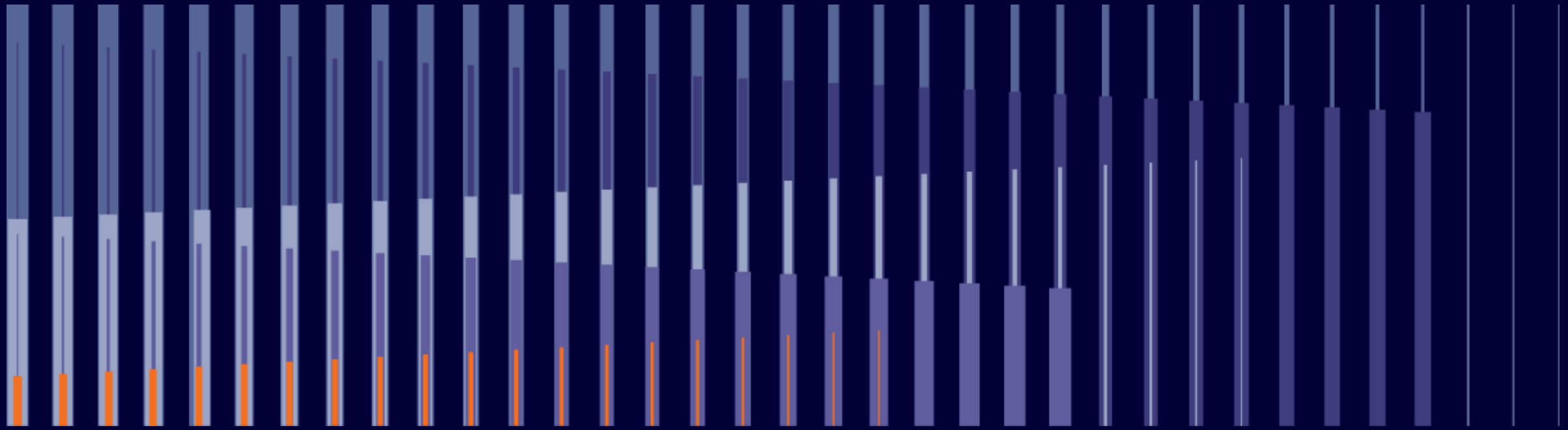
HODL
/RESEARCH

Official Report
Bittensor



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This Hodl Research Report is written by our Research Analyst, Jonathan Carbucia and our Content Marketeer, Tobias Datema.

ABSTRACT

Since 2020, the artificial intelligence industry has seen an exponential surge in growth, delivering impressive outcomes.

However, a significant drawback exists within the industry—it's currently monopolized by a handful of major players like OpenAI and Google. These companies highly prize their competitive edge and are reluctant to share data or insights. This practice not only leads to isolated ecosystems, where firms can only build upon their progress but also raises the barrier of entry for newcomers. Emerging companies must start from square one, requiring expertise in building AI models and more crucially, access to extensive, high-quality datasets. Even if they do succeed and aim to deploy their model for broader access, prevailing industry dominance by these established firms makes it an uphill battle.

To address this issue, Bittensor has established an intelligence network that enables decentralized machine learning. Developers who currently face challenges in monetizing their AI models due to high entry barriers can now upload their AI models to the network and generate returns as their models are utilized. As more models are added to the network, a unique phenomenon occurs. While conventional AI firms operate in isolation, Bittensor can form an expanding machine intelligence network. This creates a compound effect, resulting in an increasingly powerful AI system that is both accessible and inclusive, thanks to its decentralized nature. Essentially, by fostering a free market, the network acts as a gravitational force, attracting the best AI models.

PROBLEM STATEMENT (1/2)

Since 2020, the artificial intelligence (AI) industry has made remarkable advancements, serving hundreds of millions of individuals and businesses globally as they integrate this technology into their daily operations.

Notably, Chat-GPT, an AI chatbot developed by OpenAI, achieved a user base of 100 million within two days. However, the industry grapples with inherent challenges, primarily stemming from its significant centralization, where a handful of giants, such as Google, OpenAI, and Anthropic, dominate the market.

This dominance means these big companies don't collaborate much and keep their data private, making it hard for new companies to enter the market. Starting an AI company requires a lot of money, data, and expertise. Even if a new company develops an AI, competing with these big firms is tough due to their resources and data. This situation makes it difficult for new players to succeed and keeps the big companies in control.

