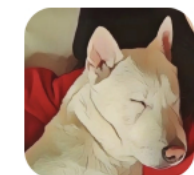


AIX CRYPTO REPORT

Author:



Maggie
Tech director
Foresight Ventures

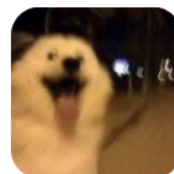


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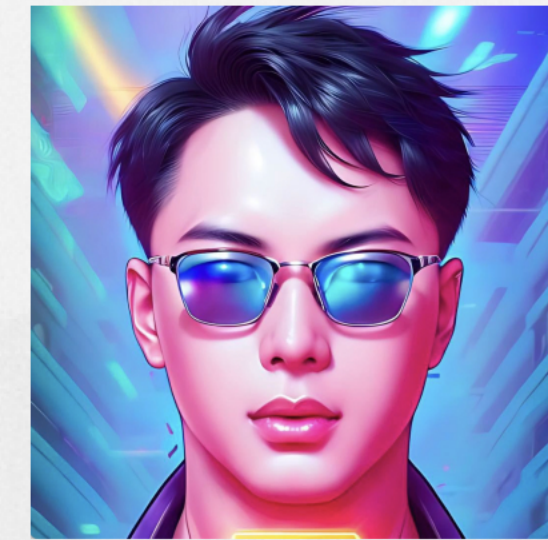
Dr. Harry Yang
Co-founder and CTO
Nesa



Tory Green
CEO
io.net

Blockchain has revolutionized the means of production, while AI has transformed the production processes.

AI x Crypto may well be the most exciting industry of the next 50 years.



Forest

Co-founder
Foresight Ventures

AI x Crypto Introduction

Since 2023, the AI industry has experienced rapid growth and a surge in investment in generative AI. According to the McKinsey Global Institute, **the AI market is projected to reach \$13 trillion by 2030, with an estimated annual contribution to global GDP growth of up to 1.2%**. The competitive advancements among major tech companies in AI further demonstrate the immense potential of the AI industry.

In crypto world, crypto protocols associated with the development of AI projects have gained early signs of adoption. Specifically, **according to Bloomberg data, the four largest AI-adjacent crypto tokens by market cap (TAO, RNDR, AKT, WLD) have surged 522% over the past year, outperforming the Utilities and Services Crypto Sector (+86%) over the same period.**

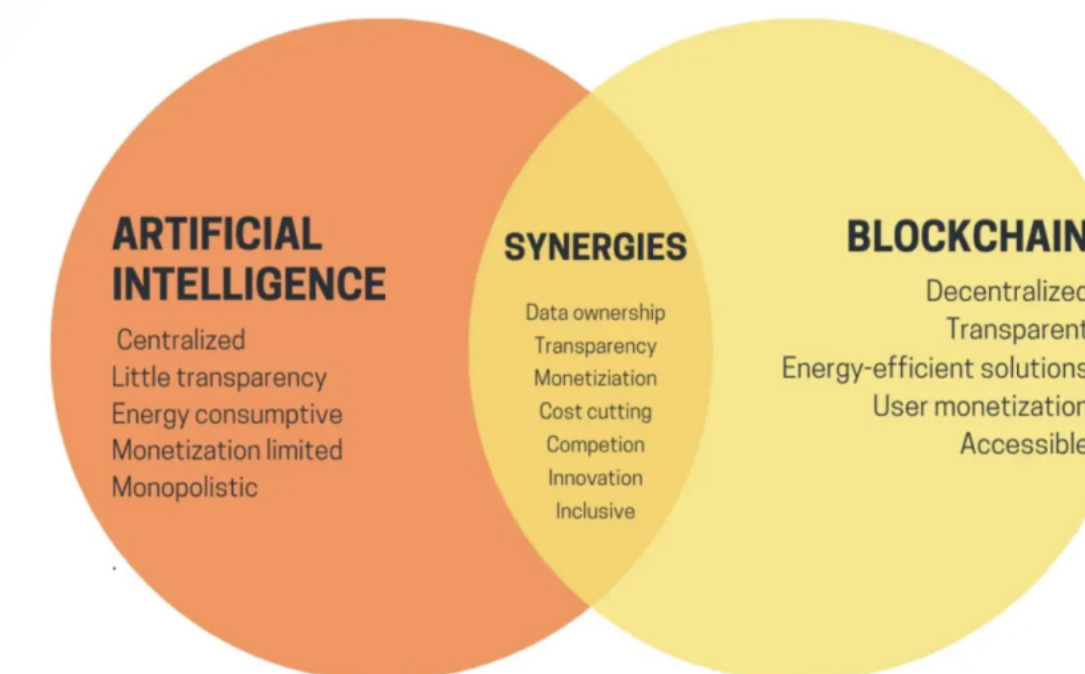
The Intersection of AI and Crypto Holds Significant Value.

Crypto Improving AI: Crypto makes us trust AI.

Crypto has the potential to address AI's concerns related to centralized control, data privacy, copyright issues, lack of democracy, and fraud, thereby enhancing its trustworthiness, assetization, and cost-efficiency.

AI Improving Crypto: AI makes blockchain smarter.

AI can empower crypto with intelligent capabilities, enabling smart contracts to make AI-driven decisions, giving blockchains the ability to perceive the physical world, and improving the user experience of blockchain apps.



Source: De UETH Blog, Exploring the Convergence of Crypto x AI

AI x Crypto Systems Overview

Infrastructure Layer

The infrastructure layer provides the computational and storage capabilities necessary for efficient execution of models and applications.

This layer encompasses the foundational tools and resources that support AI applications.

Computing Power

Disinter mediate cloud oligopolists like AWS, significantly reducing the cost of computing.

Data Storage

Utilize a decentralized database/filesystem/DA layer to store data for decentralized AI. Own, control, and utilize AI assets in a decentralized manner.

Model Layer

The model layer handles tasks like data analysis, pattern recognition, and decision-making, serving as the core of AI applications.

This layer involves the algorithms and models used within AI systems.

Model Network

Establish a peer-to-peer model inference network that incentivizes the development of machine intelligence. Build new foundational models by community contributions

On-chain AI

Enable smart contracts to make decisions with AI, giving blockchains the ability to perceive the physical world.

Application Layer

The application layer relies on algorithms from the model layer and computational resources from the Infra layer to deliver practical AI functionalities.

This layer represents the user-facing part where AI technologies are directly applied to solve real-world problems.

Data Collection Dapp

Gather data simply and cost-effectively while safeguarding contributors' rights. Use label-to-earn and contribute-data/bandwidth-to-earn applications.

AI Dapp/App

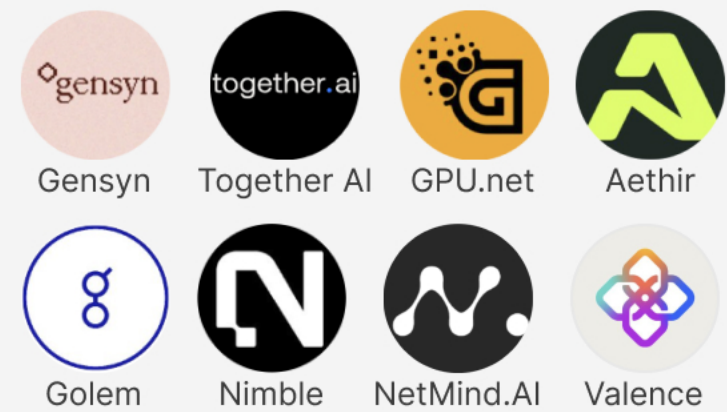
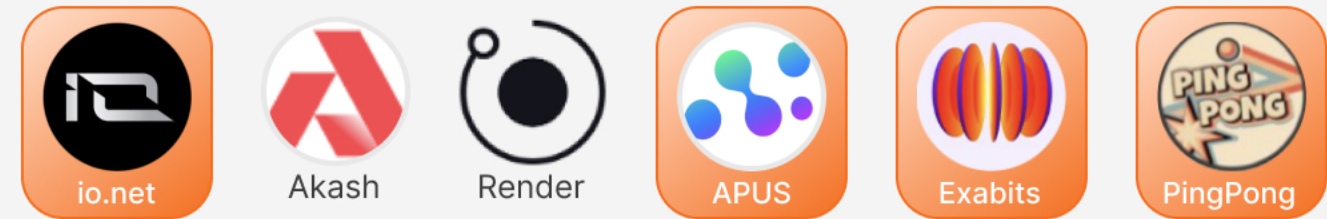
Package the infrastructure and model layers into a cohesive consumer product.

