LIKE, TRUST and RESPECT

Tokenizing Sentiment and Opinion on the Telos Blockchain

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Abstract:

Sentiment tokens, a novel form of blockchain token is defined as a transferrable token issued on a blockchain platform that can only be transferred by its issuer or issuers, rather than by the owner of the account where it is held—in contrast to how previous blockchain token standards control token transfer. The ability to issue tokens to a blockchain address or account that cannot be increased or removed by the address or account owner permits others to create persistent expressions of sentiment or opinion regarding the recipient. Potential uses are described from single-issuer ratings or certifications systems to multi-issuer "Like" or "Trust" type ratings that gain meaning through aggregation from multiple users to "Respect" type ratings that gain power either through aggregation or from extending web-of-trust recommendations from known individuals within one's circle of acquaintance to those outside of it. Various implementations are proposed.

The Power of Sentiment

Shared sentiment is a powerful cultural phenomenon. Social media and commerce platforms from Facebook to eBay to Yelp to Lyft illustrate many different implementations of the power of sharing opinions about others, especially when aggregated with the opinions of others to reveal general sentiment. Blockchain networks offer an ideal opportunity to both tokenize sentiment and add power to the aggregate expression of sentiment as expressed by users.

This paper proposes a method to tokenize sentiment across the users of a blockchain network to enable a variety of useful purposes. To facilitate this, we propose a novel implementation of blockchain tokens.

Defining Terms

A blockchain network is first described in the *Bitcoin White Paper*[1] and later extended in the *Ethereum White Paper*[2], these two representing first- and second-generation blockchains, respectively. Third-generation blockchains such as EOS[3] and Telos[4] are described in their respective white papers. Blockchain non-system tokens are a form of smart contract[5] assigning a unit of value or non-value recorded on a particular

blockchain address or account. An address is a form of public key used in first- and second-generation blockchains that can be controlled by hashed messages created using the corresponding private key. An account is a third-generation improvement over addresses which allows the keypairs controlling the account to be changed and assigned limited control over signing functions without needing to use an entirely different address. Address and account may be used interchangeably for most concepts related to this paper. The use of non-system tokens recorded on a blockchain is most applicable to Turing-complete second- and third-generation blockchains. "Sentiment" as used here refers to a specific axis of opinion of one account or accountholder about another. This does not refer to "sentiment" as a shorthand for "sentiment analysis" which is a measure or prediction market of the likely loss or gain of a particular financial security.

Sentiment Tokens – A Novel Approach to Token Transfers

Several important token standards exist within blockchain technology. The seminal standards include the bitcoin token standard for fungible system tokens on a first generation blockchains, the ERC-20[6] (Ethereum Request for Comment) standard for fungible auxiliary tokens for second-generation blockchains, and the ERC-721[7] standard for non-fungible tokens. Other important token standards update these or apply them to different networks while retaining their general features. Arguably the most important common feature of all of these token standards is that the owner of the address or account where the tokens currently resides wholly or primarily controls their transfer. As these tokens are intended to confer ownership of value, this is a natural and necessary approach to control over their transfer. Blockchain technology, however, offers more robust and varied approaches to controlling tokens; the owner need not control the transfer of all tokens.

If tokens are to be used to express sentiment about an address or account, the ability for the address or account owner to acquire or remove these tokens would render the expression of others' sentiment worthless. The account owner could simply remove all of their demerits and acquire merit tokens to easily appear virtuous. In order for the expression of sentiment to have value, the tokens representing the sentiment must be transferrable only by the issuer so that they remain attached to an address or account as a persistent badge that the account owner can neither acquire nor dispel on their own. This control of transfer by the issuer and not the owner is the primary defining feature of the *Sentiment Token*.

Sentiment Token Definition

A Sentiment Token is a blockchain token intended to convey some sort of sentiment, opinion, data, meta-tag, or other information about an account which is defined by the issuer who also solely controls the transfer of the token and not of the owner or controller of the cryptographic keys that otherwise control the receiving address or account.