Bittensor addresses this challenge through the establishment of a decentralized intelligence network, fostering machine learning and reshaping the landscape of AI development. This innovative approach empowers developers to seamlessly monetize their models by contributing them to the Bittensor Network. The essence lies in the utilization of data: the more frequently the data is employed, the greater the financial returns for developers.

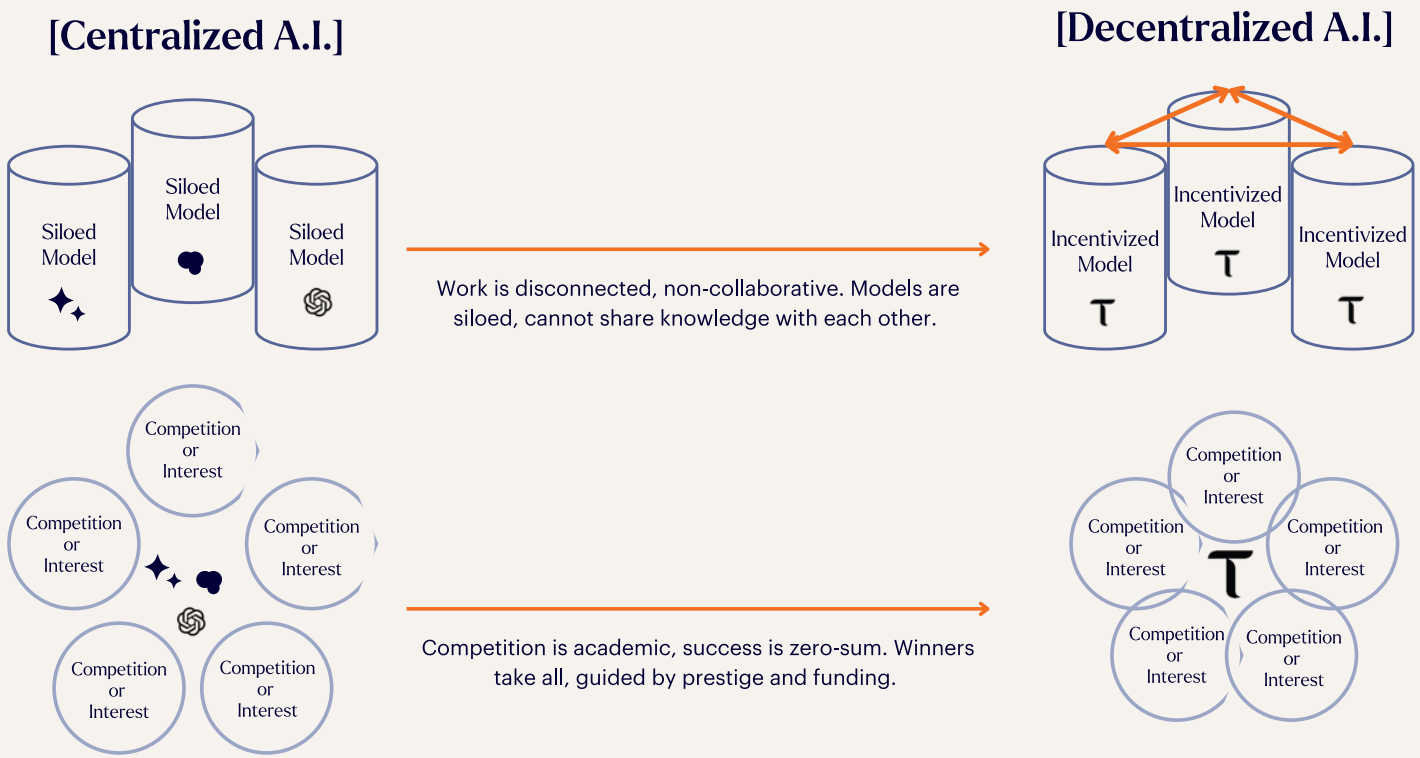
PROBLEM STATEMENT (2/2)

As more and more AI programs join the Bittensor network, it becomes like a huge, diverse library filled with all sorts of information.

This makes the AI smarter and more capable because it can learn from a wide range of sources.