AI x Crypto Ecosystem Overview

Infrastructure Layer

Computing Power

Compute power network



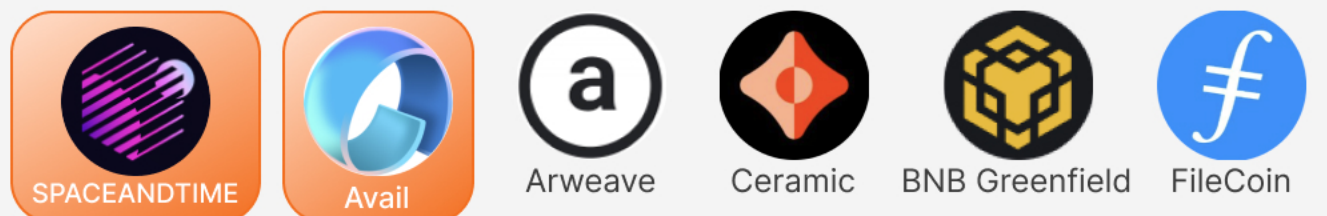
Some projects provide compute power, models, and data, becoming all-in-one AI development platforms. They support model training and inference, blurring the line with the Model Layer.

Data Storage

Optimized DA/DB for AI



General purpose DA/DB/File System



Highlighted projects are part of Foresight Ventures' portfolio. Foresight Ventures is very optimistic about the combination of two disruptive technologies: Crypto and AI, and has extensive investments in this category.

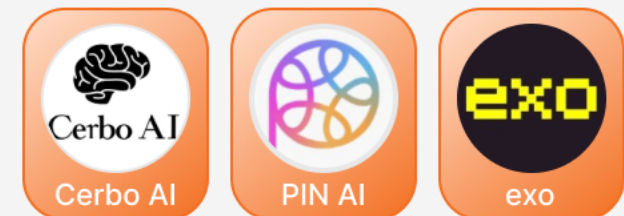
Model Layer

Model Network

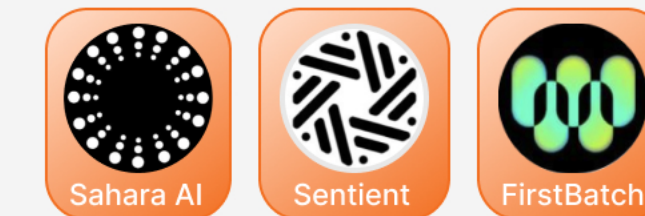
Inference network



Personal AI network



Community-built Model

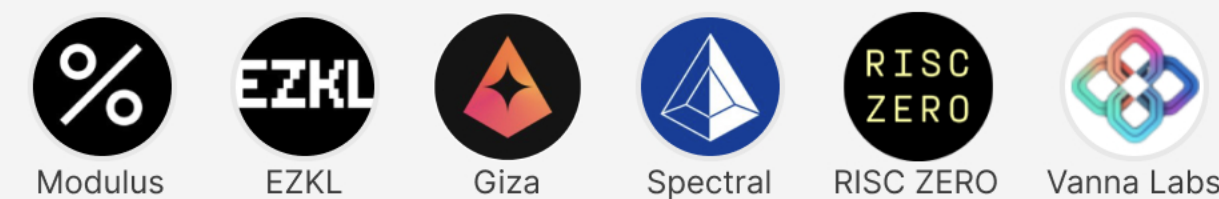


Privacy preserving AI agent (FHE ML, Federated Learning, TEE and MPC)

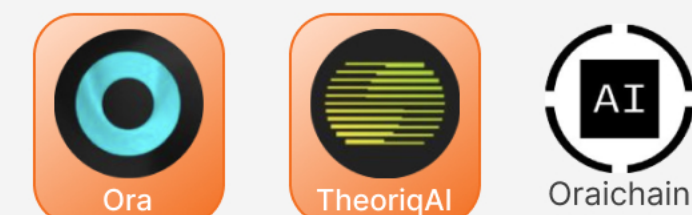


On-chain AI

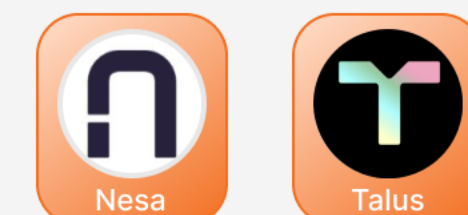
ZKML



OPML and AI oracle



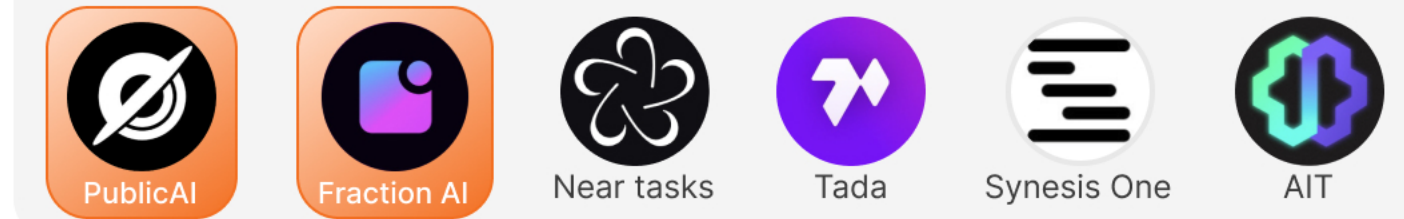
AIVM and more



Application Layer

Data Collection Dapp/App

Label-to-earn, talk-to-earn, collect-data-to-earn (active income)



Provide-data/bandwidth-to-earn (passive income)



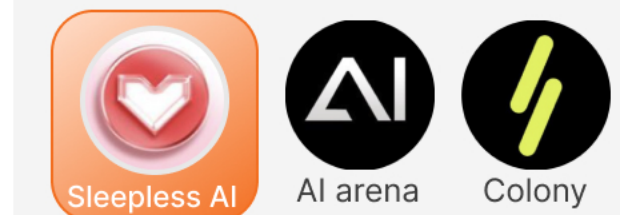
Data collection apps can also be categorized under the model layer.

AI Dapp/App

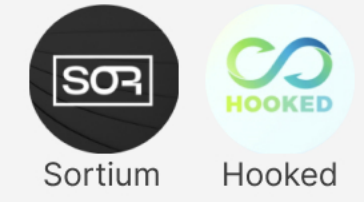
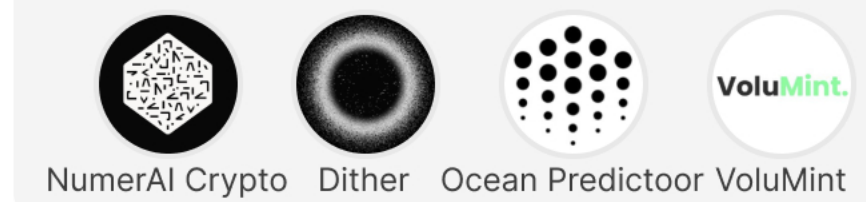
AI creator platform



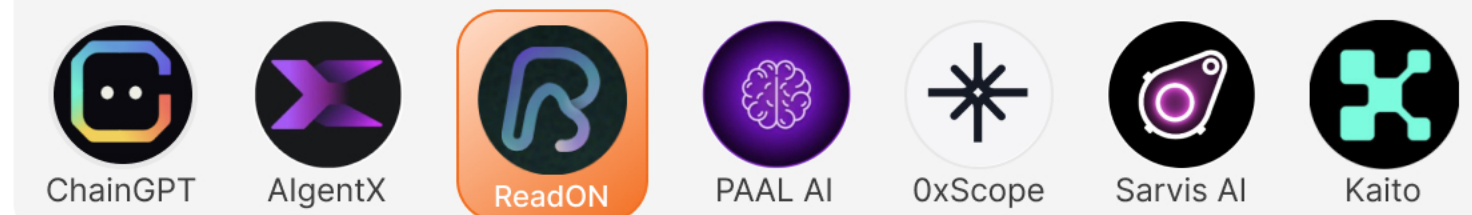
AI predictions, trading, AMM, defi



Social, gaming, entertainment



Blockchain chatbot, tools, and more



AI x Crypto - Infra Layer - Computing Power

Summary

Decentralized computing power projects gather GPUs and CPUs from underutilized sources, such as independent data centers, crypto miners, and hardware networks like Filecoin and Render. They offer decentralized and cost-effective computing power, bypassing cloud oligopolists like AWS.

