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# **1** Key Takeaways

- Interest in artificial intelligence ("AI") has experienced an upswing in the last few months, as evident by Google search trends and soaring AI-related token prices.

- Funding for AI-related web3 projects surged in 2023, reaching US$298M. This is more than the collective funding amount raised for AI projects from 2016 to 2022, at US$148.5M.

- AI-related tokens have generally experienced positive performance in 2023, with the top five AI coins by market capitalization significantly outperforming BTC and ETH, culminating in gains ranging from 200% to 650% in 2023.

- We have observed several trends and tangible use cases that have emerged from the convergence of AI and crypto. From powering the growth of decentralized physical infrastructure networks ("DePIN"), to the creation of more interactive consumer-facing applications, we highlight a few notable developments in this report.

(2) Introduction

2023 proved monumental for artificial intelligence ("AI"), as the transformative power of AI became more evident, notably with the widespread use of AI chatbots such as OpenAI's ChatGPT, Google's Bard, Microsoft's Bing Chat, and others. ChatGPT, in particular, highlighted AI's potential by reaching the milestone of 100 million users in just two months - an achievement that outpaced major social media platforms like TikTok and YouTube.

Figure 1: ChatGPT is one of the fastest-growing applications, achieving 100 million users just two months after its launch
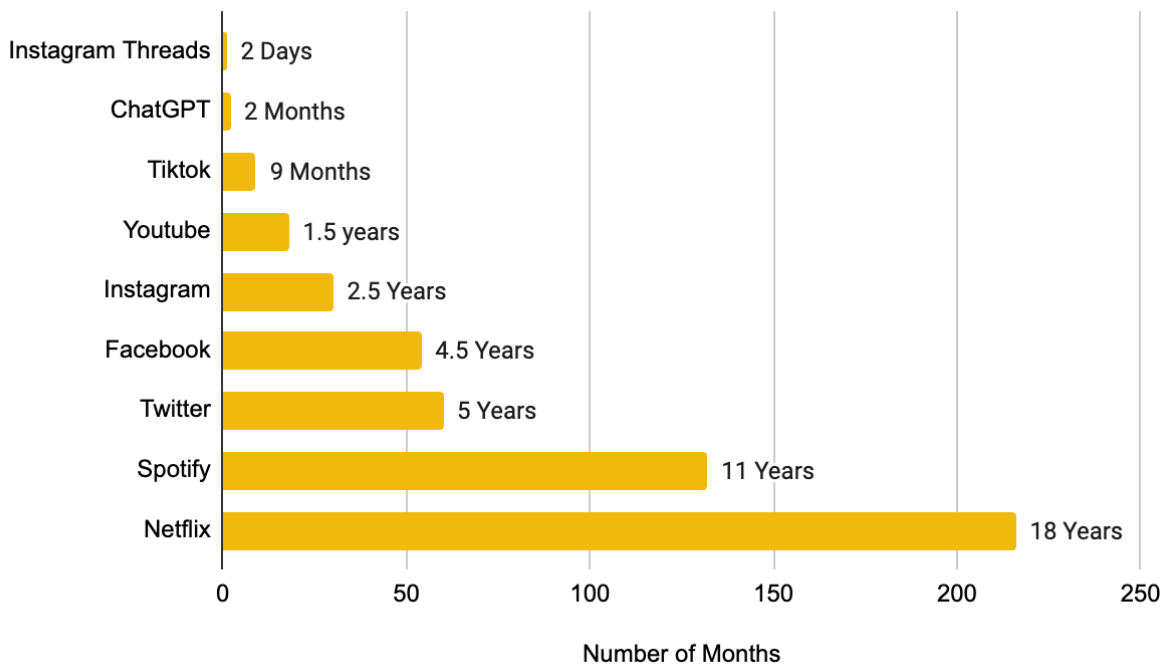

Source: demandsage, Binance Research

On a more relevant note, AI has also started to reshape the crypto landscape, both in practical use cases as well as heightened interest in AI-related tokens. The fusion of these two disruptive technologies has quickly risen to a prominent narrative within the industry. Building on our previous report that shed light on the use cases of AI in crypto, we now revisit this evolving landscape. In light of the recent renewal of interest in the field, we will take a look at the current state of the market and examine new developments.

3 State of the Market

In 2023, the public's interest in AI saw a significant upswing, evidenced by the marked increase in "AI" searches on Google worldwide. This heightened interest suggests a growing public engagement with AI-related topics. This surge is largely attributed to the popularity of AI chatbots, the launch of new AI tools, as well as increased media coverage and desire to learn about AI.