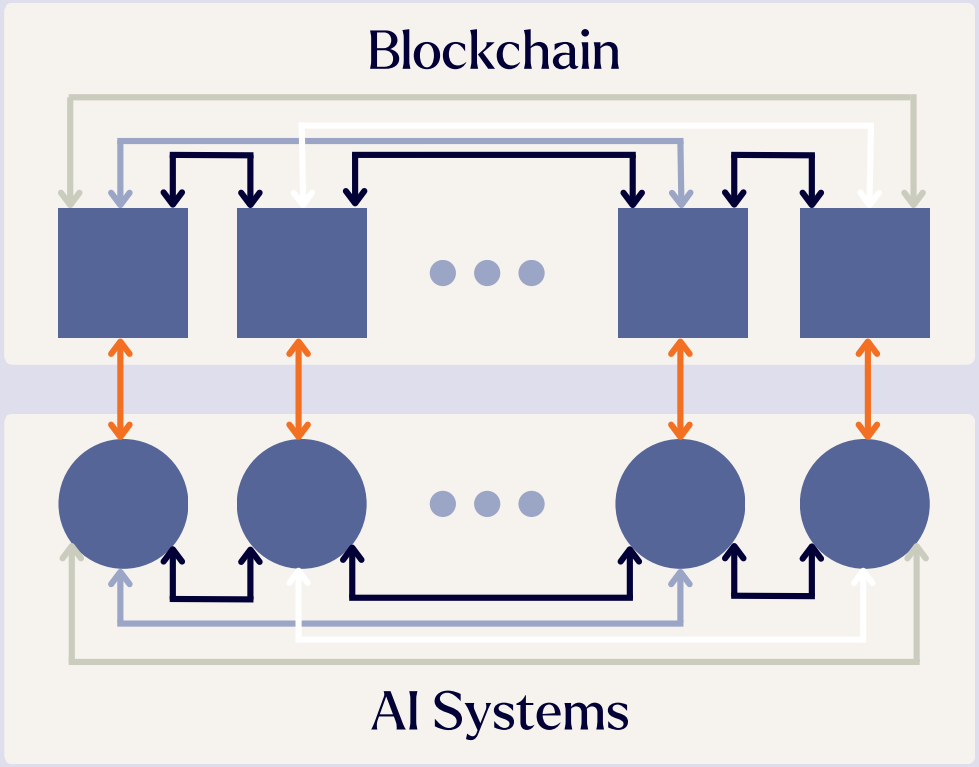
This growth in the network's intelligence isn't just about having more data; it's also about making AI accessible to everyone. Unlike systems controlled by big companies, Bittensor's network is open for all to use and contribute to.

A key feature of Bittensor is that it gives regular users a say in how the AI develops. Instead of big companies making all the decisions, users on the Bittensor network can help guide the direction of AI's growth. In essence, Bittensor is creating a new way of developing AI. It's not just a few people in charge; it's a community effort. Everyone who uses Bittensor can help shape how the AI evolves.



Open-source decentralized protocol, blockchain-based machine learning network

Source: https://bittensor.org/



Source twitter.com/Bittensor_FR/status/1717904701851590912/photo/1

SOLUTION

Bittensor has created a decentralized peer-to-peer machine learning protocol that can be compared to a neural network infrastructure for machine learning and AI applications.

This is achieved by the unique design of the Bittensor network, enabling AI systems and the blockchain to integrate. The Blockchain layer, built on Polkadot Substrate, serves as a foundational layer-0 blockchain beneath the AI layer. It is pivotal in enforcing the consensus mechanism, ensuring peer identity, and providing incentives for network peers. Communication between these layers is facilitated through inter-process communication.

The AI layer plays a key role in simplifying the Bittensor kernel and making sure that a node's neural network can smoothly communicate with other nodes in the network. In the Bittensor Protocol, every node contains just one neural network.

To achieve a fair distribution of incentives, the Bittensor network employs a staked weighted trust system. Peers actively rank each other, and highly ranked peers receive additional rewards. Importantly, the blockchain layer places trust in the collective rankings provided by all participating peers, avoiding reliance on individual rankings. Peers must register wallets and unique cryptographic keys to submit rankings, which serve as both identification tools and are crucial for signing transactions and facilitating peer communication. Additionally, the blockchain layer addresses collusion challenges through a trust-based incentive mechanism, rewarding "trusted" peers who have reached consensus within the network. This strategy enhances the security and fairness of the Bittensor network's incentive structure.

"AI is neither good nor evil. It's a tool. It's a technology for us to use."

