Fairness in Token Delegation: Mitigating Voting Power Concentration in DAOs

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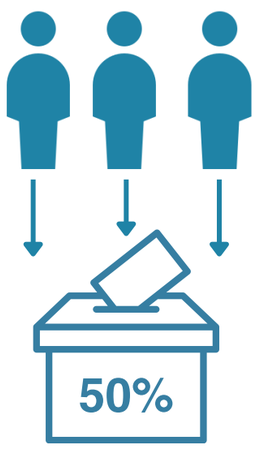
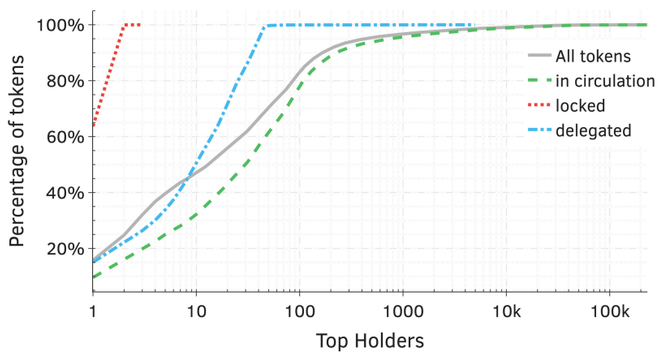
Motivation

Fairness Gap in DAO Token Delegation

- A small group of 10 voters holds significant voting power (50.53% of all tokens).
- Proposals only required an avg. of 3--5 **voters to obtain at least 50% of the votes**.



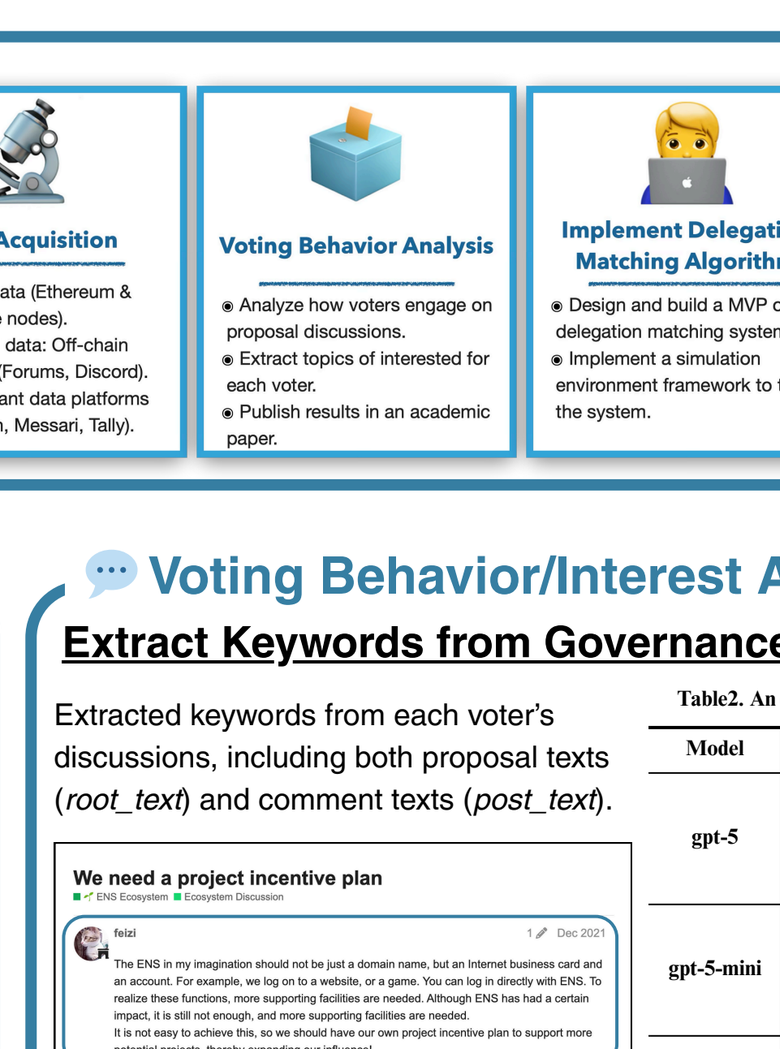


Smaller voices are drowned out, decreasing participation.

Current Problem

Popularity Bias in Delegation Platforms

Case Study: Tally - Platform Designed to Support DAOs



- Dashboards display accounts based on their popularity (e.g., **voting power, received delegations**).
- Token holders struggle to **identify delegates truly aligned with their interests** among numerous options.

Our Proactive Solution

Interest-Aligned Delegation Matching

RQ: Among all accounts available to whom should users delegate their tokens to?

Goal: Support token holders' decision-making to **delegate to voters who are better aligned with their interests**.

Example: A *Delegation Advisory* system, similar to voting advisories in democratic elections.

Data Acquisition

- Analyze how voters engage on proposal discussions.
- Extract topics of interested for each voter.
- Publish results in an academic paper.

Voting Behavior Analysis

- Design and build a MVP of delegation matching system.
- Implement a simulation environment framework to test the system.

Implement Delegation Matching Algorithm

- Deploy the matching algorithm by partnering with delegation platforms / DAO projects.
- Evaluate the performance via A/B testing and/or simulations.