Figure 2: Google search interest in AI saw a significant uptick in 2023, greatly surpassing that of "Crypto" and "Bitcoin"
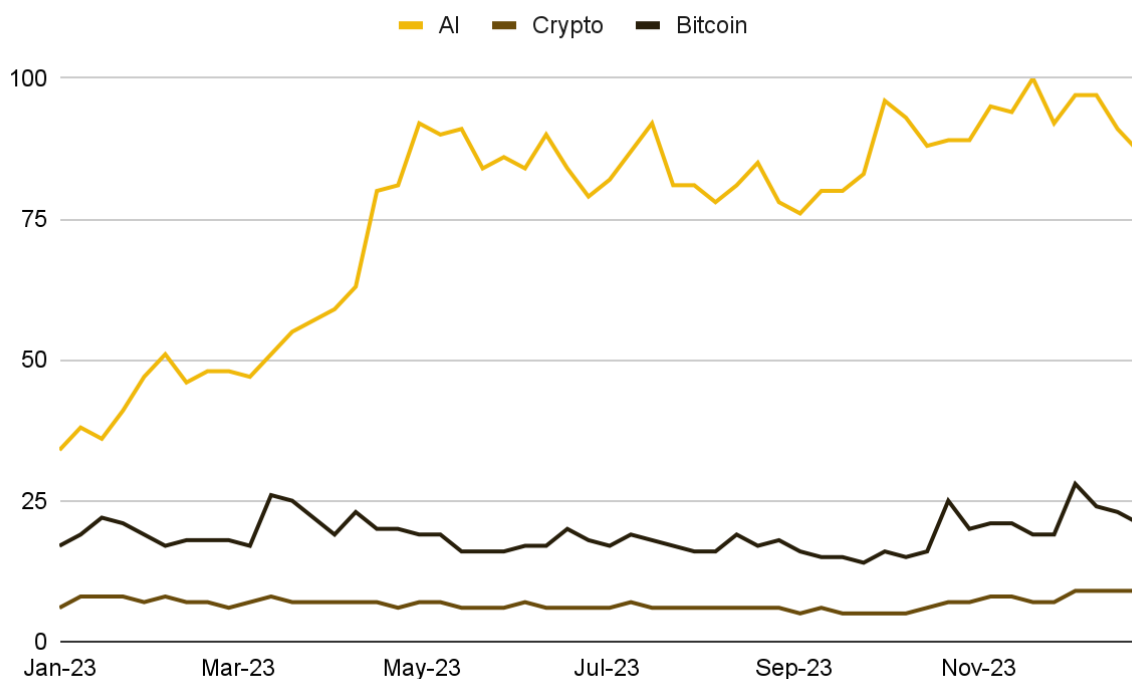
Source: Google Trends, Binance Research, as of December 31, 2023
Note: Numbers represent search interest relative to the highest point on the chart for the given region and time.

Conversely, the search interest for "Crypto" remained relatively stable throughout the year. It exhibited a slight downward trend from January to May, followed by a period of stability, and then experienced a minor uptick toward the end of the year. The search trends of "Bitcoin" mirrored that of "Crypto", but with more notable fluctuations. This volatility in Bitcoin interest can be linked to the several heated narratives surrounding Bitcoin, including Ordinals/BRC-20s, potential spot ETFs, and the halving in 2024. These events contributed to an increase in Bitcoin's price, reigniting public interest.

Overall, the search trends reveal a clear divergence between the growing interest in AI and the relatively stable interest in Bitcoin and Crypto, indicating that AI has been capturing the public's attention at an increasing rate, with no apparent signs of interest waning so far.

(3.1) Robust Investor Interest

The AI sector also showcased a robust performance regarding investor interest in 2023. Despite an overall reduction in funding amounts, AI's share of US startup funding grew by 230% in relative terms, accounting for approximately 26%. This growth occurred in a context where both AI and Non-AI sectors experienced a downturn in funding. However, AI showed particular resilience compared to the broader market.

