Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Distributed Computing

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Measuring Decentralization in DAOs

It's voting day in your favorite Decentralized Autonomous Organization (DAO). The proposal is critical, the stakes are high. Based on prior discussions on Reddit and Discord, you're confident your favored option will pass with flying colors; after all, most accounts hold a similar amount of tokens, and there seems to be a broad consensus. To your surprise, the final vote swings in the opposite direction, secured by a very slim majority. What happened?

This unexpected outcome often stems from a fundamental challenge in DAOs. As voting power is tied to token ownership, a single "whale" with numerous accounts can distribute their tokens to create the *illusion* of diverse voters. All these copies however vote in unison. This hence raises the question of how truly decentralized such networks really are.

This project aims to build a new generation of such decentralization metrics. By embedding voter accounts in a metric space where similar voting patterns place accounts closer together, we can identify "voting blocs." Critically, instead of relying on sensitive clustering algorithms to detect these blocs, this project will integrate *clone-robust weighting functions*. These mathematical tools are designed to automatically detect and ensure highly similar, near-duplicate voters *share their collective influence*, rather than amplify it. The result will be a stable and fair decentralization metric that effectively distinguishes true diversity from mere illusion.

Requirements: This project demands strong mathematical and coding proficiency, coupled with a solid background in machine learning. Candidates should be highly motivated, capable of independent work, and eager to contribute their own ideas. While not strictly required, previous knowledge of blockchain technology and a keen interest in DAOs will be a substantial advantage.

Interested? Please reach out for more details!
In a few sentences, describe your motivation for this project, highlighting any relevant courses or prior projects that your transcript can further illustrate.

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