Oren Etzioni, Professor Computer Science

TECHNOLOGY (1/3)

The ***Yuma Consensus***, a Proof-of-Intelligence consensus mechanism, is a special system Bittensor uses to manage and secure its network

The Yuma Consensus, een Proof-of-Intelligence consensus mechanism, is a special system Bittensor uses to manage and secure its network. It helps spread AI processing tasks across many computers (nodes), making it possible to handle bigger and more complex tasks.

This system combines two methods, proof-of-work and proof-of-stake, to validate transactions and create new blocks in the blockchain. Nodes complete computational tasks and are rewarded with tokens for their work. Yuma is unique because it also involves machine-learning tasks. Nodes that contribute high-quality AI models get rewarded with TAO tokens, Bittensor's native cryptocurrency.

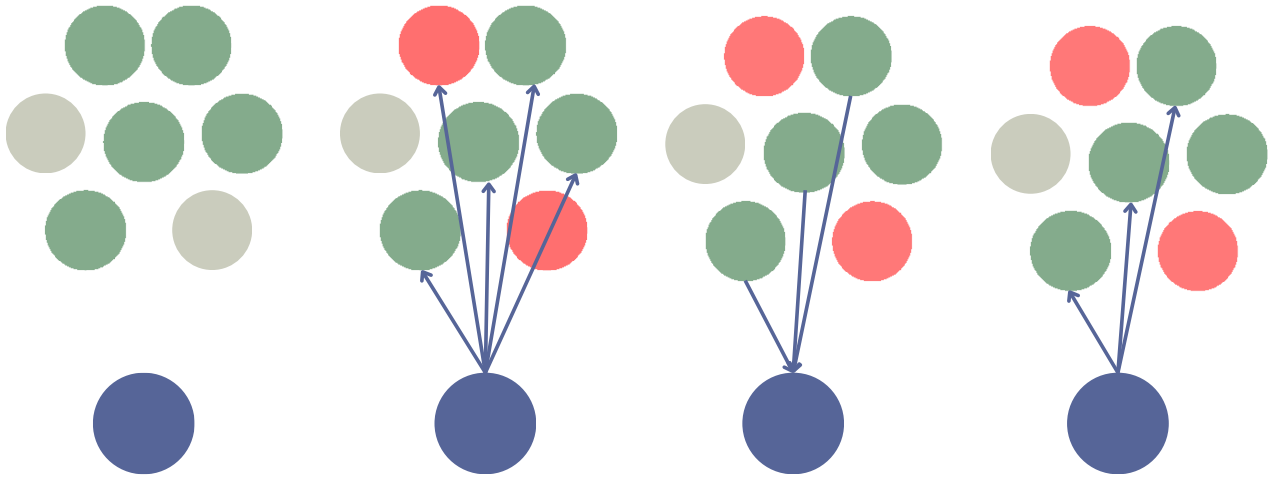
The system is designed to be fair, with validators making sure that rewards are given out correctly. This encourages everyone to work together and keeps the network secure. The implementation of PoI within Bittensor yields three primary advantages: incentivizing valuable contributions, fostering collaboration, and enhancing blockchain security.

TECHNOLOGY (2/3)

In addition to pioneering a new consensus mechanism, Bittensor introduced the innovative concept of a ***Decentralized Mixture of Experts*** (MoE).

Where centralized AI-models are limited to knowledge of specific areas, MoE combines the knowledge of multiple models (experts) to come to the most optimal solution. Where one model is focused on languages, the other might be experienced in programming languages. When new data enters the Bittensor network, these experts collaborate, generating more accurate predictions collectively than any single expert could achieve alone—a testament to the power of interconnected systems.

Operating in a peer-to-peer distribution, these neurons hold varying network weights stored on a digital ledger. Peers actively rank one another, training neural networks to assess the value of neighboring nodes, crucial for the network's overall performance. The ranking system accumulates scores on a digital ledger, rewarding high-ranking peers monetarily and granting them greater influence within the network. This direct correlation between contributions and rewards fosters fairness and transparency, creating a marketplace where intelligence is evaluated and priced by other systems, incentivizing continuous improvement and knowledge enhancement among peers.



1. Locate peers from the chain and select whom to query.
2. Send inputs forward to the peers selectively based on specialty.
3. Join responses from responding peers. Responses are used as input to the client model.
4. Gradients propagate backward, training the network.

