Quadratic Funding using Blockchain

Problem Statement

Often in a crowdfunding situation, there is a pool of funds to be "matched" with the crowd funds. For example, for each dollar put toward a project, a dollar from the fund will be put toward the same project. There is an issue with this though, 1 person could put $1000 on project A, while 500 people put $1 on project B. More people want project B to succeed, but project A will receive more from the fund.

Solution

Quadratic Funding (QF). QF is based on a mathematical equation that ensures a proper distribution of matching funds. Instead of funds being matched 1:1, they are directly related to how many users have voted on a project. Using QF, project B would receive more funds matched to it.

Quadratic Funding Formula

$$v_i^p\left(\left(\Sigma_j\sqrt{c_j^p}\right)^2\right) - c_i^p$$

Main Technologies Used

Rust

Substrate

Polkadot

How It Works

Some user starts a voting round and becomes the round **Coordinator**, their account balance will become the matching pool of funds. A different user creates a new project and becomes that **projects owner**. The project owner is then responsible for registering their project to the voting round. The users are now able to **cast votes**, specifying an amount of funds to donate. The Coordinator eventually ends the voting, triggering the QF calculation and distribution of matching funds to all project accounts

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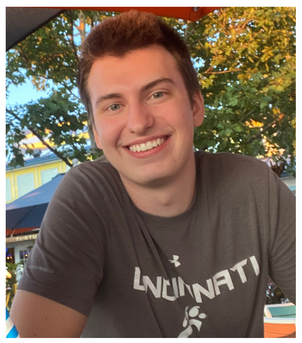

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Challenges

Our project had 2 main challenges. Our first problem improper planning, we had to restrict the scope of the project to be more realistic. The second was writing code that compiles to WASM. We did not have access to the Rust standard library, and thus had to find creative solutions for some issues.

Impact

Many organizations could benefit from using quadratic funding for their crowdsourcing campaigns. The users placing votes know their funds will be honestly matched. The project owners know they will be fairly compensated based on the desires of the community.

Results

We chose to make a module on the Substrate blockchain framework as our implementation. This allowed our team to focus on developing a quadratic funding system without worrying about the money portion. Our project provides a barebones yet functional QF implementation. In the future we would like to expand this project to add zero knowledge voting, sybil resistance and anti-collusion, which would make it production-ready.