NFTeller: Dual Centric Visual Analytics of NFT Transactions

Yifan Cao[1], Meng Xia[2], Kento Shigyo[1], Furui Cheng[4], Qianhang Yu[1], Xingxing Yang[1], Hongkun Liu[1], Wei Zeng[1,3], Yang Wang[1], Huamin Qu[1]

{ycaoaw, kshigyo, xyangbx, hliucu}@connect.ust.hk, huamin@ces.ust.hk, mengxia@andrew.cmu.edu, {qhyu, yangwang, weizeng}@ust.hk, furui.cheng@inf.ethz.ch

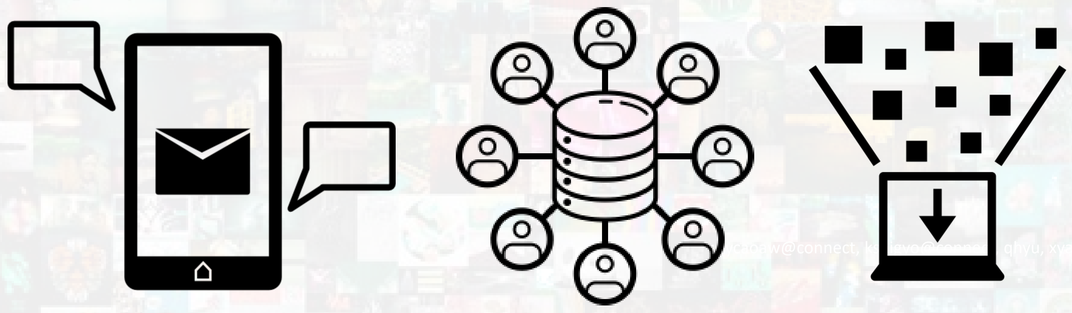
[1]Hong Kong University of Science and Technology [2]Carnegie Mellon University [3]Hong Kong University of Science and Technology (Guangzhou) [4] ETH Zurich

What is NFTs?

- Non-fungible tokens (NFTs) are non-interchangeable units of data stored on the blockchain, which can bind with various digital assets to prove their authenticity and scarcity.
- Recently, NFT collectibles and market-places are attracting more and more people all over the world.

Research Motivations

- The lack of assessment metrics for NFTs has caused challenges for stakeholders, e.g., investors, collectors, and brokers, to identify impact attributes and evaluate NFT collectibles efficiently.
- Extant blockchain data analytic tools are not capable of presenting massive amount of heterogeneous and multi-modal data of NFT projects (e.g., social media text, numerical transaction data, and images). Thus, a comprehensive and visual analytic tools is needed.



Analysis Tasks

- Identify a comprehensive impact attributes analysis framework with domain experts through in-depth interviews.
- Design an interactive visualization system to flexibly fulfill dual-centric analysis workflows for NFT stakeholders:
  a) Summarize the temporal evolution and correlation of transaction patterns of NFT collection projects;
  b) Present an augmented chord diagram for exploring the co-collected projects and co-occurring whale accounts.

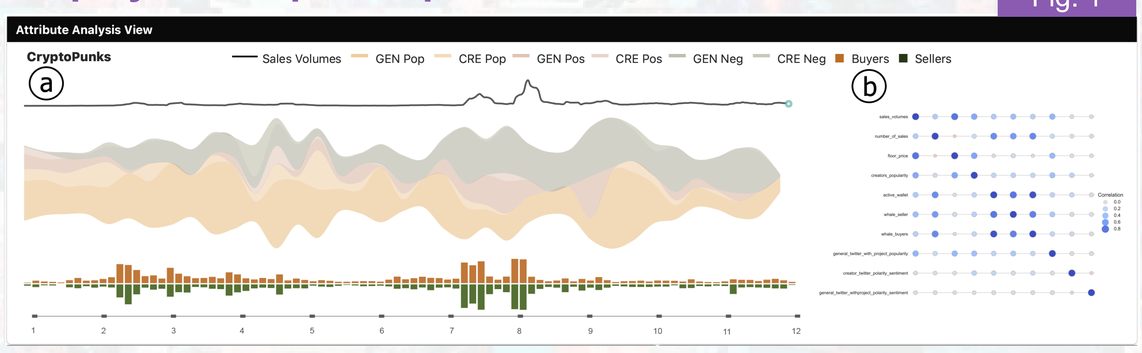
Impact Attributes

Visual Features	**Style Category**: the aesthetic style of individual NFT projects.
	Visual Scarcity: within-collection uniqueness of NFT collectibles.
Communication Effects	**Popularity**: attention got on social media.
	Sentiment Polarity: negative, positive, and neutral distribution.
Whale Accounts' Behaviors	**Transaction Activities**: NFT transactions among whale accounts.
	Co-collection Preference: co-collected NFTs by whale accounts.

