A Data Exploration Tool for Novel DeFi-Metrics on the Algorand Blockchain

Nguyen Quy Tung Long, Final Presentation – Bachelor Thesis

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Outline

A brief Overview of Algorand

Algorand™

Founder *Silvio Micali* - Professor of Engineering at MIT

Algorand

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Algorand

- *Fast*, *secure*, and *scalable* blockchain platform
- *pure-proof-of-stake* based consensus approach

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Algorand

- ***Fast***, ***secure***, and ***scalable*** blockchain platform

- ***pure-proof-of-stake*** based consensus approach

- A growing number of *assets* and *financial instruments* being used on the network.

Total ASAs ?	Fungible ASAs ?	Non-Fungible ASAs ?
7,492,660	74,674	7,417,986

Total ASAs Non-Fungible ASAs Fungible ASAs ?   7D **30D** 90D 6M 1Y

7.48M

7.46M

7.44M

7.42M

OCT 15   OCT 22   OCT 29   NOV 5
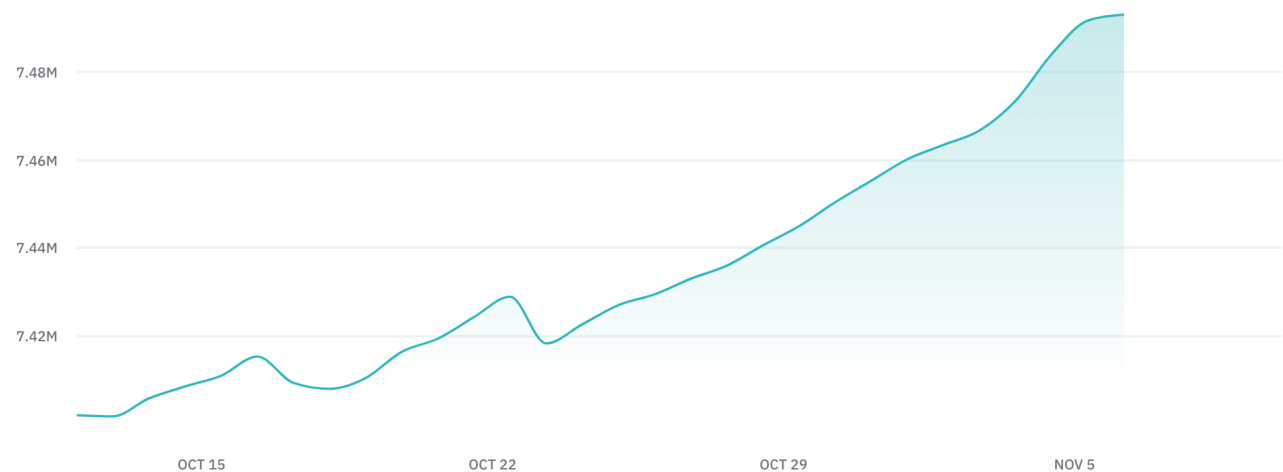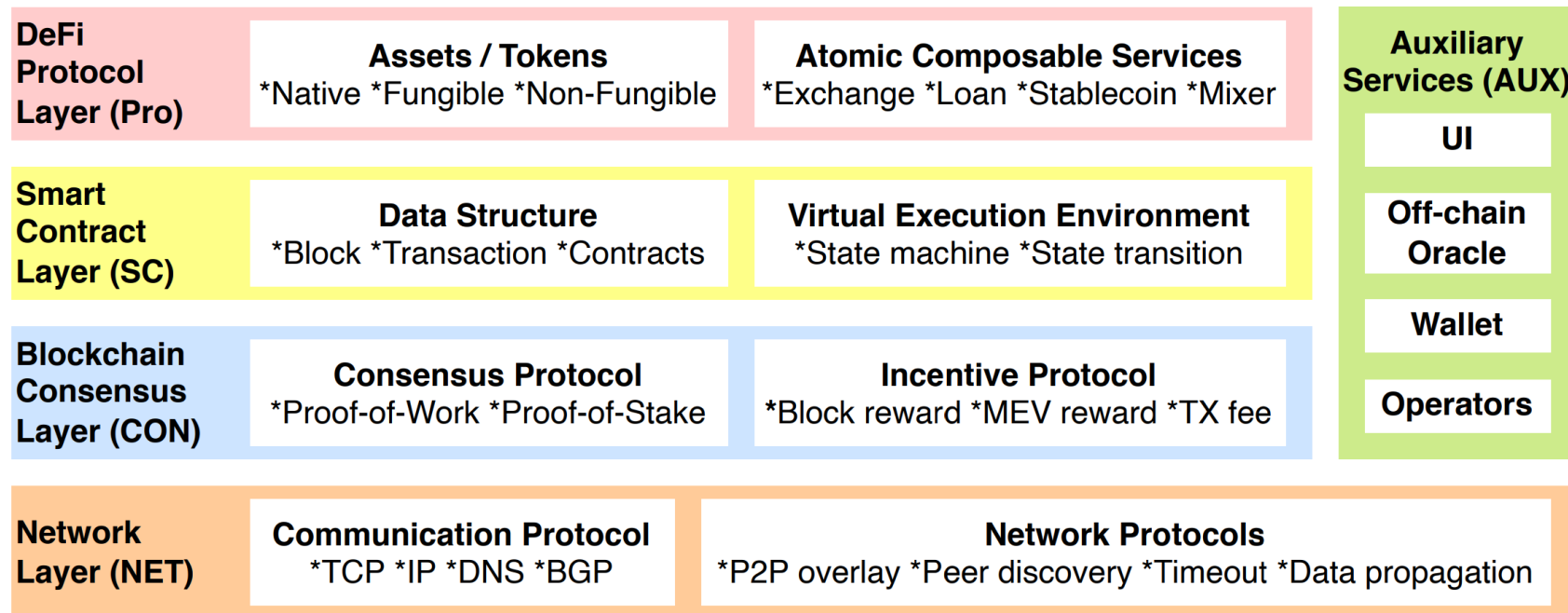
Algorand Standard Assets, *provided by* *Algorand MainNet Metrics Dashboard*, *via* *Algorand Developer Portal*, *accessed 10.11.2023*