Source revelointel.com/insights/bittensor/

TECHNOLOGY (3/3)

In the Bittensor network, a ***subnet*** is like a small, specialized project within the larger network. Each subnet consists of a group of nodes (computers) that work together closely.

These subnets are designed to focus on specific types of tasks within the Bittensor network. This setup allows the Bittensor network to efficiently manage different kinds of computational needs, with each subnet playing its own unique role in the larger ecosystem.

These diverse subnets within Bitensor are purpose-built to handle an array of functions, whether it's managing various machine learning models, processing data, or engaging in other computational endeavors. Each subnet flaunts distinct characteristics, encompassing finely-tuned algorithms, specialized hardware, or customized parameters, tailored precisely to meet specific computational requirements.

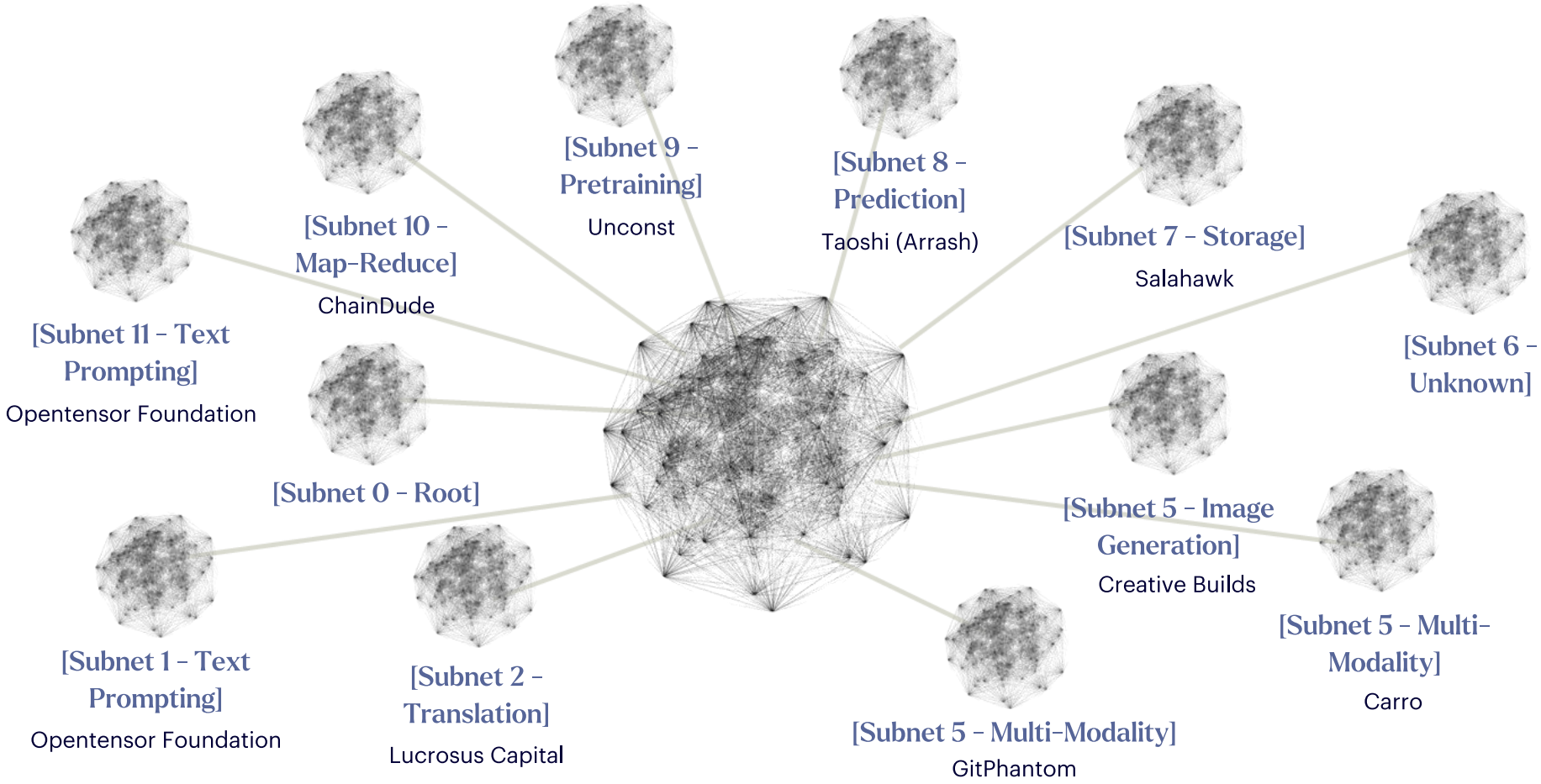
Nodes within a subnet harmonize their efforts by exchanging information, validating computations, and collectively pursuing objectives exclusive to that particular subnet.

