

# Predictors of NFT Prices: An Automated Machine Learning Approach

Ilan Alon, University of Ariel, Israel

Vanessa P. G. Bretas, Dublin City University, Ireland\*

Villi Katrih, Signex, Israel

## ABSTRACT

This article aims to broaden the understanding of the non-fungible tokens (NFTs) pricing determinants by investigating features, both market- and network-related aspects. NFTs are uniquely identifiable digital assets stored on the blockchain. Ownership is assigned through smart contracts and can be transferred or resold by the owner. The authors analyzed a comprehensive dataset from Signex.io with over 19,183 datapoints on NFT prices and NFT social communities using automated machine learning (AML), a suitable technique to investigate the most impactful factors due to a lack of knowledge on the exact determinants. Findings show that network factors are the most important pricing determinants: Twitter members followed by Discord members. Online communities drive the price of NFTs, but not in a linear fashion. Given the newness of the phenomenon and no agreed upon pricing models, this article contributes by using AML to discover the most relevant determinants of non-fungible tokens (NFT) prices.

## KEYWORDS

AML, Artificial Intelligence, Digital Assets, NFTs, Non-fungible Tokens, Pricing, Social Metrics, Signex.io

## INTRODUCTION

Non-fungible tokens (NFTs) are tradeable rights to digital assets whose ownership is recorded in smart contracts. In other words, they configure a new form of ownership that gives value to assets in a digital form. These digital assets - images, videos, characters, music, game record, text, virtual creations, among others - can be traded using digital cryptocurrency payments registered on the blockchain (e.g. Ethereum and Flow blockchains) (Bao & Roubaud, 2022; Dowling, 2022a, 2022b). The value of NFTs are hard to ascertain as they do not usually provide future cash flows, and are more akin to art than to stocks. Well known NFT projects that have skyrocketed in prices include *Crypto Punks* and *Bored Apes* whose prices have exceeded 100k USD per a single image in 2022.<sup>1</sup> Beeple's "Everydays: the First 5000 Days" sold for around \$69 million, making it among the most expensive NFT ever minted.

DOI: 10.4018/JGIM.317097

\*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

Unlike crypto coins and tokens that are fungible, NFTs are cryptographic assets that are non-fungible. This means that each NFT item is a uniquely identified code with its own distinguishable metadata. Cryptocurrencies are interchangeable, and one digital coin is indistinguishable from another coin of the same ecosystem. The key characteristic of NFTs is the uniqueness of each token. Restricted ownership is granted by offering a unique digital certificate of ownership for the NFT, and their ownership records cannot be modified (Dowling, 2022b; Umar et al., 2022).

The trade volume of NFTs has increased in recent years, experiencing record sales especially after the Covid-19 pandemic. The effects of Covid-19 in the dynamics of financial markets, including cryptocurrencies movements, has started to be investigated (Conlon et al., 2020; Conlon & McGee, 2020; Goodell & Goutte, 2021a, 2021b). Mobility restrictions enhanced digital engagement and, consequently, the interest in cryptocurrencies and digital assets. In 2020, sales volume of NFTs was approximately 95 million US dollars. By the end of the second quarter of 2021, the NFTs trade reached 2.5 billion US dollars (Aharon & Demir, 2022).

The increase interest in NFTs started to be reflected in academia in the last few years. However, the topic is still under-researched in the fields of business, economics and finance despite its growing relevance. NFTs are considered one of the best recent economic innovations, creating new ways to tie technology and economic value and breaking down financial borders. NFTs democratized the access to digital assets and captured the interest of venture capitalists, Big Tech, digital and social media platforms (Laurence, 2021; Williams, 2022). Nevertheless, little is known about their pricing dynamic and relevant factors affecting it, especially network determinants impacts on prices.

Moreover, while previous studies aiming to investigate pricing determinants of NFTs made significant contributions (e.g., Horky et al., 2022; Kräussl & Tugnetti, 2022; Nadini et al., 2021), they mostly worked with partial datasets, metrics, and linear models. We aim to broaden the understanding of the NFTs pricing determinants by applying automated machine learning (AML). We used comprehensive data from *Signex.io*, a platform that helps investors to find NFT projects using general and social metrics from Twitter, Discord, Reddit and others.