Extending the Definition

Sentiment tokens are issued from one or more smart contracts that exists on one or more blockchain addresses or accounts. They may have a sole issuer such as a centralized ratings system, for example if *The Michelin Guide*[8] tokenized their restaurant rating system to apply Star ratings from a smart contract under Michelin's sole control to issue, remove, or modify that would be applied to the publicly acknowledge account of a restaurant. The veracity of the single issuer would be easily verified and their tokenized

sentiment would be essentially impossible for recipients to fake or remove while being transparent and discoverable to any third party. Many forms of certifications, licenses, and ratings could utilize this model.

An alternative form of sentiment tokens may have multiple issuers of the same token or set of associated tokens that are semi-fungible in that all are of the same type and name and therefore may convey information about the aggregate sentiment of groups of issuers, but each token is further scoped by its individual issuer address or account. For example, a RESPECT token may be issued from a single token-issuing smart contract that permits other addresses or accounts to issue tokens from that contract with their own address or account name as the `issuer` and therefore controller of token transfer. Such tokens would be semi-fungible in that any RESPECT token from a single issuing account is fungible with any other, but tokens from different issuers are not fungible across issuer accounts. In this way, these tokens convey information about the sentiment of any single issuer regarding the recipient account. Further, the aggregate amount of RESPECT tokens issued to a given account conveys meaning about group sentiment.

As the sole-issuer (Michelin ratings-type) version is an easily understood subset of the more expansive implementation of sentiment token, we will focus on describing the latter here with the expectation that all information needed to implement simpler versions, such as a single-issuer token, is encapsulated within it.

Three Approaches to Tokenizing Sentiment

Any kind of personal opinion or sentiment can be expressed through a sentiment token. For the initial implementation, we will describe three useful axes: Like, Trust and Respect to illustrate three distinct implementations of tokenized sentiment.

Like demonstrates a balanced ternary system: a person can express a sentiment of one "Like", one "Dislike", or a neutral or non-opinion or about another person or account. (A simpler, binary version of this similar to the Facebook-style "Like" can also be tokenized with expressions of "Like" or no recorded opinion signifying a neutral, negative, or non-opinion of another.) In simple terms, a person either likes something or they don't which could mean either dislike or no opinion or else they like, dislike or express no opinion. (Our implementation herein uses the latter.) In either case, there is no granular scale of greater or lesser like or dislike expressed.

Trust also demonstrates a balanced system with positive values expressed in "Trust", negative values expressed in "Distrust" or no expressed opinion or the expression a neutral opinion also possible but indeterminate. The difference between Trust and Like is that Trust also includes a fixed scale of granularity for each direction. This allows a person not only to express one's like or dislike of another, but when expressing a sentiment of trust, to provide a relative amount of trust or distrust to properly convey scale. A person can trust another a small amount (water my plants for the weekend) moderate amount (feed my dog for the weekend) or a large amount (babysit my children for the weekend). The amount of TRUST or DISTRUST tokens bestowed on another account by any single issuer gains additional meaning and facilitates more clear communication through the use of the common scale.

Respect demonstrates a balanced system with no predetermined scale where each user provides their own personal context and the value of the "Respect" or "Disrespect" is derived from the reputation of the issuer and also expressed in magnitude by the number of tokens designated. Some context is assigned by either strictly limiting or rate-limiting the issuance of RESPECT and DIS tokens to any one issuer so that bestowing an amount that is high relative to either the total or weekly issuance limit indicates a strong and possibly sustained feeling of ongoing respect or disrespect for an account. Unscaled tokens with unlimited issuance

remove this meaning, but still allow the strength of sentiment for any given issuer to be expressed as a percentage of the issuer's total bestowal of that token on other accounts. (This approach is also available to unscaled tokens with limited or rate-limited issuance.) In this implementation, RESPECT and DIS tokens are rate-limited to facilitate ongoing engagement with the system.

Implementing Tokenized Sentiment

The implementation of this tokenized sentiment utilizes common principles for all three approaches with the primary difference being the amount of tokens that may be bestowed on any given account: a single token in either direction, a fixed scale or maximum amount of tokens in either direction, or a free amount of tokens in either direction.