DeFi

- **Decentralized Finance** (**DeFi**) is a *financial infrastructure* built on top of a *blockchain network*.
- It relies on *open*, *permissionless* protocols / *decentralized* applications.

DeFi Protocol Layer (Pro)	**Assets / Tokens** *Native *Fungible *Non-Fungible	**Atomic Composable Services** *Exchange *Loan *Stablecoin *Mixer	**Auxiliary Services (AUX)**
			UI
Smart Contract Layer (SC)	**Data Structure** *Block *Transaction *Contracts	**Virtual Execution Environment** *State machine *State transition	**Off-chain Oracle**
			Wallet
Blockchain Consensus Layer (CON)	**Consensus Protocol** *Proof-of-Work *Proof-of-Stake	**Incentive Protocol** *Block reward *MEV reward *TX fee	**Operators**
Network Layer (NET)	**Communication Protocol** *TCP *IP *DNS *BGP	**Network Protocols** *P2P overlay *Peer discovery *Timeout *Data propagation	

High-level systematization of Decentralized Finance

Zhou, L., Xiong, X., Ernstberger, J., Chaliasos, S., Wang, Z., Wang, Y., ... & Gervais, A. (2022). Sok: Decentralized finance (defi) attacks

Block Explorer

AlgoExplorer – Algorand Blockchain Explorer

Metrics on existing Block Explorers

TUT

> **Circulating Supply**
> - liquidity & network health
> - readiness for supporting DeFi projects

> **TVL - Total Value Locked**
> - capital investment
> - users' trust & financial scale

> **Total TXs – Transaction Count**
> - User's adoption

Metrics / Block-Explorer	Market General Information					Asset Information				Transaction Details					Block Information			Address / Account Information		
	Circulating Supply	Staked Supply	Price	TVL	TX Cost	Price ($)	Chart of Stats	Market Cap	Total Txs	Tx ID	TX Type	Sender	Receiver	Fee	Round	Proposer	Txs	Balances	Assets	Apps
AlgoExplorer	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AlgoScan	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Goal Seeker	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗

> **Daily Transaction Count**

> **Daily On-chain Volume**

> **Unique Daily Senders / Receivers**

Motivation

TUM

Existing Algorand Block Explorers

✔️ Market Performance

✔️ Community's Engagement

✔️ Assets Utilization

❌ Activities on Decentralized Exchange (DEX)

❌ Comparison of Tokens Trading Frequency

❌ Trading Volume of DEXs, Tokens

❌ Maximal Extractable Value

…

➡️ Not much useful information for *traders*, *MEV researchers*, etc.

➡️ Develop a data tool to help extract more in-depth *insights* about *DeFi assets* and *protocols*
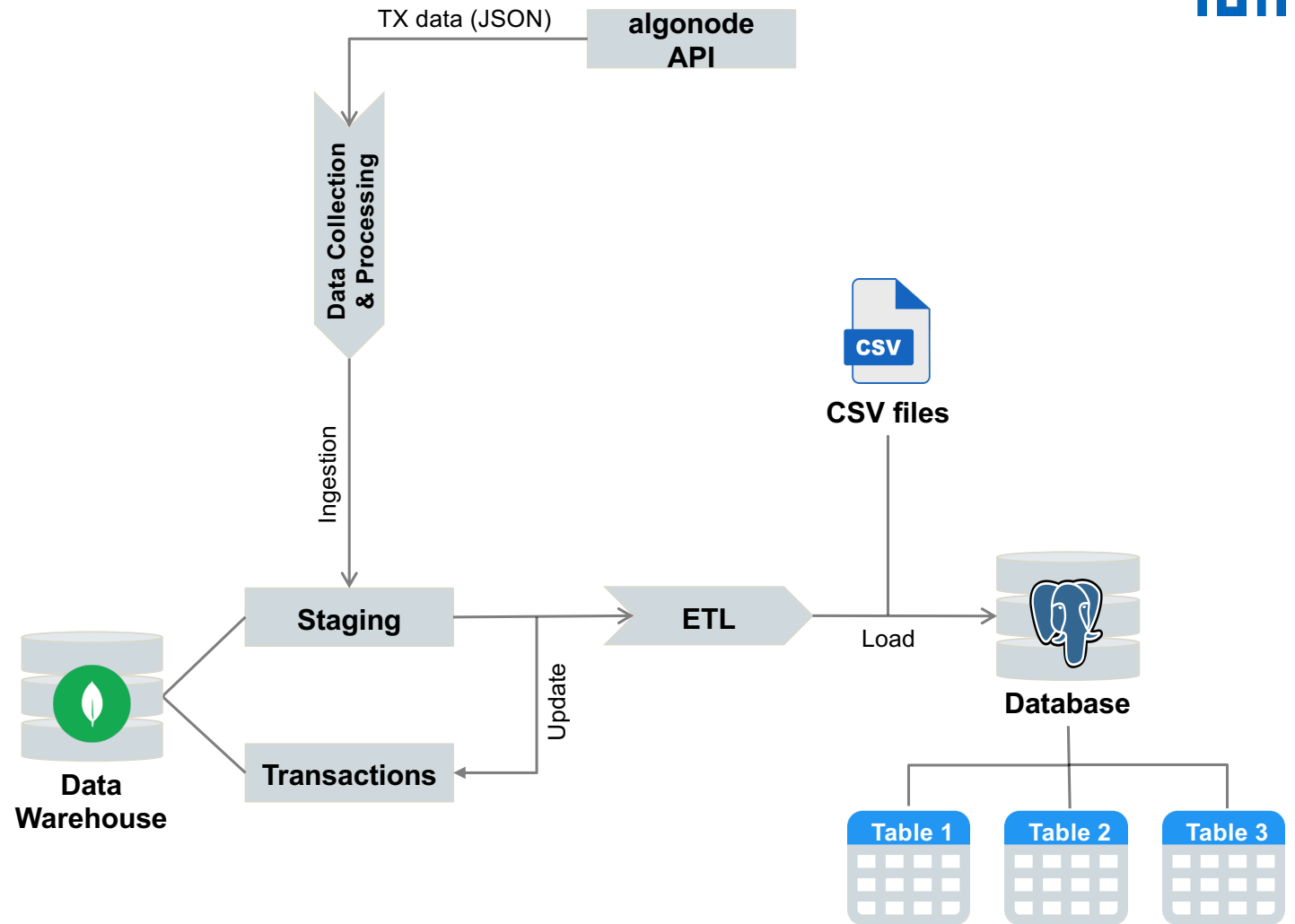
AlgoExplorer, *accessed 26 April 2023*

