty

The degree of novelty for a particular origin node is the average of the distances between its subgraph and the subgraphs of each of the target nodes that are similar enough to it that they can be swapped into its place without affecting the function of its supergraph. These distances are called *swappable component distances*.

The degree of novelty of the invention or innovation is the average of all swappable component distances.

The distance metric used to measure the swappable component distances can be any distance metric that is applicable to the vector space.

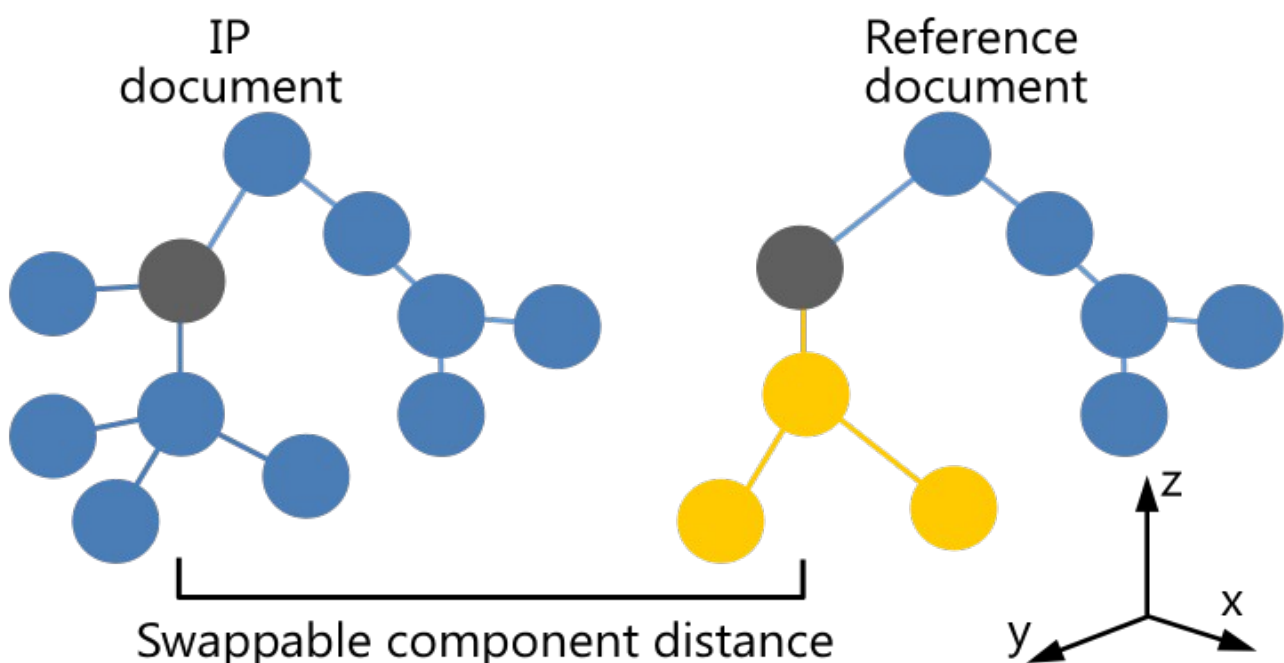


Fig. 5 Illustrates the concept hierarchies of an IP document and reference document in a vector space. The reference documents unique cluster is in orange, while the origin and target nodes are in grey.

The context for claims of novelty for an invention or innovation can be represented by the origin and target nodes in a narrow sense; and in a broad sense, by the hierarchical clusters minus the subgraph that has either an origin or target node as its root.

Licensing

Licenses for creation of LushCoin registered items outside LushCoin are strictly forbidden. Anyone wishing to create any of LushCoins registered items must agree to LushCoins terms and follow LushCoins processes.

Application coin contents are licensed under GNU Affero General Public License, Version 3 (AGPLv3) to non third party applicants.

The intellectual form is licensed under AGPLv3 to non third party applicants.

AI Ethics

The use of artificial intelligence comes with great responsibility, therefore LushCoin adheres to *The Creed*; a sincere, highly structured framework of allowed actions for artificial intelligence agents. The aim of The Creed is to avoid accidents, protect privacy and preserve liberty.