Key Tailwinds

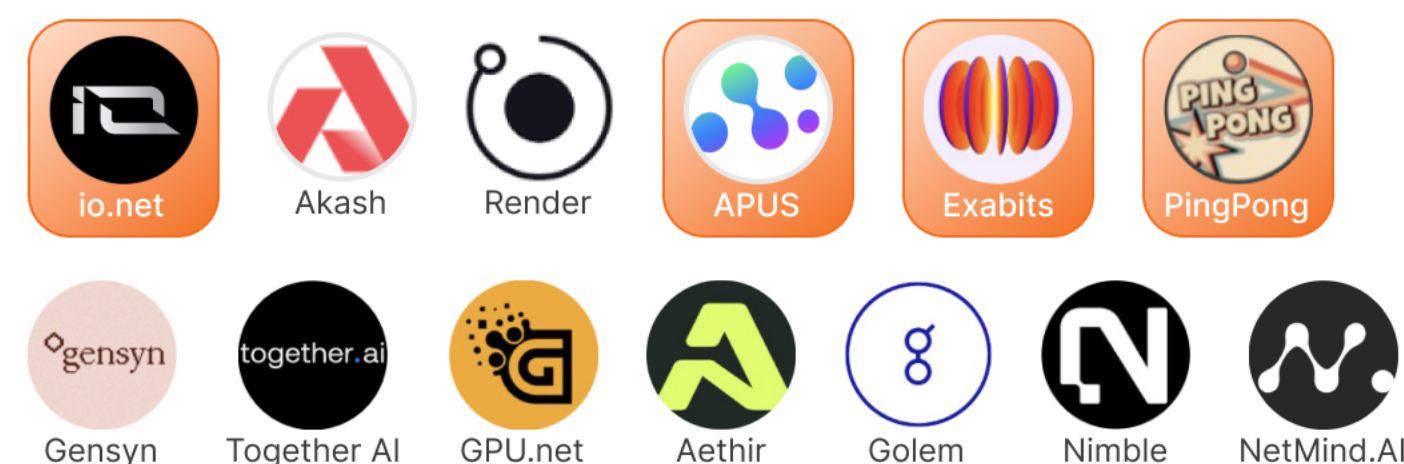
Meet Genuine Needs. Demand for AI has surged, causing a GPU shortage and boosting the decentralized computing power industry.

Has Competitive Price Advantages. Providers can supply idle computing power at minimal cost, giving decentralized networks a pricing advantage.

Key Headwinds

Lower Quality. The quality of decentralized computing power varies, with some projects allow personal computers to connect via home networks, making it generally lower quality than that of large data centers. However, this is starting to change.

Projects to Watch



Key Tech Challenges

Verifying Work Completion. Running the entire model to verify work completion is costly.

Solving Halting Problem. It's hard to predict if tasks will finish in a finite time.

Addressing Privacy Concerns. Protecting sensitive AI data is crucial.

Addressing Heterogeneous Parallelization. Distributed computing networks face delays from data transfers, and performance issues due to slower devices. Parallelizing tasks across devices is challenging.

Tech Innovations

Optimizing Network Transmission. Utilizing a secured mesh VPN to allow ultra-low latency communication between the antMiners nodes 'workers'.

Decentralized Training of Foundation Models in Heterogeneous Environments. "Our key technical contribution is a scheduling algorithm that allocates different computational 'tasklets' in the training of foundation models to a group of decentralized GPU devices connected by a slow heterogeneous network. Across 8 different cities spanning 3 continents, our approach is 4.8X faster than prior state-of-the-art training systems." (Together AI)

Protecting AI Privacy with Fully Homomorphic Encryption. Transform ML models into their FHE equivalent using, and run inference or train on encrypted data and perform inference or training on encrypted data.

Case Study

What is io.net?

io.net is a decentralized GPU network designed to give unlimited computing power to ML applications.

How does it work?

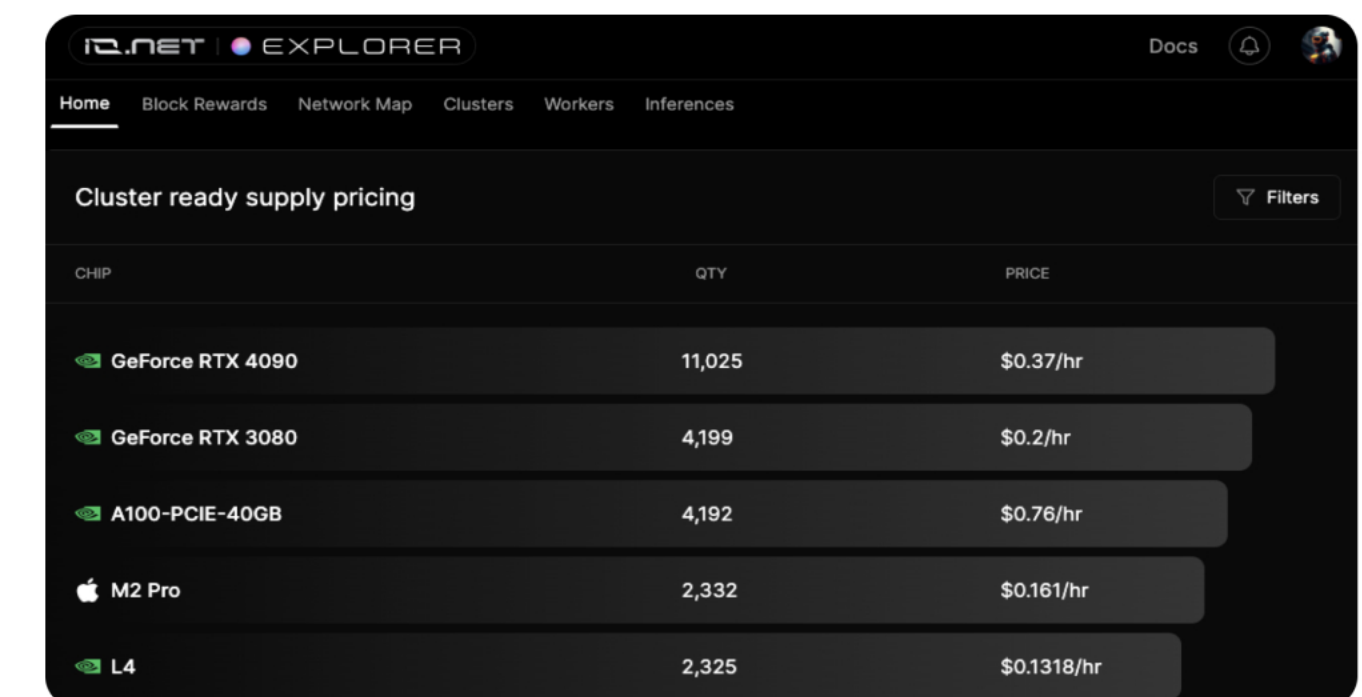
io.net gathers GPUs from underutilized sources such as independent data centers, crypto miners, and other hardware networks like Filecoin and Render, to offer decentralized and cost-effective computing power.