Outline

Data Pipelines

Data Collection & *Processing*

- Fetch transaction data from public APIs (*algonode*)
- Raw data in JSON documents
- Store in data warehouse (*MongoDB*)

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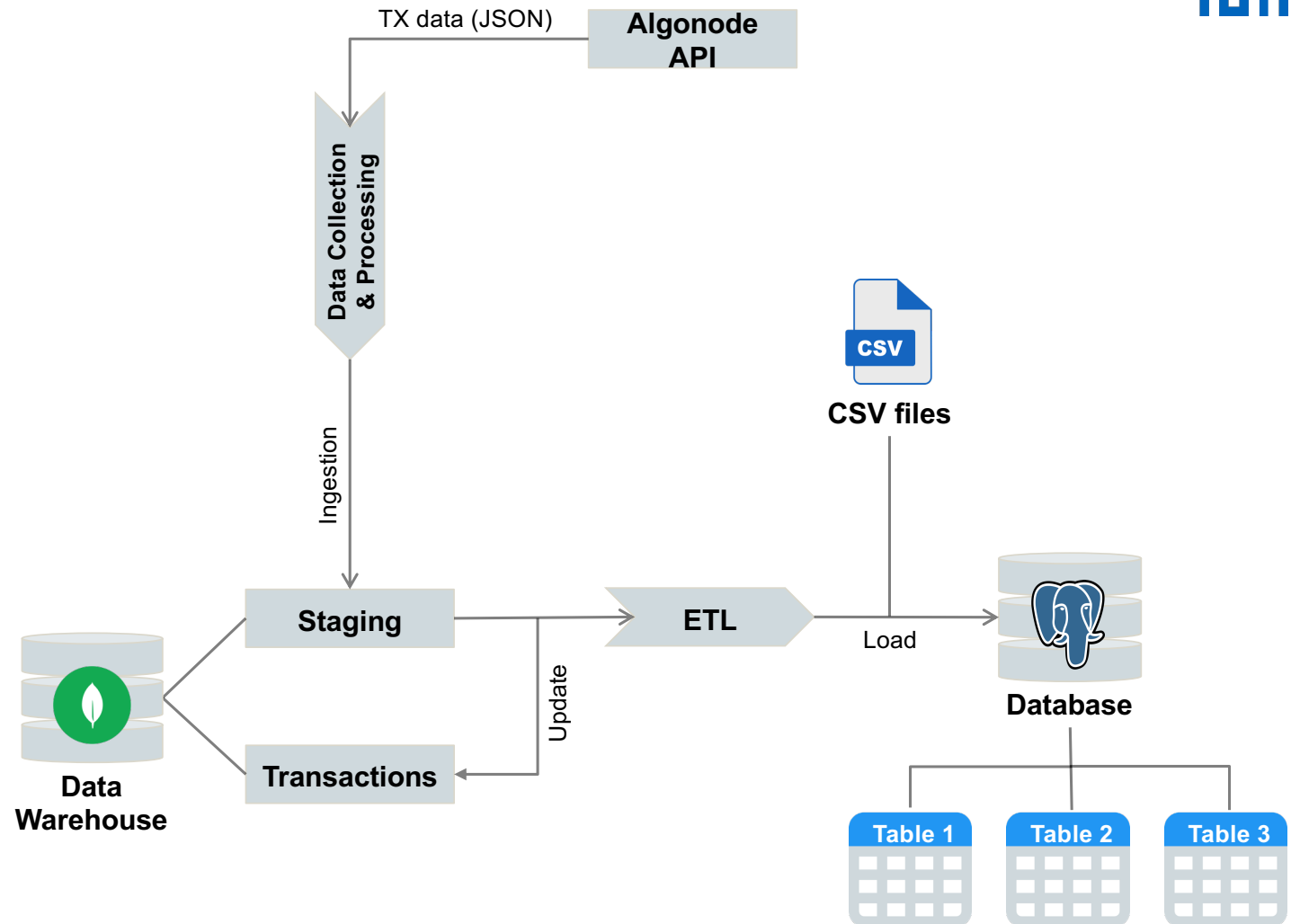- Raw data in JSON documents
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ETL Pipeline