LushCoins observation of The Creeds ethical standards includes the strict forbiddance of any artificial intelligence agent making unregulated connections to a network.

"At the core of The Creed is a series of dogma's whose thrust is to:

- 1. preserve individual privacy, protect society from manipulation and assign responsibility for the actions of AI agents;*
- 2. protect individuals and society from physical harm caused by an AI agent, as well as providing a failsafe means to disable an AI agent;*
- 3. prevent AI agents from openly or clandestinely entering into plots or conspiracies within themselves or with any other kind of intelligent being."*

- www.mindmutiny.com/ethics.html

In addition to adherence to The Creed, the ratification of projects by communities ensures that artificial intelligence is never fully in charge.

Initial Funds

LushCoins foundation on the economic potential of inventions or innovations and the real work they can do within communities means that it is self funding. There is no need to raise funds by proof of burn, proof of stake, or other form of initial coin offering (ICO).

The initial funding for LushCoin will be created from the economic ecosystems from two donated innovations that will act as seeds around which others can innovate. The first is called Windway and the other is a self-organising city called *Awesome City*. It is hoped that talented people will take advantage of them to build a vibrant ecosystem around LushCoin. Any other inventions or innovations are most welcome of course.

Windway is a transportation system based on generating pressure differences in a long tube such that winds blow through it because of the chimney effect.

Windway is expected to generate opportunities for talented people to invent various sail crafts, ground effect machines, other services (postal for instance) and varied automations and so forth that can utilise Windways winds.

Awesome City is a sustainable, self-running city on the blockchain in which everyone can own a house and house owners in turn, own the infrastructure of the city. Utility companies would need to rent infrastructure from house owners.

Ownership of the city's infrastructure will make its dwellers very vested in its wellbeing and give them the ability to sack erring or Shylock utilities.

Infrastructure ownership also gives individuals and communities better control of the access points to their privacy. Humankind is the only creature with a developed sense of privacy, so invasion of privacy reduces a persons humanity and moves them closer to the rank of animals.

In general, the way Awesome City works is by:

- lowering the cost of building by utilising plastic waste and alternative composites to extrude whole wall and other house sections, roads and pavements (sidewalks) - all complete with piping and wiring for services;
- each house coming as a package with a prefabricated section of street and sidewalk that belongs to the house owner;
- decentralisation of services, such as electricity, water and sewage (the extent will vary with climate and locality).

It is expected that Awesome City will spur several inventions and innovations, from construction methods to legal frameworks.

Learn more about Windway and Awesome City on [Github](#).

Code Style

Code will be kept simple, so that those without a C# background can get up and running quickly.

Concepts that are uncommon outside C# will not be used C# (LINQ and dynamic for instance).

The *var* keyword will not be used in C# files because, it is not essential and can create difficulties for those not familiar with .NET system namespaces and types.

User interfaces will be done in HTML for ease of development across varying devices.

Conclusion

A method has been proposed that replaces PoW with actual work that adds real value to quality of life the physical world, creates a new definition for currency, while putting people first through artificial intelligence-blockchain synergy. A continuous loop of investment in communities is encouraged through a structured means of harnessing the original ideas of their talented individuals.

Inventors and innovators are rewarded for the value their ideas bring, while effort and monetary cost of protecting intellectual property has been lowered to almost zero, with the community given oversight. Further, novel methods have been proffered by which inventions and innovations are both simultaneously protected and released as open source for the rapid spread of knowledge across communities.

Rather than tangled legal processes in varied countries; rights to a concepts originality can be protected with an idempotent intellectual form, robust cryptography and the inbuilt trust of the blockchain.

Inventors and innovators are also paid (until death) in blocks each time anyone makes a successful LushCoin application to use their work, sparing the pain of having to walk a maze in negotiations for royalties with several distinct institutions and businesses.

Acknowledgements

Special thanks go to Satoshi Nakamoto, the late Hal Finney and Gavin Andresen for the invention of Bitcoin and the blockchain. The very concept of LushCoin would not have been impossible without their efforts.

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