Why use io.net?

80% Cheaper: For example, A100 on AWS is roughly estimated \$4.10/hour, while on io.net it is \$0.76/hour.

Ample Resources: Access to over 300K verified GPUs and 77K verified CPUs.

Cutting-Edge Technology: Pioneering in the blockchain space by integrating advanced ML tech stacks like Ray, Kubernetes, and mega clusters into a GPU DePIN project for large-scale deployment.



GPU	QTY	PRICE
GeForce RTX 4090	11,025	\$0.37/hr
GeForce RTX 3080	4,199	\$0.2/hr
A100-PCIe-40GB	4,192	\$0.76/hr
M2 Pro	2,332	\$0.161/hr
L4	2,325	\$0.1318/hr

AI x Crypto - Infra Layer - Data Storage

Summary

Utilize a decentralized database/filesystem/DA layer to store data for decentralized AI. Own, control, and utilize AI assets in a decentralized manner.

Key Tailwinds

Foster a Collaborative AI Development Environment. Integrate decentralized databases with distributed computing power for data collection and AI processing.

Offer Cheaper Storage. It is cheaper than centralized data storage.

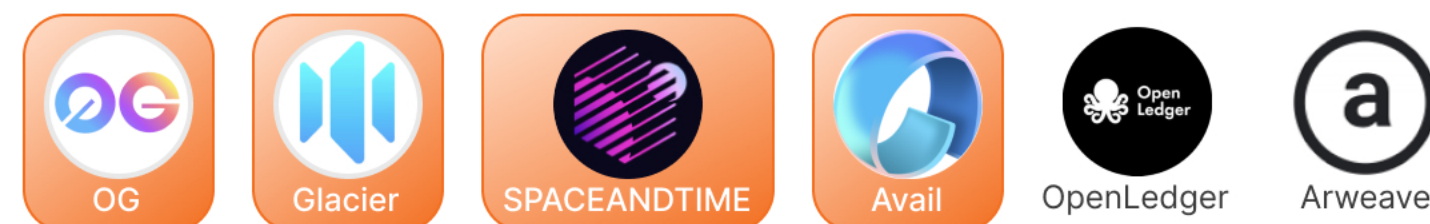
Ensure Data Accountability. Understanding data sources and accountability improves model quality. Provider decentralization enhances data privacy, security, transparency, and accountability, building safeguards for AI.

Build a Decentralized Data Marketplace. Decentralized databases securely share data across organizations, enhancing AI model accuracy with diverse data.

Key Headwinds

Retrieval Speed Considerations. Decentralized storage often has slower data access due to distribution across nodes, increasing network latency and complexity, which can limit application usability.

Projects to Watch



Key Tech Challenges

Improving Data Retrievability. It is challenging due to the varied quality and wide distribution of nodes.

Designing Effective Incentive Models. Incentive models influence miners' enthusiasm and willingness to provide services.

Designing a Storage Verification Algorithm. The algorithm secures data and ensures retrievability, but complex designs can affect retrieval performance.

Ensuring a Reasonable Degree of Decentralization. Maximizing decentralization boosts resilience, but reducing it can improve retrieval performance.

Tech Innovations

Data Availability Sampling. Use data availability sampling and data erasure coding to check that data is available without putting too much strain on any individual node.

Vector Database for AI. Provide a decentralized vector database that stores data as high-dimensional vectors instead of traditional tabulated lists, making it highly useful for AI applications.

Payment Channels for Data Retrieval. Utilize payment channels to minimize delays associated with the payment process during data retrieval.

Case Study

What is OG?

OG is an infinitely scalable data availability layer and data storage system that provides the necessary infrastructure to scale Web3 and bring novel use cases on-chain. Optimized for on-chain AI.

How does it work?

OG combines a Data Availability layer (OG DA) and decentralized storage (OG Storage), using an independent consensus network for data upload, storage verification, and incentives, harnessing global unused storage for blockchain and AI services.

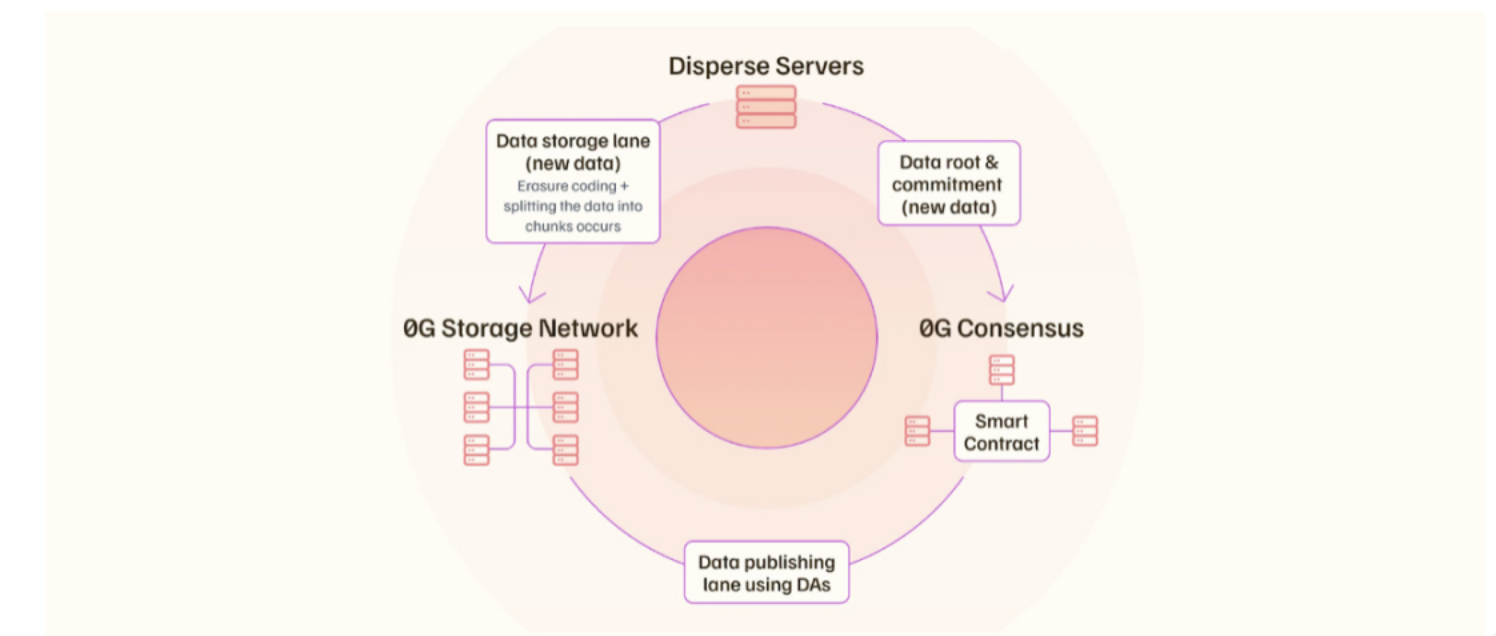
Why use OG?

Democratized AI access: Fostering collaboration and development.

Optimized DA for on-chain AI: Ability to store large inference traces and input data and run inference requests.

1000x lower costs than ETH: Storage and retrieval at \$0.0005 vs. \$51 on ETH L1.

Lightning speed: Innovative design for high data propagation speed without compromising security.



AI x Crypto - Model Layer - Model Network

Summary

Establish a peer-to-peer model inference network that incentivizes the development of machine intelligence.

Key Tailwinds

Facilitates Openness and Collaboration in AI. A Decentralized AI network enables models to improve within a community. This accelerates advancements, fosters innovation, and builds robust AI models.

Tokenizing AI Models/Agents Promotes High-quality AI Product Output. It serves as a market optimizer by providing a competitive incentive system for AI product creators.

Reduce AI Costs and Encourage Small Businesses. The decentralized network reduces application costs, enabling broader participation in AI innovation.