The common traits to all of these systems are:

- Tokens for any axis, either positive or negative, are issued under a single contract (for blockchains where this is possible, otherwise as contracts recorded at multiple addresses).
- A separate token is used to represent positive and negative direction (LIKE/DISLIKE, TRUST/DISTRUST, RESPECT/DIS or DISRESPECT).
- Tokens are held in the recipient's account and freely viewable on the blockchain as a balance held by that account.
- Each token is issued by a particular account so that they are semi-fungible. One RESPECT token from Shonda's account is fungible with any other RESPECT token from Shonda's account but not with RESPECT tokens from Mikhail's account. A person may have 20 (Shonda's) RESPECT tokens and 5 (Mikhail's) DIS tokens that do not specifically offset one another.
- When transferring tokens from the same issuer, it is not possible to have both positive and negative tokens used along the same axis. If Mikhail has 5 (Shonda's) RESPECT tokens and Shonda then issues 7 DIS tokens to Mikhail, the 5 (Shonda's) RESPECT tokens will first be removed before 2 (Shonda's) DIS tokens are applied.
- The transfer of tokens is controlled entirely by the issuer not the recipient such that the recipient can neither acquire or remove tokens placed on their account without action by the issuer. This is the reverse of standard tokens.
- When tokens are first issued or minted, they are initially placed in a specific account created specifically as a holding area for all unassigned sentiment tokens, positive and negative. This prevents the issuer from assigning large numbers of positive sentiment to their own account through initial issuance or from increasing their net negative or positive sentiment scores by transferring the opposite direction tokens to other accounts.
- Issuers cannot transfer tokens to their own issuing account (but can issue tokens to another account they own).

Each token, then has a particular set of actions required to achieve this.

Issue() action creates the token. Typically an issue action would take the parameters *issuer* (the account issuing the token) *token* (the token name), *amount* (the amount of tokens to be issued), and *account* (the recipient account where these newly issued tokens will be sent, if other than the issuing account.) The issue() action for these sentiment tokens need not take parameters because the tokens' creation will always follow a fixed pattern.

- Issuer will be the name of the account or address issuing the token.
- Token will be both the positive and negative versions of the contract token (e.g. LIKE/DISLIKE).

- Amount will be a fixed amount depending on the issuance rules of the specific token. For LIKE tokens, where only one can ever be attributed to another account, issuing a strict 200,000 LIKE and DISLIKE tokens per issuer should be enough for any account. For TRUST or RESPECT tokens on the other end of the spectrum, since any amount may be used, the relative value is suggested by the issuance rate and a more frequent issuance, such as weekly, may create better engagement.
- (Recipient) account will always be the same upon issuance so that all newly issued RESPECT and DIS tokens go to a specific account such as `respectbank` for holding until transferred. Because the issuer, not the recipient always controls token transfers, the tokens can exist in one account and still be easily transferred to another by the issuer.
- The issue action must check the date of the previous issue() action call so as to keep issuance to the predetermined period for a given token (annually, weekly, daily, etc.)

Transfer(token, amount, account) assigns the token to another account with some specific rules:

- Only the issuer can transfer the token.
- The token cannot be assigned to the issuer account itself.
- When transferring a token in one direction, the balance of the corresponding opposite token is first checked and reduced to maintain a balanced scale.
- The token can only be transferred in the amount relative to its predetermined maximum, if there is one. (E.g. a LIKE token has a maximum of 1 (issuer) LIKE or (issuer) DISLIKE per account. A RESPECT or DIS token has a maximim of 5 per issuer per recipient.)

Use Cases

Because these tokens cannot be dispelled by the account holder except through the actions of the issuer, they gain reputational power, especially when aggregated across many users. This suggest many use cases.

Auxiliary Voting: Consider a voting proxy intended to vote for the block producers (DPOS validating nodes) on a network that have garnered the most LIKE. A smart contract on the proxy account could regularly monitor the LIKE and DISLIKE tokens assigned to each block producer's account and use these to select the block producers that will receive the votes that network users stake to the proxy based on defined rules. For example, the block producers could be ranked by either the total or average LIKE/DISLIKE delta. This creates an informal voting on a DPOS network that does not use the amount of staked native tokens in an account for its vote power but instead assigns an equal potential of vote power to every account that the account issues relative to their direction of sentiment. This provides a qualitatively different voting system than previously possible. A voting proxy that wishes to offer its votes to the most liked/least disliked block producer could do so and give every account the same vote weight regardless of staked tokens.