**Figure 3: AI's share of US startup funding doubled in 2023***
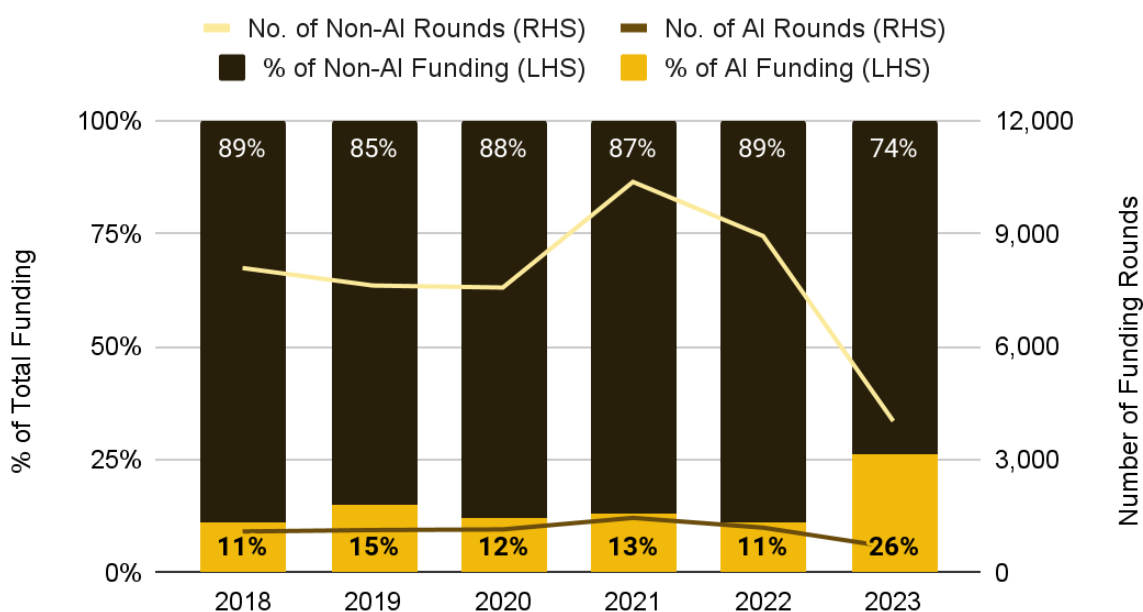
Source: Crunchbase, Binance Research, as of August 29, 2023
*Note: The most recent data for 2023 was not available at the time of publication. Readers are advised to take this limitation into account when interpreting the analysis.

While Non-AI sectors witnessed a significant 65% decrease in absolute funding amount from 2022, **the reduction in AI funding was comparatively modest at just 6%**. Additionally, when considering the number of funding rounds, non-AI sectors experienced a 55% decrease, whereas the AI sector saw a 45% reduction. This comparatively smaller decline in AI funding and funding rounds indicates that investor interest in AI applications remains relatively high, despite the overall downtrend in funding amount since its peak in 2021. This could also suggest a sustained belief in the long-term potential of and viability of AI technology and applications.

Additionally, the AI sector within Web3 experienced explosive growth in terms of funding in 2023. Data from Rootdata reveals a stark contrast between the collective funding amount for AI projects from 2016 to 2022, which totaled US$148.5M, and the funding amount in 2023 alone, which reached US$298M[1]. **This figure for 2023 is double the total funding of the previous seven years, reflecting AI's surging traction within the year.**

Figure 4: AI projects' funding of US$298M in 2023 ranked 7th, representing 3.7% of the total funding for Web3 projects
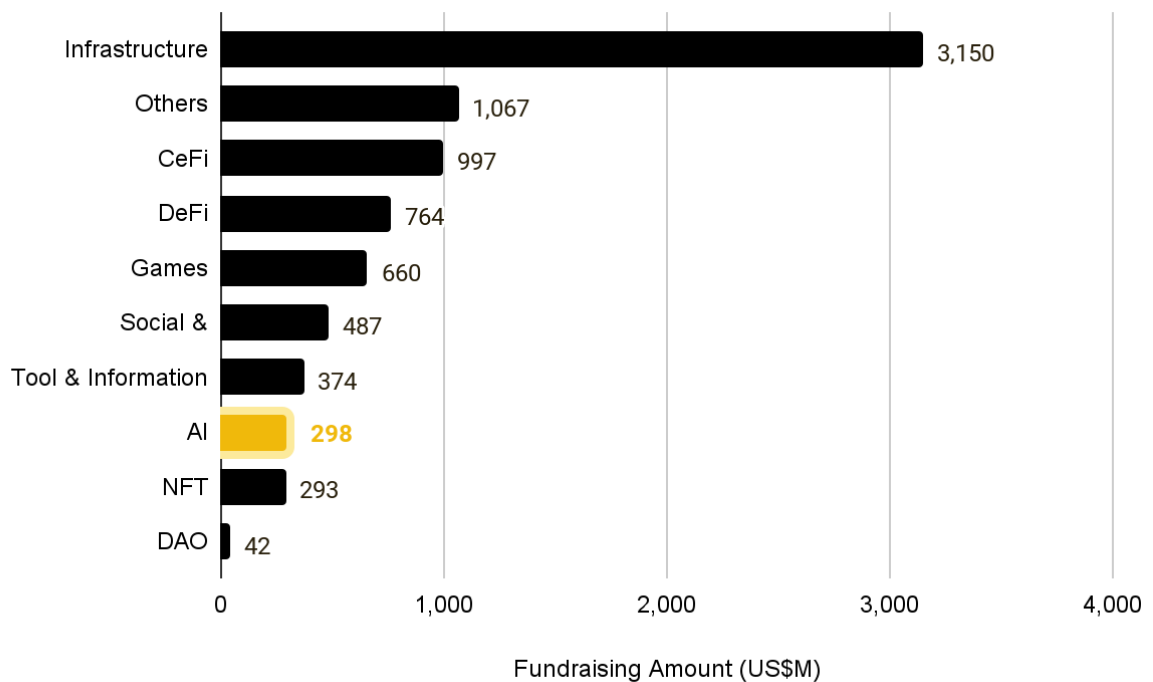