Key Headwinds

Most Projects Rely on Open-source Models. That may not achieve the same high level of performance as centralized, large-scale models in the market within the short term.

Projects to Watch



Key Tech Challenges

Requiring a Blockchain with a High TPS. Model inference often occurs at high frequencies, requiring well-designed payment methods to minimize delays caused by transactions.

Choosing the Best Inference Results from Multiple Outcomes. Selecting the best inference results to provide to the user is challenging, especially with multiple models of the same type across the network, each excelling in different domains.

Tech Innovations

Using Multi-chain Blockchain and State Channels. Use state channels to support high-frequency micropayments. Or use substrate's multi-chain architecture to manage different types of model network.

Decentralized Mixture of Experts(MoE). In a MoE model, Bittensor utilizes the power of multiple neural networks to address complex problems. Each expert model specializes in a specific aspect of the data, and when new data is introduced, these experts collaborate to generate a collective prediction that surpasses the capabilities of any individual expert.

Proof of Intelligence. Proof of Intelligence is a consensus mechanism used in the Bittensor network to reward nodes that contribute valuable machine-learning models and outputs to the network.

Edge AI Model. Runs AI models directly on the user's device.

Case Study

What is Bittensor?

The Bittensor Protocol is a decentralized machine learning protocol that enables the exchange of machine learning capabilities and predictions among participants in a network.

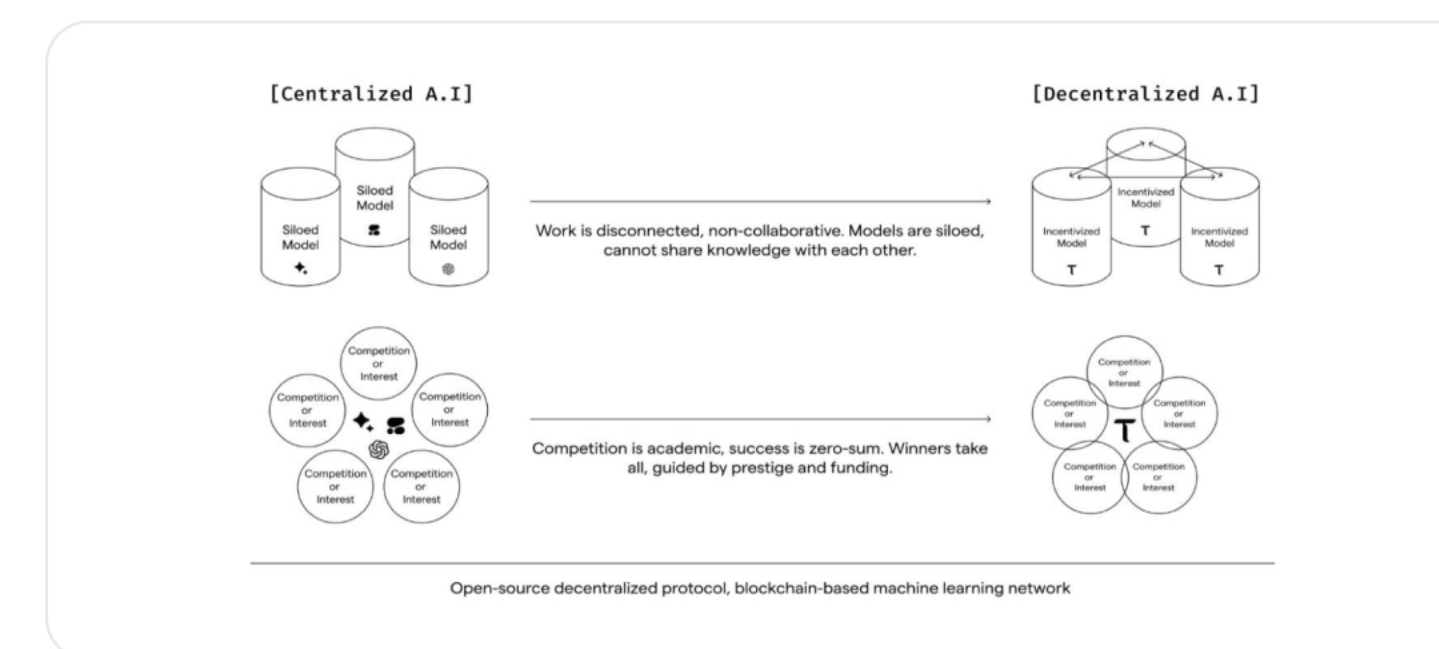
How does it work?

Miners in the Bittensor network host models to provide machine learning services. When a client requests a prediction, the network directs it to a registered miner. The miner processes the request and returns the prediction to the client.

Why use Bittensor?

Increasing Diversity and Quality of Models: In the Bittensor ecosystem, top producers receive more incentives, while less competitive ones are gradually phased out.

Resource Sharing and Cost Reduction: Bittensor functions like AI Lego, encouraging users to share and innovate by combining models. This mechanism enhances efficiency, reduces redundant investments, and lowers costs. Decentralized computing resources further decrease computational expenses.



AI x Crypto - Model Layer - On-chain AI

Summary

Enable smart contracts to make decisions with AI, giving blockchains the ability to perceive the physical world.

Key Tailwinds

A Completely New Category of Narrative. On-chain AI attracts attention, benefiting project funding and TGE.

Enabling Blockchain to Perceive The Physical World. An on-chain AI facial recognition model lets blockchain recognize faces.

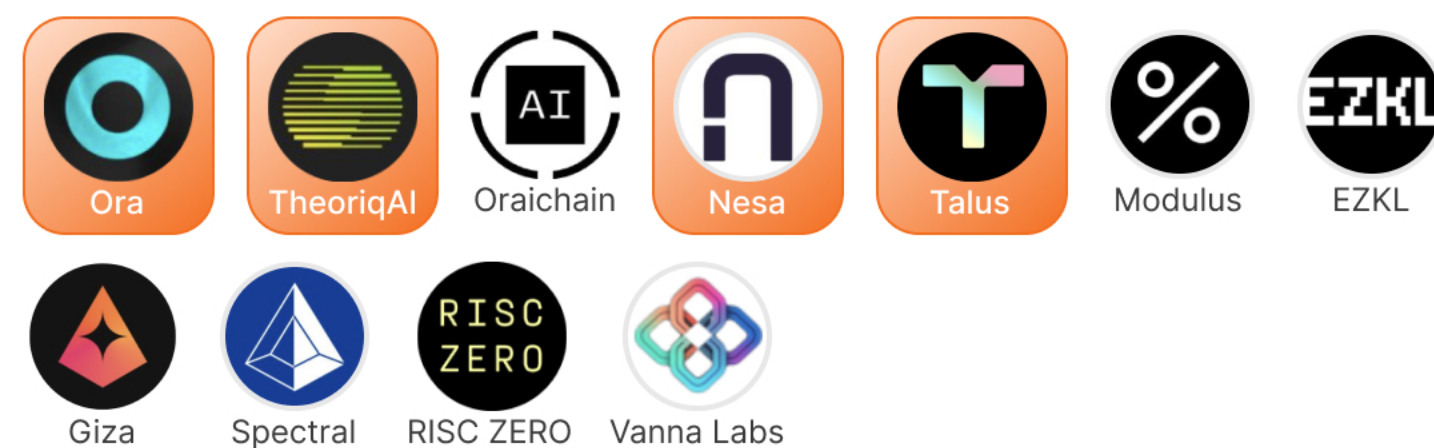
Empowering Smart Contracts to Make Decisions Using AI. An on-chain ETH prediction model helps smart contracts make trading decisions.

Running AI models with Privacy Protection. Technologies like ZKML, FHE, and MPC protect the privacy of AI models or user input/output.

Key Headwinds

Unclear Demand Drivers. On-chain AI uniquely integrates AI into crypto, creating a new narrative. Its demand is unclear and needs strong applications for adoption.

Projects to Watch



Key Tech Challenges

Verifying Inference Results. Blockchain data must be locally verifiable by nodes. The challenge is proving AI inference results come from the specified model, as random and floating-point numbers cause uncertainty in decentralized systems.

