Is decentralized finance actually decentralized? A social network analysis of the Aave protocol on the Ethereum blockchain

COMP7860 Project Proposal

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Contents

Paper Introduction

- Research Topics/Keywords
  1. Cryptocurrency / Digital Currency (Bitcoin, Ethereum)
  2. Blockchain Network (A shared, distributed and immutable ledger)
  3. Decentralized Finance
  4. AAVE (A lending and borrowing protocol on Ethereum blockchain)
- Backgrounds
  1. Actual realization of peer-to-peer transactions and the levels of decentralization is largely unknown
  2. How the levels of decentralization would affect the economic performance of the blockchain platform and market outcomes (liquidity and volatility) are largely unexploited

Paper Introduction Cont.

- Research Methodology
  1. Apply **Social Network Analysis** and **Regression Analysis** to measure the **level, dynamics, and impacts of decentralization** in Decentralized Finance (DeFi) token (AAVE) transactions on the Ethereum blockchain
- Key Results
  1. The realization of decentralization: **two larger crypto exchanges dominate**
  2. Blockchain network dynamics: **from decentralized to more centralized**
  3. Counterfactual impact evaluation: higher degree of decentralization => **higher return and lower volatilities**
- Reasons of Replication
  1. Network Analysis Method
  2. Blockchain Application

Paper Justification

- Publication
  1. Accepted at 29th Annual Global Finance Conference (June 2022)
  2. Available on ArXiv
- Code
  1. Programming language: Python
  2. Code: Available on GitHub Repository
     1. Core-peripheral Analysis
     2. Network Features
     3. Regressions

Paper Justification Cont.

- Original Data Availability
  1. Original Data: Full Datasets available on GitHub Repository
     1. Historical and Real time economic features of AAVE Token
     2. Historical Total Value Locked (TVL) data of AAVE Token
     3. Historical and Real time transaction data of AAVE Token
  2. Date Sources
     1. AAVE Token Economic Feature Data: Available on Coin Metrics GitHub
     2. AAVE Token TVL Data: Source from DeFi Pulse (Data Service unavailable from May 18th, 2022)
     3. AAVE Token Transaction Data: Available on Kaggle Public Datasets (Ethereum Blockchain)

Paper Justification Cont.

- New Data Extraction
  1. Data Extraction Methods
     1. **Economic Feature Data:** Direct Data Extraction using GitHub raw data link
     2. **TVL Data:** Python API Request (API Service unavailable from May 18th, 2022)
     3. **Transaction Data:** Kaggle's public dataset BigQuery integration
  2. New Data Availabilities
     1. New Economic Feature Data is **available** on Coin Metrics GitHub
     2. New TVL Data is **not available** anymore as the API service shut down
     3. New Transaction Data is **available** in Kaggle Public Dataset (Complete Live Historical Dataset)

****The time period of existing data is 10/10/2020 - 09/10/2021, the period of new data will be 10/07/2021 - 09/07/2022**

Paper Replication

Replication of Result 1:

Result 1: Defining decentralization via network measures	Existing Data	New Data
1.Correlation Heatmap of network features	Yes	**Yes**
2.Time-series Plots of network features	Yes	**Yes**

Replication of Result 2:

Result 2: Core Periphery Structure	Existing Data	New Data
1.Core days count distribution of CA and EOA	Yes	**Yes**
2.Distribution of core nodes number	Yes	**Yes**
3.Distribution of avg number of neighbors of core nodes	Yes	**Yes**

Paper Replication Cont.

Replication of Result 3:

Result 3: Counterfactual impact evaluation	Existing Data	New Data
1.Results of the token market returns (USD)	Yes	**No****
2.Results of the 30-day volatility growth rate	Yes	**Yes**

****AAVE TVL data is not available anymore due to DeFi Pulse's API shuts down from May 2022**

References

[1].

[1] Ziqiao Ao, Gergely Horvath, and Luyao Zhang. Are decentralized finance really decentralized? a social network analysis of the aave protocol on the ethereum blockchain, 2022.

Thank you!