Source: Rootdata, Binance Research, as of December 31, 2023

When compared to other sectors in the Web3 landscape, AI projects' funding of US$298M in 2023 ranked 7th, surpassing NFT at US$293M and DAO at US$42M. This funding represented about 3.7% of the total funding for Web3 projects in 2023. While 3.7% might appear modest, it's quite notable considering AI only started gaining significant traction in 2023, and this considerable growth in funding underlines the increasing recognition and value placed on the sector.

(3.2) Strong Outperformance

From a price perspective, AI tokens have also outperformed the broader market and experienced a significant surge over the past quarter and year. A rise in interest in the sector has contributed to the strong price performance in AI-related tokens.

Figure 5: AI tokens ranked as the second-best performing category over the last three months
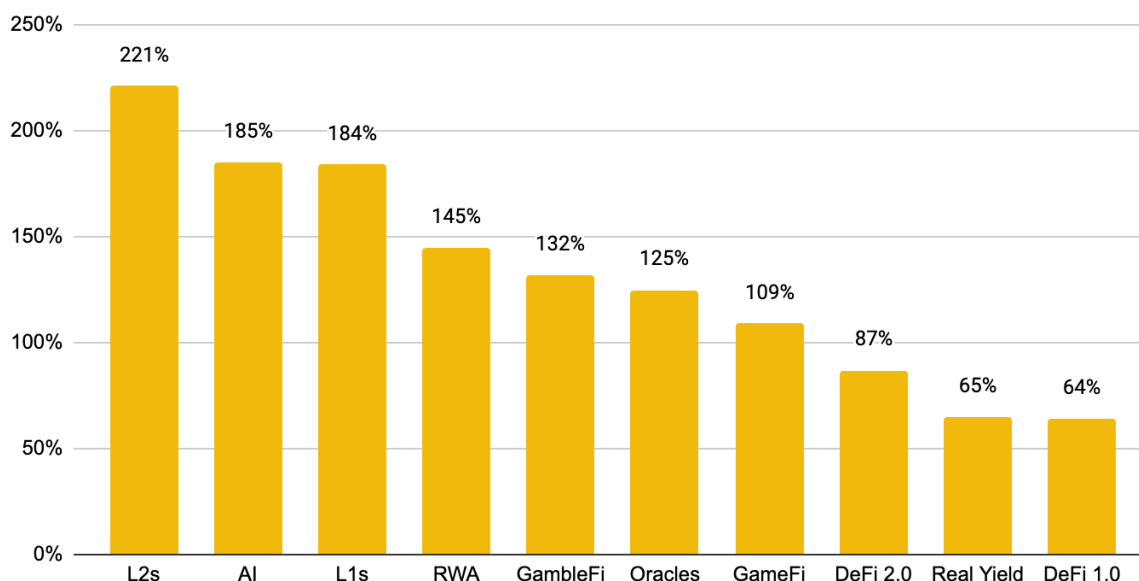
Source: Dune Analytics (@cryptokoryo_research), as of January 2, 2024
AI Tokens Included: AGIX, CTXC, FET, OCEAN, ORAI, RNDR

According to a Dune dashboard that aggregates the performance of representative tokens across different narratives/sectors, AI tokens ranked as the second-best performing category over the last three months. Note that although the original dashboard includes meme coins, we've excluded them from our analysis given the disproportionate large percentage performance gains as a result of their relatively lower market capitalization.

When comparing the top five AI tokens, in terms of market capitalization, against BTC and ETH, it's evident that AI tokens significantly outperformed the majors in 2023. The one-year performance of these AI coins varied from 200% to as high as 650%. In contrast, BTC ended the year with a gain of 150%, while ETH registered a 44%.

However, it's crucial to note that BTC and ETH have much larger market capitalizations compared to these AI tokens. Consequently, it's natural for BTC and ETH to experience smaller gains in terms of percentage. This comparison primarily serves to highlight the strong performance and growing traction of AI coins in the recent months.