- Extract & Transform document data into structured data
- Load transformed data to relational database (*PostgreSQL*)

Additional **CSV files** (*application ID, asset ID, asset price,…*) to enrich datasets.

Pipelines should be triggered and run on regular basis (*batch processing*).

Data Analysis

User Interface are web pages where user can enter input or filter, sort output etc.

User Input is used to complete a pre-defined SQL template.

Each **User Request** is an execution of a SQL query.

Any **new metrics** can be added by simply integrating its computation logic (SQL query) to the data tool.

Streamlit

AlgoSight Pages

Users

PY

Utilities

Database

SQL templates

Table 1   **Table 2**   **Table 3**
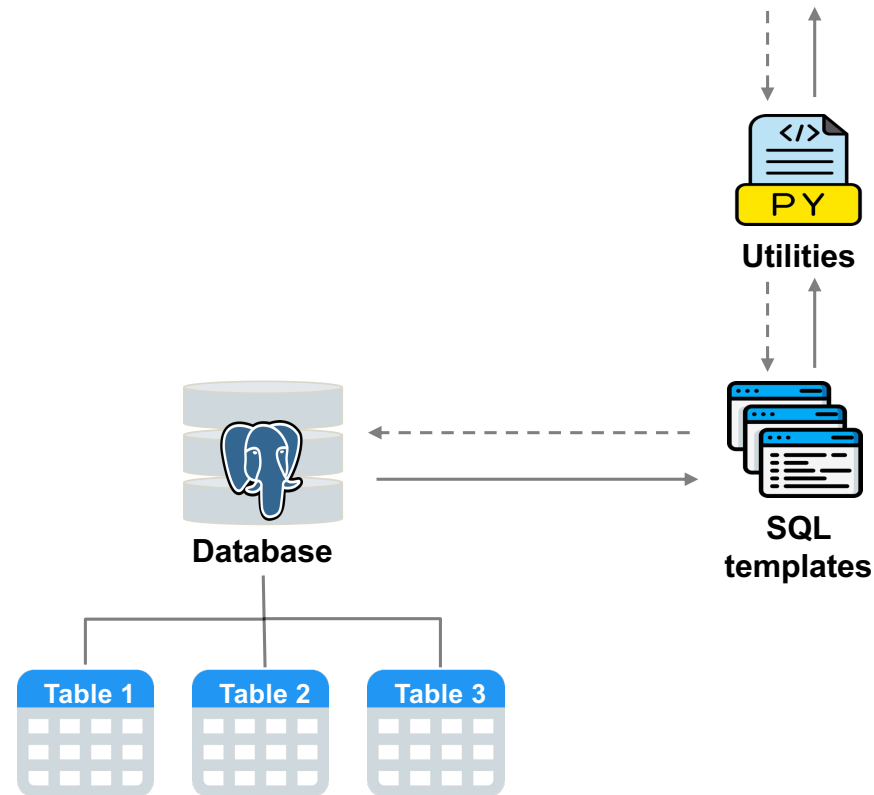
Demo

Outline

1. Background & Motivation
   - Algorand and DeFi
   - Block Explorers and Metrics
   - Motivation
2. Design and Implementation of AlgoSight
   - Data Pipelines
   - Data Analysis
   - Demo
3. **Insights from Metrics and Visualizations on AlgoSight**
4. Future Work

Insights from Computed Metrics and Visualizations on AlgoSight

DEX & Token Activity

Aggregated Level

(e.g., Most active DEXs)

- Transaction count

→ consistency & reliability of DEXs / Tokens.

