

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

COMP7860 Project Update

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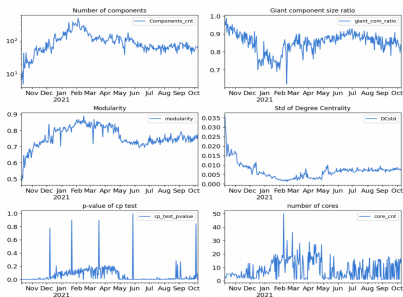
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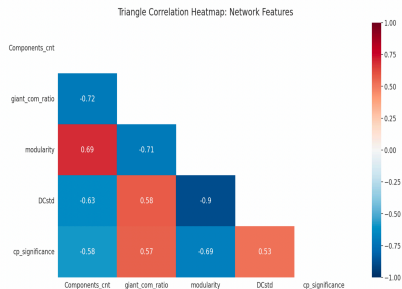
# Replication on Original Data

## Progress: Replication of Result 1:

Result 1: Defining decentralization via network measures	Original Data
1. Correlation Heatmap of network features	100%
2. Time-series Plots of network features	100%



(a) Time-series Plots of network features

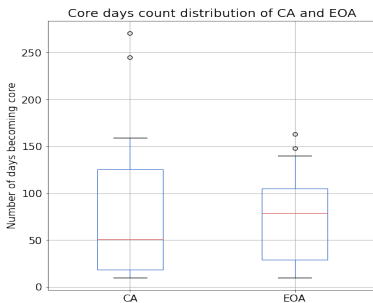


(b) Correlation Heatmap of network features

# Replication on Original Data Cont.

## Progress: Replication of Result 2:

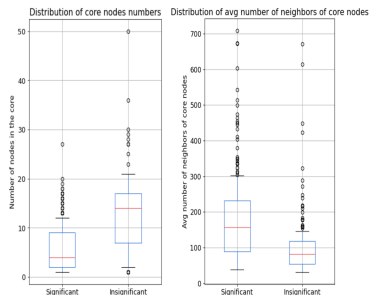
Result 2: Core Periphery Structure	Original Data
1.Core days count distribution of CA and EOA	100%
2.Distribution of core nodes number	80%
3.Distribution of avg number of neighbors of core nodes	80%



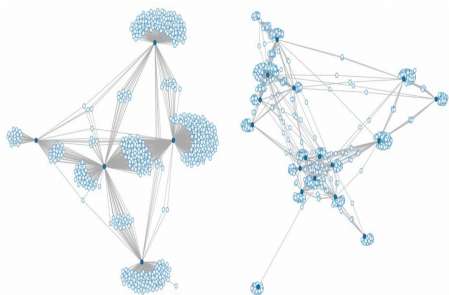
(c) Core days count distribution of CA and EOA

# Replication on Original Data Cont.

## Progress: Replication of Result 2:



(d) Core days count distribution of CA and EOA



(e) Network graphs on 2020-10-12 (left) and 2021-02-22 (right)

# Replication on Original Data Cont.

## Progress: Replication of Result 3:

Result 3: Counterfactual impact evaluation	Original Data
1.Results of the token market returns (USD)	100%
2.Results of the 30-day volatility growth rate	100%

Time horizon	t, t+1 (1)	t, t+7 (2)	t, t+14 (3)	t, t+21 (4)	t, t+28 (5)	t, t+35 (6)	t, t+42 (7)	t, t+49 (8)	t, t+56 (9)	t, t+90 (10)
$\Delta$ component cnt	-0.015	0.113	0.281**	0.423***	0.342***	0.318***	0.261**	0.293**	0.320**	0.258**
$R^2$	0	0.007	0.029	0.047	0.037	0.033	0.021	0.025	0.025	0.017
Residual Std. Error	(0.129)	(0.132)	(0.163)	(0.192)	(0.178)	(0.177)	(0.185)	(0.192)	(0.213)	(0.221)
$\Delta$ giant com ratio	0.024	-0.028	-0.086	-0.188**	-0.212**	-0.144	-0.176	-0.377**	-0.442***	-0.332***
$R^2$	0	0.001	0.003	0.012	0.017	0.008	0.011	0.049	0.056	0.032
Residual Std. Error	(0.129)	(0.132)	(0.165)	(0.195)	(0.180)	(0.179)	(0.186)	(0.190)	(0.209)	(0.219)
$\Delta$ log(modularity)	0.011	0.059	0.089	0.278**	0.288***	0.212**	0.239**	0.351***	0.368**	0.592***
$R^2$	0	0.003	0.004	0.027	0.034	0.019	0.023	0.046	0.041	0.108
Residual Std. Error	(0.129)	(0.132)	(0.165)	(0.194)	(0.179)	(0.185)	(0.190)	(0.211)	(0.211)	(0.221)
$\Delta$ log(DCstd)	0.018	0.005	-0.082	-0.217***	-0.268***	-0.220***	-0.220***	-0.267**	-0.257*	-0.337***
$R^2$	0	0	0.004	0.021	0.037	0.026	0.025	0.034	0.026	0.046
Residual Std. Error	(0.129)	(0.132)	(0.165)	(0.195)	(0.178)	(0.178)	(0.185)	(0.191)	(0.212)	(0.218)
cp significance	-0.014	-0.090**	-0.163***	-0.278***	-0.322***	-0.324**	-0.314*	-0.188	0.056	1.834***
R2	0.007	0.031	0.039	0.061	0.046	0.028	0.018	0.005	0	0.124
Residual Std. Error	(0.080)	(0.242)	(0.391)	(0.528)	(0.718)	(0.931)	(1.138)	(1.269)	(1.351)	(2.432)
PCA component1	0.024	0.047*	0.063*	0.092***	0.076**	0.059*	0.045	0.018	-0.033	-0.236***
PCA component2	-0.015	-0.117	-0.196	-0.401***	-0.332***	-0.279***	-0.266***	-0.249**	-0.236**	-0.651***
PCA component3	0.056	0.228***	0.400***	0.575***	0.487***	0.438***	0.435***	0.459***	0.469***	0.561***
$R^2$	0.011	0.107	0.194	0.3	0.252	0.202	0.177	0.172	0.146	0.42
Residual Std. Error	(0.129)	(0.126)	(0.149)	(0.165)	(0.158)	(0.161)	(0.170)	(0.178)	(0.200)	(0.170)