Detailed Visual Analytics

Display development patterns

Fig. 1



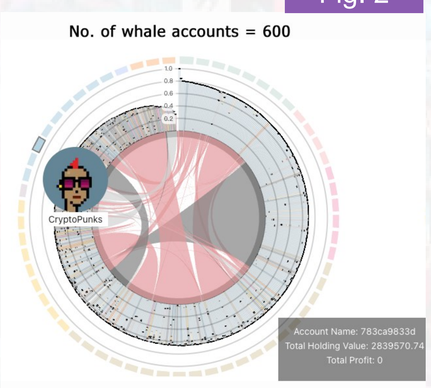
In Fig. 1 the attribute analysis view illustrates:

a) [left] The temporal pattern of communication effects and whale accounts' behaviors of selected NFT projects;
b) [Right] The Spearman's rank correlation coefficient graph of all dynamic attributes.

Co-collection Analysis

Fig. 2

- In Fig. 2, the whale account co-collection view is an augmented chord diagram with a radial stacked bar chart, which interactively presents the set relations between NFT collection projects and whale accounts.
- By comparing co-collection view, stakeholders can find prospective NFT collection projects.



Scarcity Analysis

Fig. 3

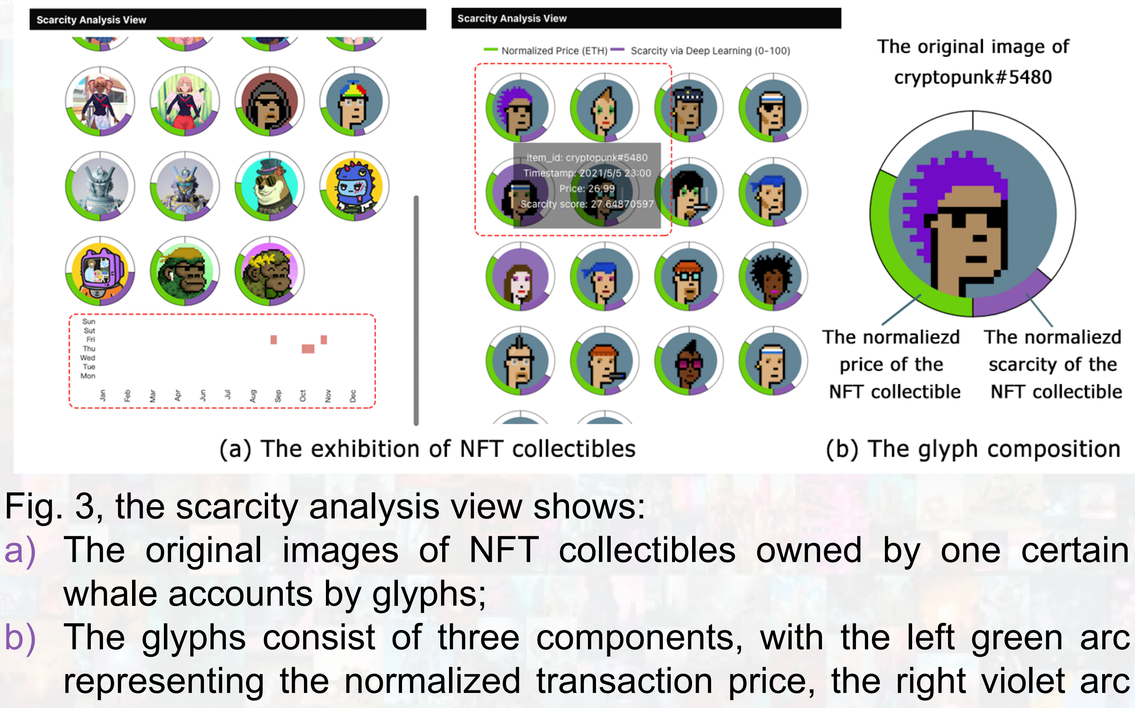


Fig. 3, the scarcity analysis view shows:

a) The original images of NFT collectibles owned by one certain whale accounts by glyphs;
b) The glyphs consist of three components, with the left green arc representing the normalized transaction price, the right violet arc representing the normalized scarcity score, and the image in the in the foreground.

Conclusions

- We characterized one static impact attribute and two dynamic attributes out of various potential factors in collaboration with domain experts.
- We developed *NFTeller* with five well-coordinated views and flexible interactions to fulfill a dual-centric perspective analysis of NFT transactions.
- We validated the usability of our system and derived insights via three insightful case studies.