Protecting the Privacy of Models or Input/Output Data. Companies need to shield trained models from exposure, while users must safeguard sensitive data like medical records and facial images in AI inference.

Tech Innovations

ZKML (Zero-Knowledge Machine Learning). ZKML uses ZKP to verify machine learning inferences while protecting input/output and model privacy, allowing smart contracts to utilize and validate results.

OPML (Optimistic Machine Learning): Smart contracts accept AI inference results unless challenged within a set period.

AI Oracle. Smart contracts trust and accept its inference results directly.

AIVM (Artificial Intelligence Virtual Machine): AIVM, created by Nesa, streamlines AI computation with consistent rules and protocols for all nodes, simplifying inference result verification.

Neural Network Quantization. Converts floating-point to fixed-point numbers, making networks lighter and ZK-friendly.

Privacy Protection: Utilize TEE, ZKML, FHE, and MPC to safeguard the privacy of AI models or their input/output.

Case Study

What is Nesa?

Nesa is the global blockchain network bringing AI on-chain. The Nesa platform lets applications, protocols, and smart contracts seamlessly integrate with AI.

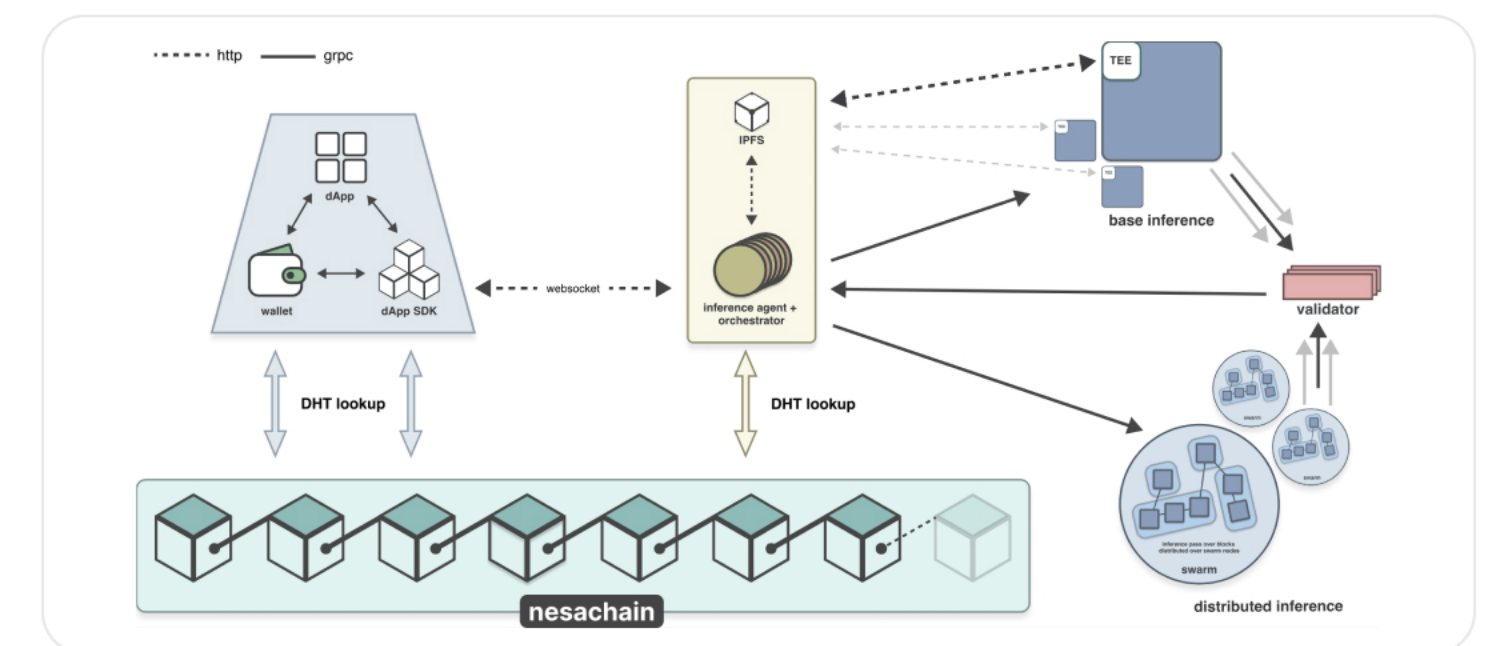
How does it work?

Nesa inference and management via AIVM. AI models are provided by developers. Node runners execute decentralized tasks like validation and inference. Users needing private inference can leverage Nesa for results from leading AI models, usable by smart contracts.

Why use Nesa?

Using AI in Smart Contracts: Users can leverage AI for decision-making. Nesa's AIVM executes AI models uniformly, ensuring consistent output across different hardware and software configurations.

Private Inference: Nesa offers a cutting-edge hybrid approach using TEE, ZKML, homomorphic encryption, consensus-based verification, and split learning to enhance security and privacy.



AI x Crypto - Application Layer - Data Collection Dapp/App

Summary

Gather data simply and cost-effectively while safeguarding contributors' rights. Use label-to-earn and contribute-data/bandwidth-to-earn applications.

Key Tailwinds

The Data Collection and Labeling Market is Enormous. A Fact.MR study estimates it will be worth \$2.57 billion in 2024, with a CAGR of 18%, reaching \$13.45 billion by 2034.

Crypto Incentives Boost Data Collection. Crypto incentives boost engagement, increase participation, and enable global involvement in data collection.

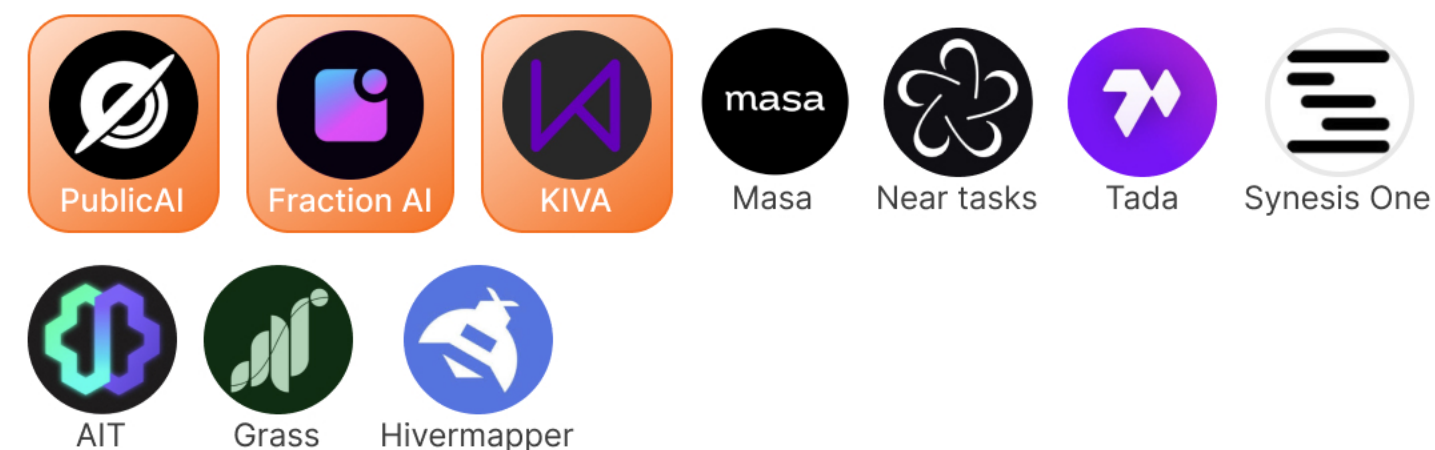
Lower Annotation Costs. Apps use idle time better than traditional studios, boosting motivation and cutting costs with a gamified approach.

Enhancing User Authorization and Protecting Contributors' Rights in AI. Crypto streamlines authorization, secures transactions, and fosters global trust and participation.

Key Headwinds

Lower Labeling Quality. Users often lack the expertise of studio staff, leading to lower labeling quality and making quality control difficult.