Reputation Discovery: Consider a blockchain where commerce is regularly performed between accounts that may be anonymous or pseudonymous. The use of TRUST and DISTRUST tokens can show the direction and scale of each issuer's sentiment about the account. Aggregated with the tokenized sentiment from multiple issuers, a new customer of an account could quickly ascertain the general trust or distrust as well as the scale of that sentiment for an account prior to completing a transaction. A wallet application could allow users to turn on optional warnings and even set warning levels when preparing to send monetary tokens to an account to notify them prior to sending funds to an account with a certain threshold of DISTRUST. This would give the account owner the opportunity to reconsider payments to strongly distrusted accounts.

Escrow Service Pricing: Consider a blockchain as described under Reputation Discovery. Users who purchase goods or services from one another may use a smart-contract powered escrow service to insure transactions between parties. The cost of providing this escrow service can incorporate the TRUST level of one or more of the parties depending the transaction. For example, a simple sale of goods from one account to a purchaser could require a lower fee from accounts that have high levels of TRUST and low levels of DISTRUST from a broad base of users.

Personal Vouching: Consider a smaller group of individuals or accounts that exists on a larger blockchain network. Perhaps these are all people working as individual virtual team members in the same field. For this example, they are all software developers, but they could be anything from video production professionals, to studio musicians, to marketing professionals. As new *ad hoc* teams form for various short-duration jobs, how do people within this community judge the capacity of a team member they have not previously worked with. This could be an important consideration on the outcome of the job. While individual reviews are one approach for assessing the relative value of a potential team member, each review is unique and difficult to quantify. Instead, a tokenized measurement of RESPECT can be used where the most important factor may be the issuer of any RESPECT token. A team-member discovery system could search for potential team members who hold RESPECT (or do not hold DIS) from issuers already within a user's web of trust. In this way, a user looking for additional team members for a particular role on a project can use RESPECT or DIS tokens issued by a known party as a way to prioritize or qualify potential team members. Although RESPECT and DIS tokens do not have a common scale of bestowal, a Personal Vouching system could easily compare the percentage of tokens that a known reviewer bestows on an account under consideration relative to the total.

System Gaming

While certain controls are incorporated into the design of sentiment tokens such as issuer-only transfers and prohibiting the transfer to the issuing account, certain system gaming is still possible and easy. For example, an account that wished to seem well thought of could create numerous other accounts that would then be able to assign positive sentiment tokens to it. Or an account could create many dummy accounts to provide negative sentiment on its competitors. Chain analysis may provide some protections, as accounts created by or otherwise meaningfully associated with other accounts expressing similar sentiment could be discounted fairly effectively in sophisticated sentiment monitoring tools. However, while there will always be ways to game any sentiment system, it is arguable that sentiment aggregating systems are not necessarily skewed by gaming tactics that require some effort, such as creating additional dummy accounts for voting. In this line of thinking, additional effort used to express such sentiment in fact expresses strong sentiment that should be measured by such systems. People who feel so strongly about another that they go to effort to game a sentiment monitoring system, may, in fact, simply be expressing a large amount of sentiment.

More importantly when judging the ability to game sentiment systems, the effectiveness of such gaming efforts reduce significantly with the increased usership of such a system. Moreover, because the accounts are recorded on public, decentralized blockchains, the ability to detect and discount the impact of automated bot-net type accounts is far greater for sentiment token-based opinion aggregating systems than for private systems that are closed to independent analysis such as present social media platforms.

Conclusion

The authors are implementing the ideas contained in this paper as a new token standard on Telos: TIP-34 Sentiment Token Standard, and as distinct implementations of LIKE/DISLIKE, TRUST/DISTRUST, and RESPECT/DIS tokens on the Telos blockchain. We encourage the makers of blockchain tools such as wallets and block explorers to facilitate use by adding sentiment token display and monitoring functions to their tools.

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