Figure 6: Top five AI coins in terms of market cap significantly outperformed BTC and ETH in 2023, culminating in gains ranging from 200% to as high as 650%
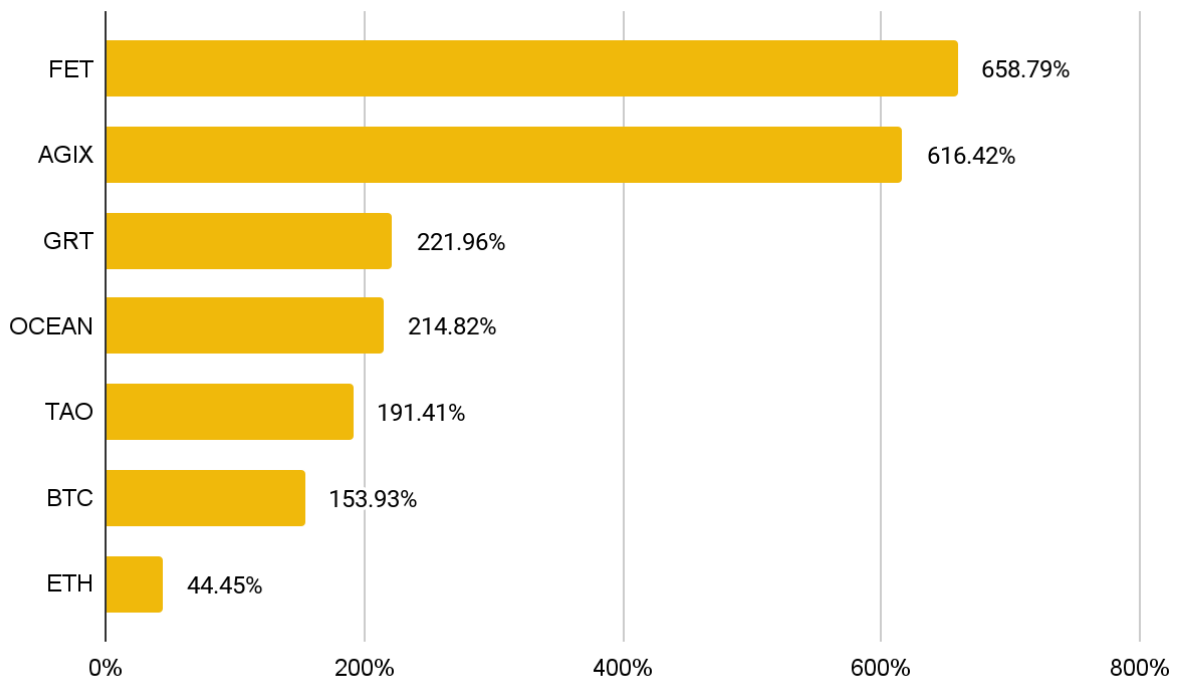
Source: CoinMarketCap, Binance Research, as of December 31, 2023

Overall, AI has been gaining significant traction. The adoption of AI applications has been on an accelerating climb, attracting sustained interest from investors and retail. Moreover, the performance of AI tokens has been robust. Alongside these trends, there are several emerging AI x Crypto innovations that are worth discussing, as detailed in the following section.

4 AI x Crypto Developments

The surge in interest in AI has fueled the growth of AI-related crypto applications, paving the way for continuous innovation in the sector. In this section, we delve into some trends and tangible use cases that have emerged from the convergence of AI and crypto technologies. From powering the growth of decentralized physical infrastructure networks ("DePIN"), to the creation of more interactive consumer-facing applications, we highlight a few notable developments in this field.

4.1 AI x DePIN

Large language models, deep learning, and various AI applications rely heavily on graphics processing units ("GPUs") for computational power. However, over the past year, burgeoning interest in AI has led to an outsized demand for GPUs, leading to a shortage of chips[2]. Without easy access to GPUs, the high cost of computing can be prohibitive for researchers and start-ups doing AI-related research. **This is where decentralized compute networks, a subset of DePIN come in. They provide an alternative to existing solutions dominated by centralized cloud providers and hardware manufacturers.** As a result, we have also witnessed strong growth of the sector driven by demand for GPUs.

Given that GPUs do not operate at 100% capacity all the time, decentralized compute networks seek to connect those with idle computing power to those who require them. This is achieved by establishing a two-sided marketplace that allows suppliers of computing power to receive incentives from the buyers. Examples of such networks include Akash, Render, Gensyn, and io.net, among others. Moreover, prices of decentralized compute networks are also competitive as there are no significant additional costs for suppliers to provide computing power to the network.

