

PATH: A Blockchain Program for Public Health Data

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Introduction

The global COVID-19 crisis has revealed major issues with the collection of public health data. Cases of infection are believed to be extremely underreported as a result of inconsistent reporting methods, delays in the data reporting pipeline, as well as differences in health-seeking behavior among individuals.¹ Furthermore, concerns around data privacy have arisen in light of tracking and surveillance-based means of gathering data on the pandemic (ex. using location data from telecommunication companies).² In order to gather high-quality public health data for regulators and epidemiologists, there needs to be a standardized and fast method of gathering data that aligns with the incentives of the population at risk.

Project Description

This project proposes a blockchain token program called *Pathogen (PATH)*, with the goal of using the token protocol to solve the inefficiencies and drawbacks of public health reporting. By using the blockchain to collect and store carefully scoped sets of health data from individuals, privacy concerns around identifiable health data can be solved. Tokens can also be utilized as a financial incentive for people to submit data, thereby alleviating underreporting caused by low health-seeking behavior. In addition, this protocol would be incredibly quick and inexpensive as it would be built on top of the Solana blockchain, which has very cheap and fast transactions.³ At a high level, the goal of PATH is to create a standardized way of receiving and publishing health data that offers more incentives for populations to submit reports on their own diagnostic information with improved reliability and privacy. The hope is that this improved data can then be made more readily available and accessible to both regulators and the private healthcare sector to develop policies and products to prevent the spread and growing virulence of diseases.

Deliverables

1. PATH Tokenomics Design

This entails a detailed model of PATH's built in mechanisms to ensure that the supply and demand of PATH tokens are aligned with the goals of the token protocol in improving health collection data. This will be where most of the conceptual complexity of this project lives. There are many interesting design approaches to take here. One example includes burning someone's PATH tokens for a disease if they die from it, which would reduce the supply and increase the value of PATH tokens, thereby providing more financial incentive to report data on more deadly diseases. Other design details include minting PATH tokens for new diseases, deciding reward amounts for users who submit health data, preventing abuse for financial gain, and balancing supply for diseases with a wide infection radius.

2. PATH Implementation

This entails a prototype of the PATH token protocol on a Solana development network. The code will be written in Rust and will include implementations of the core PATH tokenomics. This will also include a frontend interface for submitting/visualizing health data, as well as a simulation of how the protocol would work with COVID-19.

Conceptual Challenges

1. Balancing Centralization and Decentralization

The decentralized nature of the Solana blockchain is useful in improving accessibility and anonymity of data, but some degree of centralization is necessary for verifying that incoming data is valid. Otherwise, users could submit fake data in an attempt to acquire more and more PATH tokens. There will need to be validators with some form of

elevated privilege in the protocol, thus making balancing the benefits of decentralization and centralization a difficult problem.

2. Maintaining Anonymity

Anonymity of the data can only be guaranteed if the collected data is not identifiable. Thus, a well-defined set of properties must be selected such that a person's identity is not traceable from the data alone. At the same time, there must be enough data such that it is still useful for research.

3. Representing New Diseases

Should PATH create new fungible tokens (ex. PATH-COVID19, PATH-SARS) for new diseases? Who has permission to make these new tokens and what restrictions are there?

Implementation Challenges

1. COVID-19 Simulation

Creating a simulation of the protocol for COVID-19 is challenging in that lots of fake data needs to be generated and processed. Gathering aggregated statistics for this test data will also be quite challenging when the data is stored on the Solana blockchain, as I will have to choose a method that minimizes cost.

2. Tooling

While I've worked with smart contracts on the Ethereum network using Solidity before, this is my first time working with Solana and programming in Rust. I'm hoping to learn a lot about best practices when creating Solana programs, and also how to interface with the Solana blockchain for the frontend part of the deliverable. The low transaction fees and high transaction speeds of Solana are more conducive to this project's purpose compared to Ethereum. I'm very excited to work with it.

Citations

1. <https://www.devex.com/news/data-around-covid-19-is-a-mess-and-here-s-why-that-matters-97077>
2. <https://jhumanitarianaction.springeropen.com/articles/10.1186/s41018-020-00072-6>
3. <https://solana.com/>
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