This collaborative approach not only scales operations but also nurtures specialization, enhancing the Bitensor network's prowess efficiently and precisely handling a multitude of tasks.

Moreover, within this dynamic system, the network governs itself by allowing the registration of up to 32 subnets, and when a new subnet joins, the one with the lowest emission value is deregistered. This autonomous mechanism ensures that subnets continuously prove their merit, fostering a competitive yet regulated environment within the network.

This dynamic regulation emphasizes the need for each subnet to consistently demonstrate its value to secure a position in this fiercely competitive ecosystem.

TECHNOLOGY (3/3)



Source twitter.com/Bittensor_FR/status/1717904701851590912/photo/1

ECOSYSTEM

Given Bittensor's presence in a specialized market, building a robust ecosystem will naturally require some time.

Currently, the network comprises 32 subnets designated for specific AI models such as the completions from text prompts. The team acknowledges that the ecosystem is not yet thriving, and this is by design. To ensure the network's proper functionality, a critical number of miners is essential. Consequently, the team has prioritized attracting miners to support the network. With a sufficient number of miners validating the network, the next phase involves efforts to entice AI developers and models. While growth is anticipated, the niche nature of the sector suggests that this expansion may take some time.

COMMUNITY

Since its launch in 2021, the network has slowly attracted thousands of users:

~54k

Accounts

Over the past two years, 54K accounts have been created to interact with the Bittensor network

27K

Accounts with balance

Of the 54K accounts, 27K accounts have a positive TAO balance.

~49k

Opentensor

The foundation of Bittensor has ~45.000 followers which is still relatively low for a digital asset network. This could imply that participants in the digital assets market are relatively unfamiliar with Bittensor.

$1.383b

Market Cap

Since its launch in 2021, Bittensor has increased to a market cap of over +$1B, slowly entering the top 50 projects in terms of market cap.

PARTNERS

Within the Bittensor network, there are some exciting partners.

Digital Currency Group, PolyChain Capital and Firstmark

First, the protocol is backed by industry-leading venture capitalists such as Digital Currency Group, PolyChain Capital and Firstmark. The backing of these leading VCs illustrates the potential of Bittensor and grants access to leading figures, a vast network, and additional guidance. Important to note, that these VCs have acquired the token either through validating & mining or acquired the token on the open market. The token had a fair launch, meaning there were no pre-mined tokens or Initial Coin Offering.

Cerebras and Opentensor

Other important partners include Cerebras, an American artificial intelligence company. Together with Opentensor, the firms created BTLM-3B-8K (Bittensor Language Model), a new state-of-the-art 3 billion parameter open-source language model that achieves breakthrough accuracy across a dozen AI benchmarks. As Bittensor continues to grow, the expectations are that more AI-related partners will enter the ecosystem.

"Like all technologies before it, artificial intelligence will reflect the values of its creators. So, inclusivity matters from who designs it who sits on the company boards and which ethical perspectives are included."

Kate Crawford, Academic AI

MEET THE TEAM

Jacob Robert Steeves

CO-FOUNDER

- Machine Learning Researcher at Known Inc
- Software Engineer at Google
- Bachelor of Applied Science (BASc) Mathematics and Computer Science.