We contribute to the field in two ways. First, we seek to provide further understanding on NFTs pricing determinants with special attention to network aspects. Big Tech and online communities and platforms act as connectors, influencing the evolution of the NFTs market. We develop a comprehensive model for NFTs pricing that includes network metrics, verifying that Big Tech are relevant and important predictors of NFT prices (Bao & Roubaud, 2022; Nobanee & Ellili, 2022).

Second, we contribute by using AML to identify the most relevant NFTs pricing determinants, considering the lack of a shared understanding of the exact predictors and their relationship with the target variables. AML has an advantage compared to linear models adopted in previous studies (e.g., Goldberg et al., 2021) as it explores complexity using big data and confirm empirical patterns using testing, validation, cross validation, and holdout samples. The best model is selected based on the data characteristics, considering simultaneously the predictive capacity of multiple models (Doornenbal et al., 2021). In our case, we tested 81 different models, and found the random forest model superior in its low prediction error. The study is relevant to NFT, crypto and Blockchain researchers who are interested in the business and economic aspects of the field. We also hope that practitioners, such as NFT project managers and investors in NFT projects, can be better informed about the pricing determinants.

The remainder of this article is organized as follows. Following this introduction, we present the literature review on NFTs and asset pricing. Next, we show the methodology and results. Finally, we discuss the findings and provide the conclusion of the study.

## BACKGROUND

NFTs are assets in a digital form with blockchain-traded rights. These digital items are categorized in the NFT market according to their features, with the main categories being Art, Collectible,

16 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/article/predictors-of-nft-prices/317097](http://www.igi-global.com/article/predictors-of-nft-prices/317097)

## Related Content

---

### Gender, Culture, and ICT use

B. Ratna Kumari (2012). *Globalization, Technology Diffusion and Gender Disparity: Social Impacts of ICTs* (pp. 36-50).

[www.irma-international.org/chapter/gender-culture-ict-use/62874](http://www.irma-international.org/chapter/gender-culture-ict-use/62874)

### The Digital Citizen

Zizi Papacharissi (2008). *Global Information Technologies: Concepts, Methodologies, Tools, and Applications* (pp. 108-115).

[www.irma-international.org/chapter/digital-citizen/18955](http://www.irma-international.org/chapter/digital-citizen/18955)

### Effects of Internet Use on Well-Being in Rural China: Relieving Loneliness Accounts for the Different Effects?

Xu Ye, Zhen Wang and Ding Li (2022). *Journal of Global Information Management* (pp. 1-22).

[www.irma-international.org/article/effects-of-internet-use-on-well-being-in-rural-china/309083](http://www.irma-international.org/article/effects-of-internet-use-on-well-being-in-rural-china/309083)

### An Investigation Into the Critical Success Factors of Implementing Information Technology Service Management Frameworks

Ahad Zare Ravasan, Mohammad Mehrabioun Mohammadi and Homa Hamidi (2018). *Corporate and Global Standardization Initiatives in Contemporary Society* (pp. 200-218).

[www.irma-international.org/chapter/an-investigation-into-the-critical-success-factors-of-implementing-information-technology-service-management-frameworks/197466](http://www.irma-international.org/chapter/an-investigation-into-the-critical-success-factors-of-implementing-information-technology-service-management-frameworks/197466)

### Crowd Workers' Continued Participation Intention in Crowdsourcing Platforms: An Empirical Study in Compensation-Based Micro-Task Crowdsourcing

Gabriel Shing-Koon Leung, Vincent Cho and C. H. Wu (2021). *Journal of Global Information Management* (pp. 1-28).

[www.irma-international.org/article/crowd-workers-continued-participation-intention-in-crowdsourcing-platforms/272235](http://www.irma-international.org/article/crowd-workers-continued-participation-intention-in-crowdsourcing-platforms/272235)