Projects to Watch



Types

Label-to-earn, Talk-to-earn. AI companies post data collection jobs; users label or talk to earn, and checkers verify for active income.

Provide Data/Bandwidth to Earn. Earn passive income by granting data access and providing bandwidth for web crawlers.

Innovations

Using Crypto Incentives to Build a Trustless Global Labor Market and Reduce Annotation Costs. Crypto incentives help labelers use idle time more effectively than traditional studios, reducing costs and enabling global participation in data collection.

Gamifying Labeling. Use gamification to make the labeling work easy and fun.

Ensuring Quality Control. Use OnChain RLHF (Reinforcement Learning with Human Feedback) data consensus algorithm leverages blockchain and smart contracts to ensure data integrity. Using rewards and penalties to encourage users to verify the quality of data.

Utilizing DePIN Network for Data Collection. Provide you bandwidth for web crawler; Purchase Hivemapper's dashcam, earn money by collecting map and street view data, and earn more through labeling.

Case Study

What is PublicAI?

PublicAI is a decentralized marketplace for AI data annotation and collection, using blockchain to create a trustless global labor market with crypto incentives.

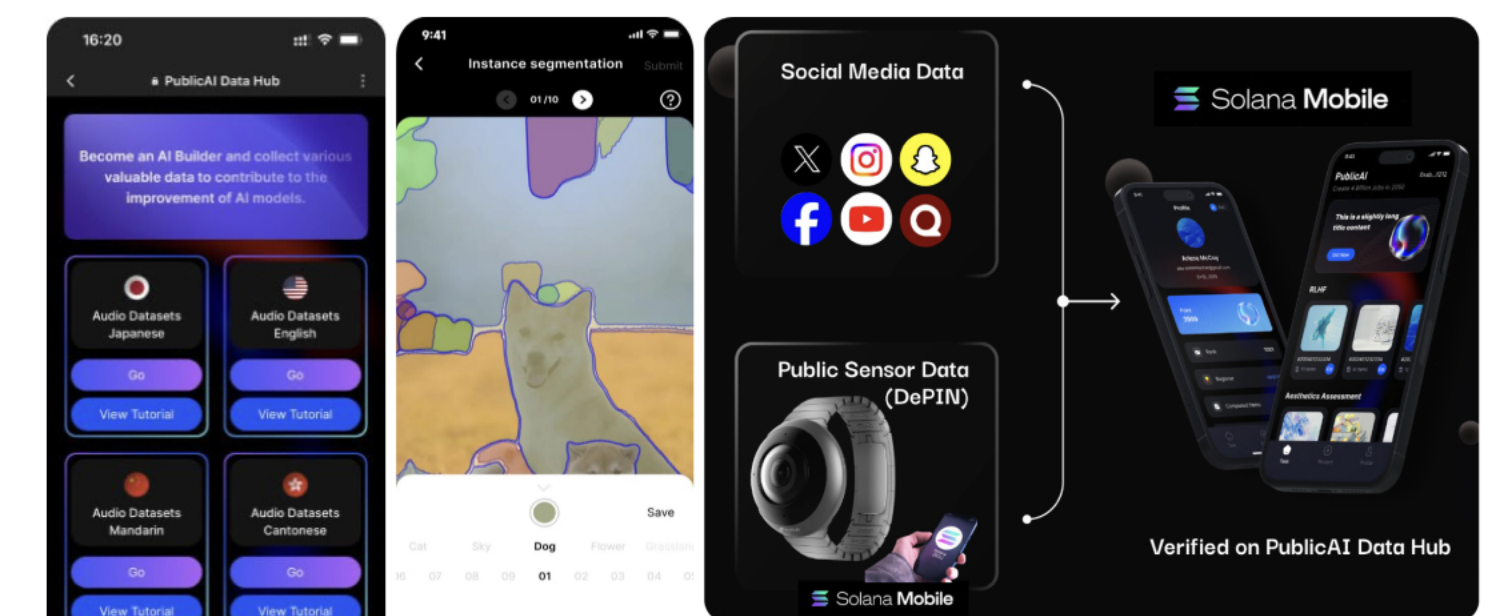
How does it work?

AI companies post data collection/labeling tasks on PublicAI. Users finish the tasks to earn, while on-chain checkers verify the data for active income. They also earn passive income by sharing social media and IoT sensor data through PublicAI's Dapps.

Why use PublicAI?

Lower Annotation Costs for AI Company: Crypto incentives help labelers use idle time more effectively, eliminating price differentials and reducing costs. A Web3 reputation system with incentives and penalties ensures quality control.

Maximize Idle Time, Enjoy More Fun, and Receive Fast Global Payments for Labelers: PublicAI uses gamification to make labeling easy and fun. Crypto payment channels overcome international settlement obstacles, welcoming global participants.



AI x Crypto - Application Layer - AI Dapp/App

Summary

Package the infrastructure and model layers into a cohesive consumer product.

Key Tailwinds

Excellent AI Creator Incentive Mechanisms Drive AI Innovation.

Crypto AI platforms use asset tokenization to help AI creators with funding challenges and profitability.

Crypto Establishes a Sharing Economy for AI, Creating Opportunities for New Business Models. It democratizes access to AI resources, giving users more control and access, and fostering global collaboration.

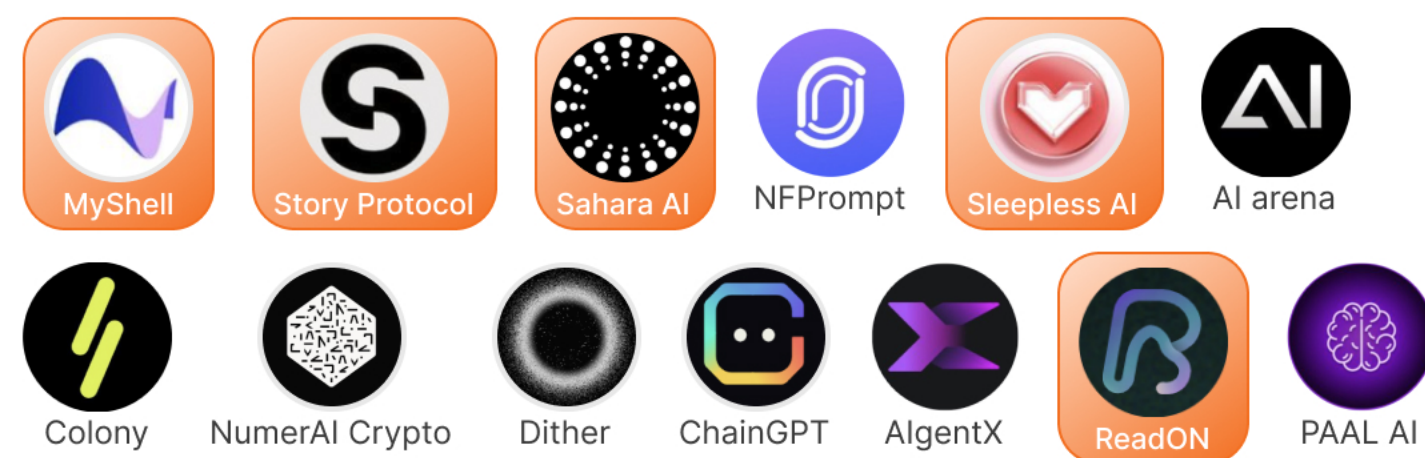
AI Dapps Offer Users a New, More Secure, and Privacy-focused Experience. The Crypto x AI tech stack helps build transparent and decentralized AI Dapps, providing enhanced security and privacy.

Key Headwinds

Uncertain Regulatory. Uncertain Regulatory. The regulatory environment for blockchain and AI Dapps is still evolving.

Complex Technique. The high technical barrier can be challenging.

Projects to Watch



Types

AI Creator Platform. Creators can customize AI models or create image works on the platform and enjoy revenue rights.

AI-based Social, Gaming, Entertainment Apps. AI enhances social, gaming, and entertainment apps/dapps, making them smarter and more engaging.