(f) Results of the token market returns (USD)

Time horizon	t, t+1 (1)	t, t+7 (2)	t, t+14 (3)	t, t+21 (4)	t, t+28 (5)	t, t+35 (6)	t, t+42 (7)	t, t+49 (8)	t, t+56 (9)	t, t+90 (10)
$\Delta$ component cnt	0.062	0.300***	0.294**	0.349**	0.348**	0.223	0.164	0.155	0.045	-0.279**
$R^2$	0.005	0.04	0.026	0.025	0.021	0.008	0.005	0.005	0	0.022
Residual Std. Error	(0.085)	(0.151)	(0.185)	(0.226)	(0.253)	(0.264)	(0.237)	(0.237)	(0.246)	(0.219)
$\Delta$ giant com ratio	-0.022	-0.041	-0.017	0.01	-0.043	-0.034	-0.061	-0.106	-0.079	0.049
$R^2$	0.001	0.001	0	0	0	0	0.001	0.003	0.001	0.001
Residual Std. Error	(0.085)	(0.154)	(0.187)	(0.229)	(0.255)	(0.265)	(0.238)	(0.237)	(0.246)	(0.221)
$\Delta$ log(modularity)	-0.013	-0.036	-0.128	-0.277***	-0.280**	-0.338**	-0.249**	-0.137	-0.131	-0.082
$R^2$	0	0.001	0.008	0.024	0.02	0.027	0.018	0.006	0.005	0.003
Residual Std. Error	(0.085)	(0.151)	(0.187)	(0.226)	(0.253)	(0.262)	(0.238)	(0.237)	(0.245)	(0.221)
$\Delta$ log(DCstd)	-0.041	-0.162*	0.016	0.128	0.16	0.232	0.153	-0.036	-0.022	0.2
$R^2$	0.004	0.018	0	0.005	0.007	0.013	0.007	0	0	0.017
Residual Std. Error	(0.085)	(0.152)	(0.187)	(0.228)	(0.254)	(0.263)	(0.237)	(0.237)	(0.246)	(0.219)
cp significance	-0.002	-0.028	-0.068**	-0.122***	-0.210***	-0.294***	-0.364***	-0.412***	-0.425***	-0.431***
R2	0.001	0.01	0.02	0.035	0.068	0.103	0.131	0.152	0.152	0.191
Residual Std. Error	(0.043)	(0.137)	(0.233)	(0.315)	(0.384)	(0.432)	(0.467)	(0.485)	(0.500)	(0.444)
PCA component1	0.007	0.03	0.036	0.072*	0.136***	0.191***	0.217***	0.252***	0.267***	0.307***
PCA component2	0.035	-0.004	-0.196	-0.271	-0.286	-0.280*	-0.141	-0.019	0.009	0.441***
PCA component3	0.025	0.132*	0.220**	0.201*	0.066	-0.109	-0.291**	-0.468***	-0.573***	-0.831***
$R^2$	0.008	0.031	0.044	0.05	0.076	0.124	0.184	0.257	0.299	0.508
Residual Std. Error	(0.085)	(0.152)	(0.184)	(0.224)	(0.246)	(0.249)	(0.215)	(0.205)	(0.207)	(0.156)

(g) Results of the 30-day volatility growth rate

# Construction of New Data

## 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 Progress Update: New Data Extraction

- ① New Economic Feature Data: **100%**
- ② New TVL Data **not available due API service shut down**
- ③ New Transaction Data: **100%**

**\*\*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**

**\*\*Missing TVL data will not impact any of the main results**

# 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!