Figure 7: Decentralized compute networks are priced competitively
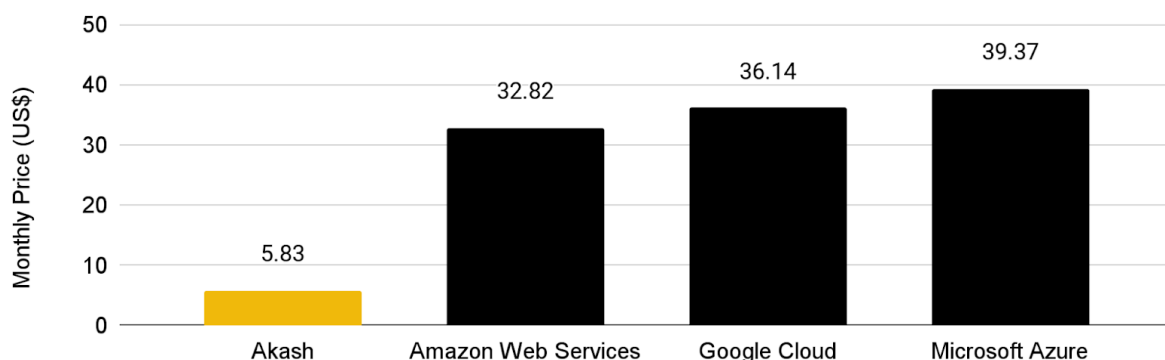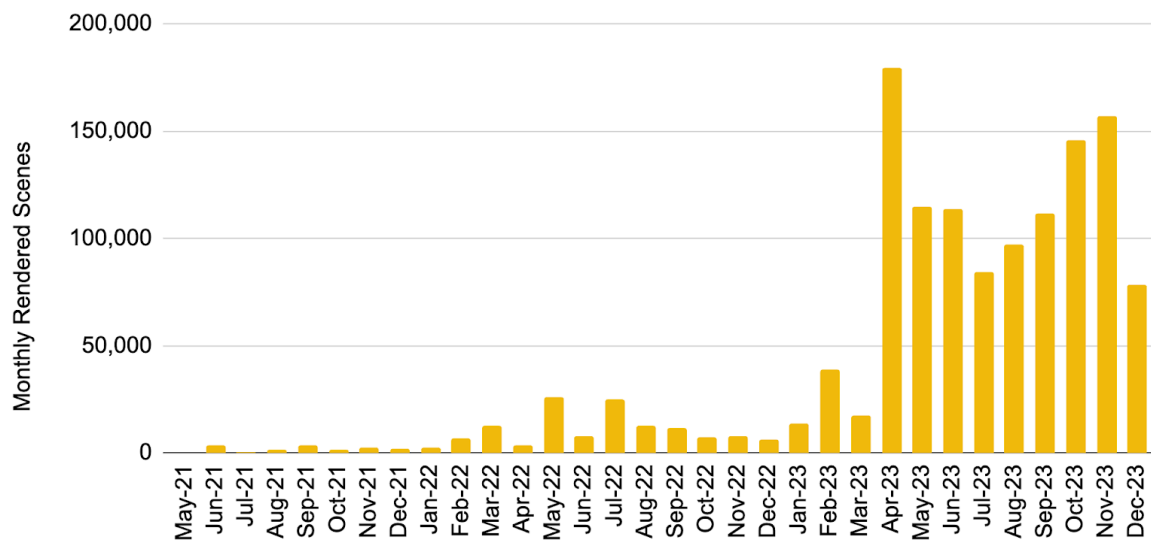

Source: Cloudmos, as of January 2, 2024
Note: Pricing is for 1 CPU, 1GB RAM, and 1GB Disk

By providing a potential solution to a tangible problem, decentralized computing networks have rode on the wave of AI growth and seen rising activity on their platforms.

Figure 8: Number of rendered scenes on Render Network has been elevated in 2023

Figure 9: Active leases on Akash network surged in Q4 2023

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## (4.2) AI x Zero-Knowledge

Smart contracts are known for their efficiency due to their code-based automation capabilities. However, their predefined nature can sometimes lead to a lack of adaptability, particularly in unforeseen complex situations. This is where machine learning ("ML"), a subfield of AI, can offer significant improvements. ML models, trained on extensive datasets, have the ability to learn, adapt, and make highly accurate predictions. Integrating these models into smart contracts could open up a wide range of adaptable and flexible capacity.

One major challenge in this integration is the exorbitant computational overhead of on-chain ML computation. This leads to the concept of Zero-Knowledge Machine Learning ("ZKML"). ZKML combines zero-knowledge proofs with machine learning. In this setup, **ML computations are processed off-chain, while ZK proofs are used to verify the integrity of these computations without revealing the actual data.** Utilizing ZKML, smart contracts can effectively leverage the power of AI while maintaining the security and transparency of blockchain technology.