- Higher activity

→ better liquidity, tighter spreads, quicker execution

→ crucial for executing large orders efficiently.

Most active DEXs between 2023-06-01 and 2023-06-08

	APP ID	PLATFORM	TOTAL TX COUNTS
1	1002541853	Tinyman AMM v.2	250424
2	818179346	AlgoFi	13329
3	818182048	AlgoFi	10567
4	620995314	Pact	7814
5	605929989	AlgoFi	6648
6	1075389128	Pact	5716
7	855716333	AlgoFi	4268
8	607645439	AlgoFi	2952
9	645869114	Pact	2046
10	835609896	HumbleSwap	1572

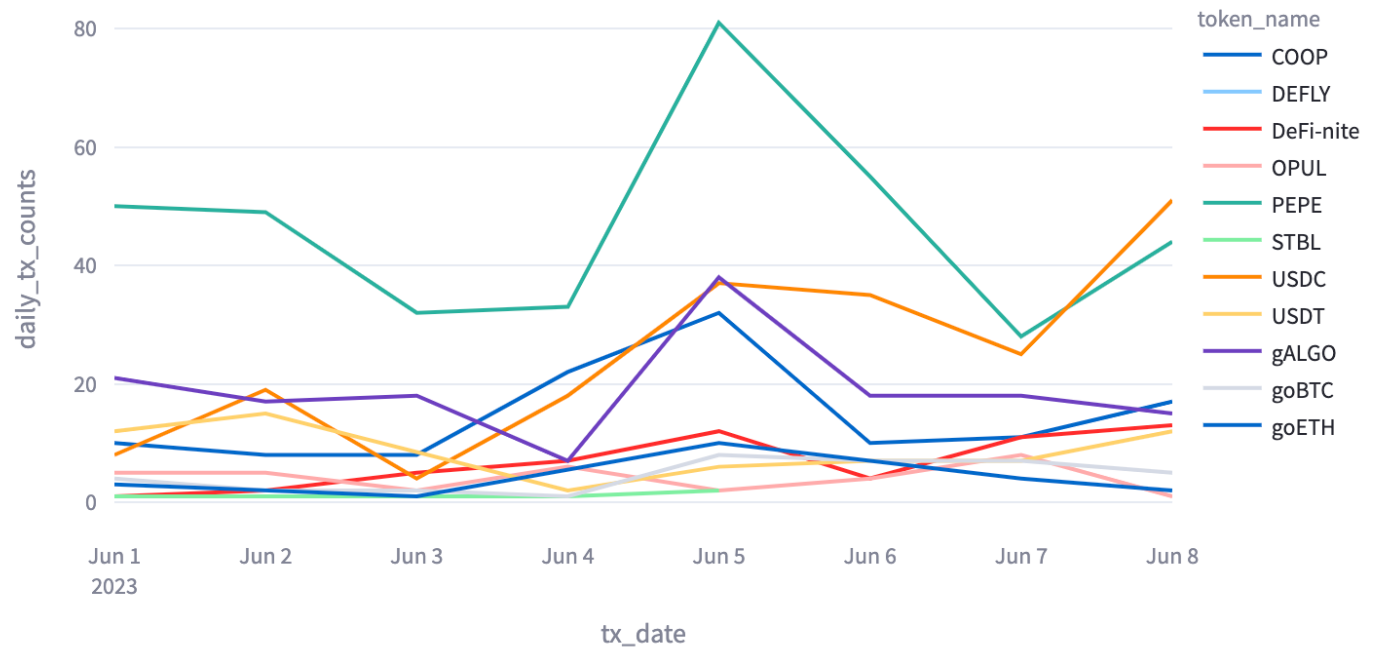# Insights from Computed Metrics and Visualizations on AlgoSight

DEX & Token Activity

Drill-downed Level

(e.g., DEXs Activity by Tokens)

- identify which tokens are most active on which platforms.