AI Apps for Predictions, Trading, AMM, and DeFi. Leverage AI for price forecasts, trading strategies, portfolio management, and engaging in DeFi projects.

Crypto Chatbots, Tools, and More: Chatbots tailored for the crypto industry, AI tools for contract auditing, data analysis and so on.

Innovations

Fair Value Distribution Ecosystem. AI creators earn from app usage and receive platform incentives, with potential funding from patrons. Integration with permissionless blockchain provides global liquidity, enhancing financial benefits and expanding AI app potential.

On-device AI Processing Protects Data Never Leaves Their Mobile Devices. Unlocking a new level of personalized AI service without compromising privacy.

Premier Text-to-speech (TTS) Models. Clone any voice in an instant, take control of its style, across any language. (MyShell)

Case Study

What is MyShell?

MyShell is the first decentralized AI consumer layer that allows everyone to build, share, and own AI Apps.

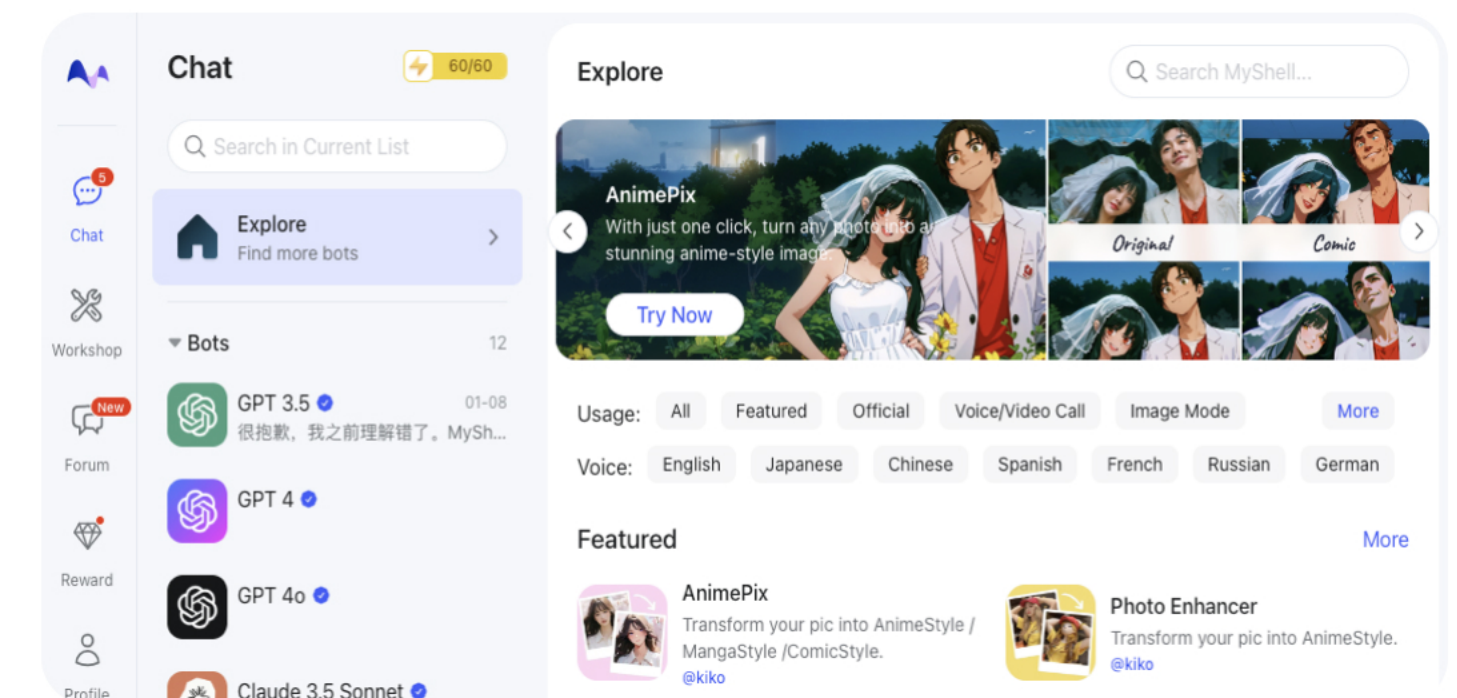
How does it work?

MyShell is built on four pillars: a model layer integrating 300+ open and closed-source models, a development platform for creating AI-native apps, an app store for launching AI apps as tradable blockchain assets, and an incentive network that shares revenue with all stakeholders.

Why use MyShell?

Easy to Use for AI Creators/Developers: MyShell offers a no-code platform for creating AI chatbots, allowing users without programming experience to easily design and customize robots for language learning, education, and utilities.

Empowering Creator Economy: MyShell values the long-term success of its creator community, offering a dynamic crypto economic model. This fosters growth, unique content creation, and a positive cycle for both creators and users.



CONCLUSION

- Generative AI is set to drive significant business transformation in the next 50 years, fueled by substantial capital influx and rapid technological advancements.
- Crypto enhances AI by addressing centralized control, data privacy, and security issues, making AI more trustworthy and efficient.
- AI x Crypto projects have shown strong asset returns over the past two years. This intersection is still in its early stages and holds significant value.
- The infrastructure and model layers of AI x Crypto are relatively mature, but application development is still in its infancy. Significant opportunities exist for expanding the application layer to leverage the developed infrastructure and models.
- AI x Crypto has brought forth numerous new research areas with vast research potentials, such as ZKML, FHE-ML, distributed ML training, network quantization, decentralized databases, fully homomorphic encryption, AI hardware and FHE hardware.

Decentralized Infrastructure:

Innovations in decentralized computing power and data storage will reduce costs and enhance the efficiency and security of AI applications, bypassing traditional cloud providers.

On-chain AI:

AI-driven smart contracts will enhance blockchain applications, including biometric authentication, fraud detection, and AI trading bots.

AI Dapps / Apps:

New AI-driven decentralized applications will emerge across various sectors, offering enhanced security, privacy, and user experience through blockchain integration.

Model Networks:

Peer-to-peer model inference networks will promote collaboration and innovation in AI, reducing costs and enabling small businesses to participate in AI advancements.

Data Collection Dapps / Apps:

The integration of AI and crypto will make data collection more efficient and cost-effective, with projects focusing on gamified data labeling and enhanced user rights protection.

Regulatory and Ethical Considerations:

Clear regulations and best practices will be essential for fostering innovation while protecting user rights and data privacy in the evolving AI x Crypto landscape.

As the first and only crypto-focused VC bridging the East and West, Foresight Ventures is dedicated to being at the forefront of AI and Crypto innovations.

We are particularly excited about uses-cases including personal AI assistants, privacy-preserving edge AI models, immersive virtual environment apps powered by AI and integrated with AR and VR technologies, global labor markets for data collection and AI training, and so on.

AI and Crypto could be the most exciting industries of the next 50 years. Blockchain has reshaped the means of production, while AI is transforming production processes. We eagerly anticipate an unprecedented explosion as these two disruptive innovations collide. We envision a future where AI wields immense power, a power unsuitable for centralized control. This brings an urgent need to establish decentralized networks to govern larger AI systems, starting with computing power and data, and gradually extending to algorithms and applications.

■ **Blockchain reshapes the means of production:**

Blockchain technology, with its distributed ledgers and smart contracts, enhances transparency and efficiency in asset management and transfer. For instance, blockchain can be applied in supply chain management to ensure that every stage, from production to sale, is traceable.

■ **AI reshapes production processes:**

The application of AI in manufacturing, services, and other fields boosts production efficiency and accuracy. AI-driven automation systems can operate 24/7, reducing human errors and optimizing resource allocation.

■ **Decentralized governance of AI:**

Decentralized networks, using distributed consensus mechanisms and transparent governance models, have the potential to mitigate the risks of AI centralization. Similar to blockchain, decentralized AI networks can establish transparent and fair governance structures through smart contracts, preventing any single entity from exerting excessive control over AI systems.



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