Figure 10: ZKML combines zero-knowledge proofs with machine learning, computing off-chain then verifying on-chain
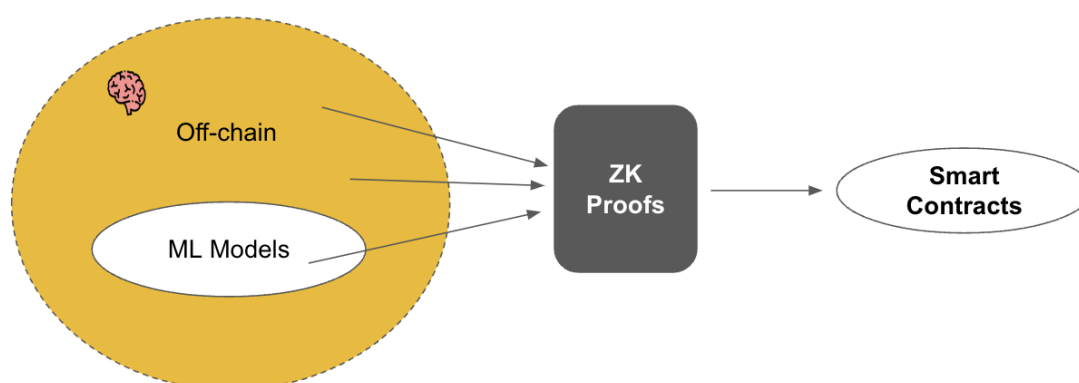
Source: Binance Research

A notable development is the ZK Predictor introduced by Upshot in collaboration with Modulus Labs. This tool enables Upshot to leverage Modulus ZK circuits for verifying asset valuation without revealing proprietary intellectual property. It can be instrumental in developing Automated Market Maker ("AMM") optimized for pricing long-tail assets, AI-driven on-chain index funds that come with on-chain cryptography proofs of their operation, or prediction market focussed on specialized topics, where the accuracy of crowd-power pricing signals can be enhanced and verified[3]. Other ZKML products include price oracle[4]. For instance, Upshot feeds its AI models with complex market data to appraise the value of long-tail assets like NFTs. Modulus's tech then verifies the correctness of these AI computations, encapsulates them in proofs, and submits them to Ethereum for final verification.

These examples represent just the beginning of the myriad applications that ZKML can enable. As the tech is still in its infancy, more matured and widespread ZKML applications could be expected in the coming years.

(4.3) AI x Consumer dApps

Over the past year, we have observed a rise of AI integration in consumer-facing decentralized applications ("dApps") to increase interactivity and foster user participation. This trend is transforming the way users engage with platforms, offering both personalization and interactivity. **By leveraging AI, such dApps empower users to shift from mere users to active participants.**

An example is AI user-generated content ("UGC") platforms such as NFPrompt. As the term suggests, AI UGC refers to content created by users with the help of an autonomous system. This is broadly achieved by putting in place a set of rules that automates the output and embedding some form of randomness in the algorithm. In other words, users can input a set of rules or constraints (e.g., patterns, colors, shapes) and the AI will generate the content based on this framework. By involving users in the creation process, AI UGC platforms establish a more participatory relationship between users and the platform, while also allowing users to come up with unique, one-of-a-kind content that are infinitely scalable.

Figure 11: Generating a NFT using text prompts on NFPrompt
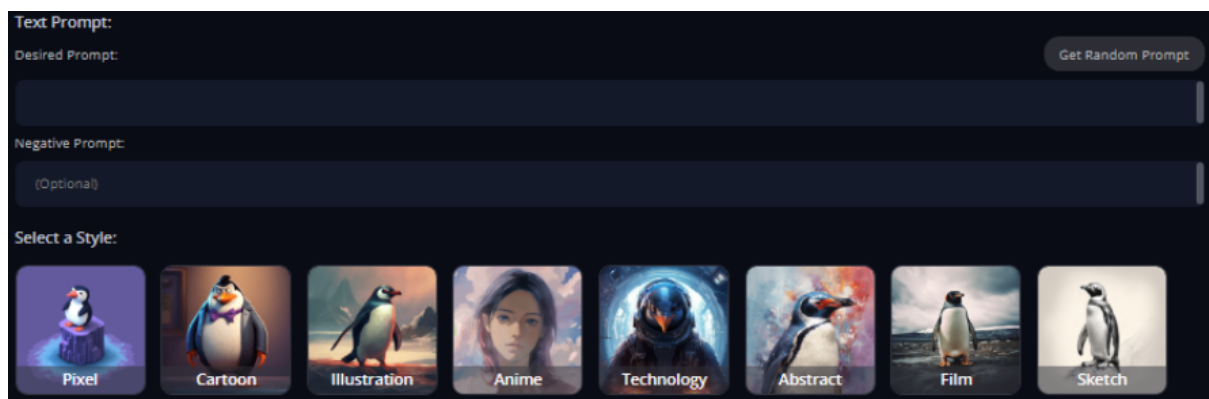
Source: NFPrompt

Beyond content generation, the integration of AI could have profound implications for web3 gaming or virtual worlds where in-game characters are significantly more interactive, and conversations become more life-like. Sleepless AI's games "HIM" and "HER" are good examples. By using AI, the gameplay is characterized by focusing on customized and realistic communication. This offers a more personalized experience and fosters more authentic emotional connections to boost user engagement.