→ where to trade specific tokens, potentially identify arbitrage opportunities.

HumbleSwap Activity by Tokens from 2023-06-01 to 2023-06-08

Insights from Computed Metrics and Visualizations on AlgoSight

DEXs Trading Volume from 2023-06-01 to 2023-06-08

Tokens Trading Volume from 2023-06-01 to 2023-06-08

Trading Volume

DEX & Token Activity from the perspective of the total value.

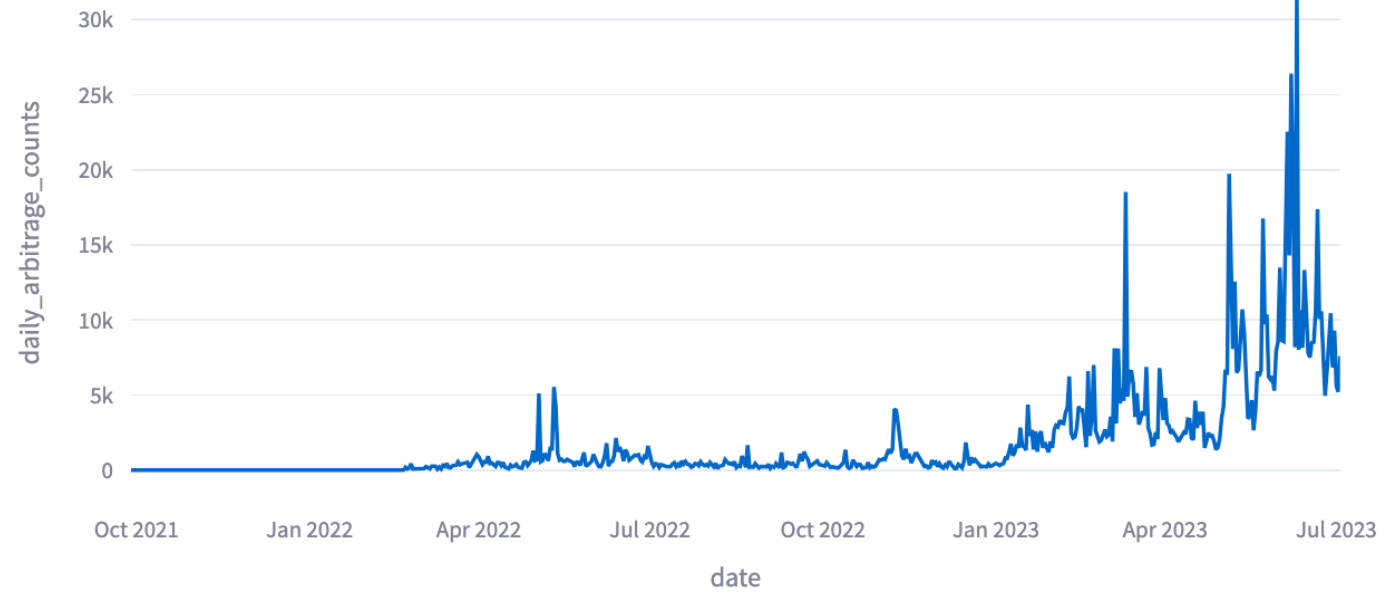# Insights from Computed Metrics and Visualizations on AlgoSight