Test and Evaluate

Data Acquistion

- **On-chain Data**: Gathered 6 DAOs' data from Ethereum and Arbitrum archive nodes. The dataset includes *token transfer transactions, governance proposals, voting activities, and token delegation details*.
- **Off-chain Data**: Scraped data from 14 DAOs' governance forums. The dataset includes *proposal metadata, user metadata, and discussion posts*.
- **Off-chain ↔ On-chain Identifiers**: Queried public profile data, including *usernames/social handles associated with on-chain wallet addresses* via Tally API.

Username-to-Wallet Mapping

Why?: To **better capture delegates' voting interests** by associating governance forums discussions with on-chain activities.

How?: Link forum names with ENS names (extracted via Etherscan ABI) or usernames on Tally.

Table1. Examples of Forum–to-Tally User Entity Matching

Label	*Username (forum)*	*Optional name (forum)*	*Mapped .eth name (Tally)*	*Username (Tally)*	*Twitter/X handle(Tally)*	*Matching reason*
High-confidence	**ayaeide.eth**		**ayaeide.eth**	ayaeide	ayaeide	Exact ENS match
Middle-confidence	**ayaeide123**		0xayae.eth	0xayae.eth	**ayaeide123**	Username and ENS alignment
Low-confidence	jjjohn.eth	**john**	0xjohn.eth	**john**	johnme	Naive name-based match
Manually verified	**blockchainedu**		blockchainedu.eth	ben	**blockchainedu**	Profile info match

Voting Behavior/Interest Analysis

Extract Keywords from Governance Forums

Extracted keywords from each voter's discussions, including both proposal texts (*root_text*) and comment texts (*post_text*).

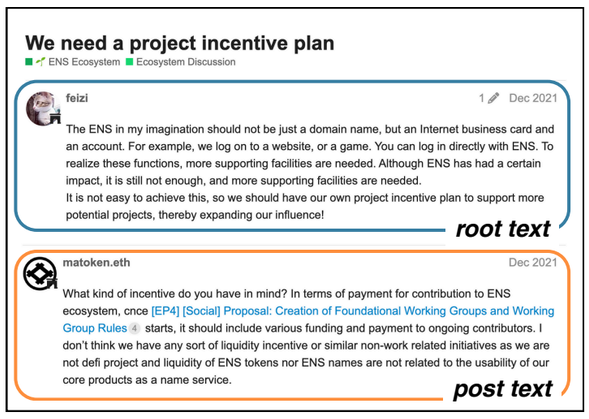
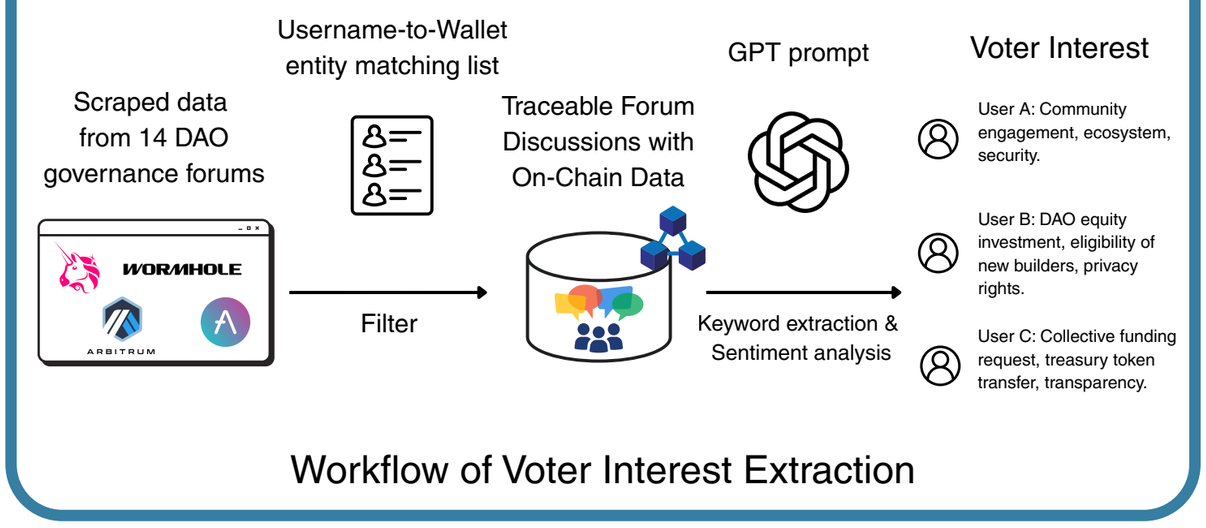


Table2. An example of keywords from different models

Model	Top Keywords
gpt-5	Contributor compensation, EP4 Foundational Working Groups, Liquidity incentives rejection, Incentive model clarification, Non-DeFi positioning
gpt-5-mini	contributor payment/funding, incentive program for projects, Foundational Working Groups proposal, opposition to liquidity incentives, ENS as login/account
gpt-5-nano	ENS incentive, working gorups, working group rules, contributor payments, ecosystem funding
KeyBERT	contribution ens ecosystem, payment contribution ens, liquidity ens tokens, contribution ens, liquidity incentive similar

Voter Interest Discovery



Workflow of Voter Interest Extraction

Future Work - Implement, Test, and Evaluate Delgation Matching Algorithm

- **Implement Delegation Matching Algorithm**: Based on the findings from voting behavior/interest analysis, we connect nuanced voter preferences extracted from off-chain data with on-chain behaviors, informing our delegation matching algorithm. Our system will ensure that **token holders delegate their voting power to delegates whose preferences and voting behaviors align with their own**.
- **Test and Evaluate**: We refine the model based on the evaluation results. **Looking for partners to test our algorithm in the wild!** 🚀