Figure 12: "HIM" and "Her" uses AI to provide an immersive experience
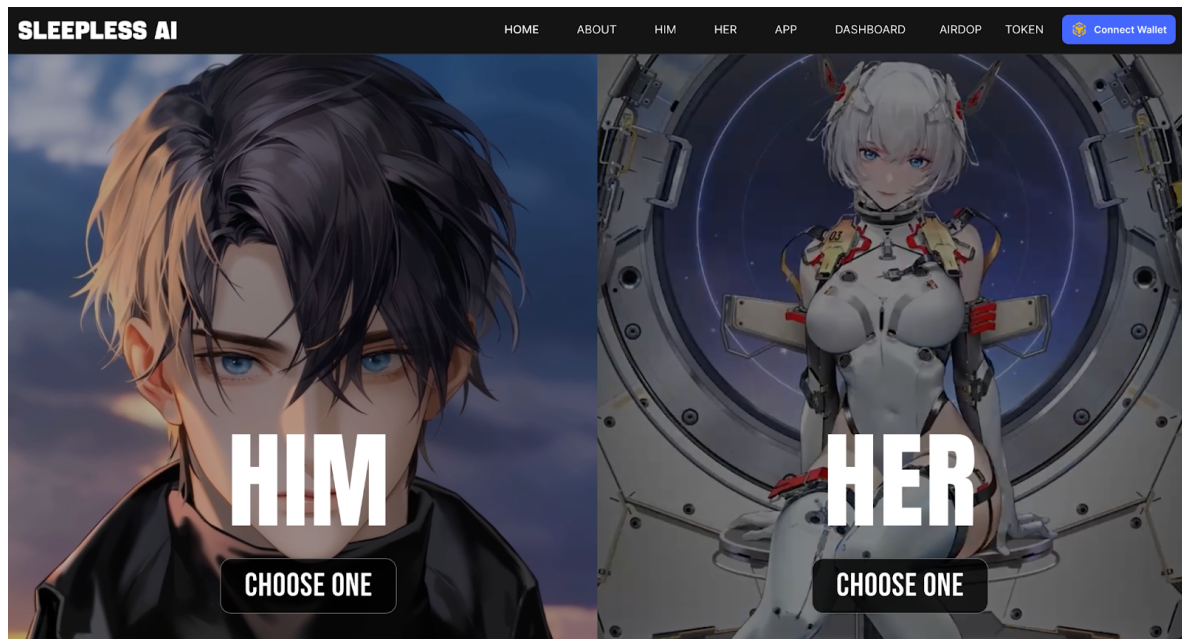
Source: Sleepless AI

(4.4) AI x Data Analytics

Accurate market data is key to understanding industry trends and is important for investors to make informed investment decisions. However, instances of ingenuine trades, such as wash trades, may artificially inflate sales and distort true sales volume. By integrating AI into the analysis to filter out noise, more accurate data output is possible. This is broadly achieved through AI and machine learning ("ML"), whereby huge volumes of data are fed as an input to identify wash trading patterns or trends. The end result is a more accurate depiction of market activity.

Case in point is BitsCrunch, an AI-powered NFT data analytics platform, which utilizes AI and machine learning to detect wash trading or suspicious trading patterns in real time, thereby providing accurate data. **The use of AI/ML allows the platform to analyze a large amount of data with relative ease, allowing the platform to differentiate between true and inorganic trading volume.** This, in turn, aids informed decision making.

Figure 13: Wash trade metrics analyzed by BitsCrunch

Metrics	Metric Unit	Description
washtrade_assets	count	The number of nfts that have been wash traded
washtrade_assets_change	pct	The change in the number of wash traded assets within the

		particular time range
suspect_sales_ratio	pct	The percentage of sales suspected of wash trading to the total transactions that has happened on that particular time period
Washtrade_wallets	Count	Number of wash traded wallets

Source: BitsCrunch

5 Closing Thoughts

The amalgamation of AI and crypto has stirred up considerable excitement about the potential of these frontier technologies to redefine the digital landscape. The rising popularity of AI-centric tokens and the burgeoning interest reflected in online search trends highlight the ongoing acceleration of the artificial intelligence narrative.

Admittedly, we have yet to reach a point of mass adoption. Many AI-powered crypto projects are still in the nascent stages of development, and others may cater mainly to niche audiences. However, the increase in tangible use cases is an encouraging trend that is positive for long-term growth. Considering these, investors need to delicately balance capitalizing on the AI hype while comprehending the risks associated with investing in such frontier technologies.

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Binance Research is the research arm of Binance, the world's leading cryptocurrency exchange. The team is committed to delivering objective, independent, and comprehensive analysis and aims to be the thought leader in the crypto space. Our analysts publish insightful thought pieces regularly on topics related but not limited to the crypto ecosystem, blockchain technologies, and the latest market themes.

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