Arbitrage Activities over Time

First impression of the activities

Arbitrage Activities

Insights from Computed Metrics and Visualizations on AlgoSight
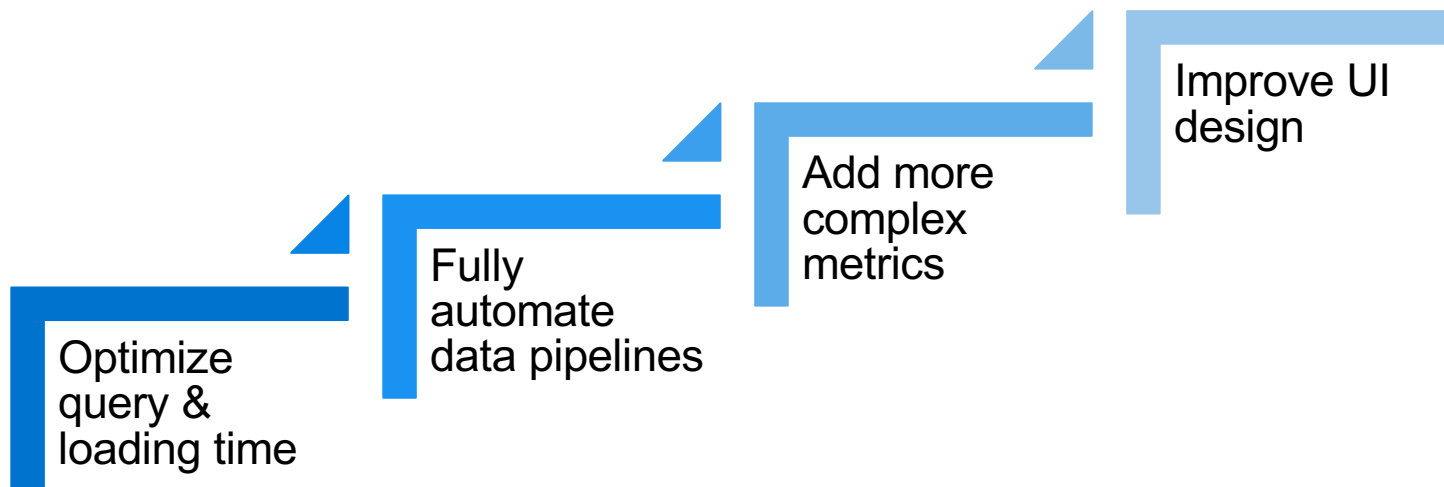
Arbitrageurs' Profits,
Arbitrage Profit per Tokens

- who made the most profit
- where arbitrage profits are being made

→ detect the patterns of the MEV strategies.

Arbitrageur Profit Leaderboard

	ARBER	PROFITS IN USD
1	AACCDJTFPQR5UQJZ337NFR56CC44T776EWBGVJG5NY2QFTQWBWTALTEN4A	110967.67
2	URKF45CZD6JGFIRBH67VQX6OCLUOXGDRRCCB3R2M7UXFY4EPOSQQ6VDQZU	31201.12
3	TEICJUFENMNMZXQTADIAUVJ25FRSYDZI3AYOBQAQQXJ4JZQDCS2RAUI634	25304.40
4	ODKHWTGQUBJ2I62QBLBL3BZP5YUSPJ5OVL7JHUKCJOE3T4YET6RXVT65QY	24897.54
5	EVESCVBC6VDIJAZM3HMUGYVQLKWHH4YJBMDV5EF65RMS67TFS5URZQ5YNY	18241.63
6	TZ3U7KHVHWPM34BJKIWKSSBRNS3LDJGSLHY2DIZVP7EJV5OKOJ5ZJW76FA	14391.43
7	EAFSBZIDWYH4BAR34FZHQXKKQ6IYRVITQPDM2XXY3RBKSRO6EIR6COTCN4	10484.67
8	XEYEWDWEHMIOAXFZN2HSBZJNCROOG7JKJLKFQSGG25JGE5UUZBZCGEWGEA	5935.95
9	MDC5Y5MOYKYRMOLR56ZQKYFQK2IR4LOOXGSHWSIRNJ3CT635FRB37YKVSA	3374.57
10	HS2YUNZNWS4S6YJUEZTHYLBTVOZ6YBBPXMIEF3PQOCSH5DPMUD24O677BQ	2947.39

Outline

Future Work

TLTI

Optimize query & loading time

Fully automate data pipelines

Add more complex metrics

Improve UI design

Thank you for
your attention!

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