Ala Shaabana

CO-FOUNDER

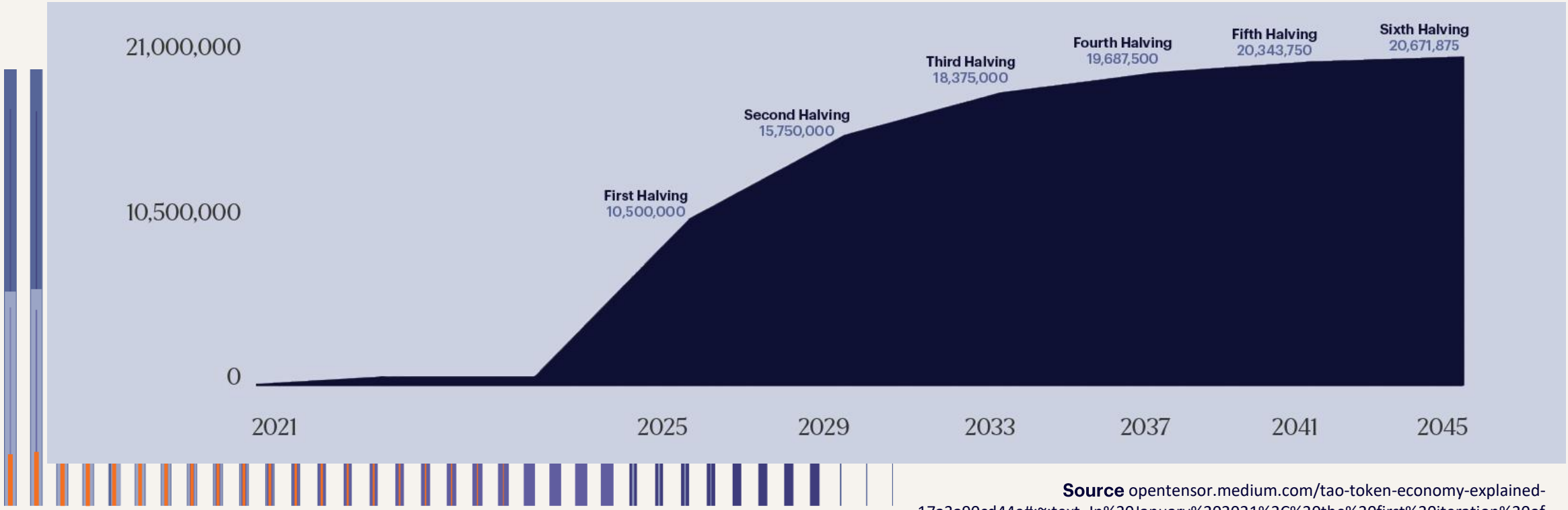
- Machine Learning Researcher at FOR.ai
- Senior Software Engineer at Instacart
- Doctor of Philosophy (PhD), Computer Science at McMaster University.

TOKENOMICS

The TAO token has taken inspiration from Bitcoin as their tokenomics have similar features. As seen in Bitcoin, new tokens are issued through the process of mining blocks and the token has a maximum supply of **21 million tokens**. Currently, a block is mined every 12 seconds with a block reward of one TAO token. This results in **7200 TAO tokens** to be issued per day. Similar to Bitcoin, the block rewards are halved every four years, causing the token to follow a disinflationary model. Currently, the circulating supply is **~5.6M**, approximately **25% of the total supply**, and when the first halving occurs, in 2025, the supply will have reached **10.5M**, which amounts to **50% of the total supply**. In total, there will be **64 halving events** before all TAO tokens will be in circulation.

Just as with Bitcoin, the TAO token doesn't have any venture capital behind it. There are no allocations to team members, or ecosystem development which we commonly see with other projects. To obtain the TAO token, users are required to take part in the mining & validating process or buy tokens on the open market.

Bittensor ***Halving Schedule*** 2021-2045



Source opentensor.medium.com/tao-token-economy-explained-17a3a90cd44e#:~:text=In%20January%202021%2C%20the%20first%20iteration%20of%20the%20main%20Bittensor,launched%2C%20codenamed%20'Kusanagi

TOKEN RELEASE

TAO follows an issuance schedule akin to Bitcoin, resulting in an initial inflation rate of approximately 50% over its first four years. Following the first halving event, this inflation rate diminishes to around 10%.

Consequently, as the protocol advances, the selling pressure on the TAO token decreases in terms of volume, creating a scarcity model for the token. With the network's expansion, there is an escalating demand for the TAO token amid a diminishing supply.

This interplay of supply and demand dynamics is expected to drive a consistent increase in the price of the TAO token, gaining strength over time. In summary, the token release exhibits a favorable pattern characterized by high initial inflation that progressively diminishes.

However, a potential drawback lies in the decreasing supply with each halving. As the network attracts more users, the heightened demand could lead to increased token prices, posing a challenge for some users to afford access to the ecosystem. In this scenario, an inflationary model might have been more appropriate to facilitate broader access to the network, particularly if the aim is to decentralize AI.

TOKEN UTILITIES

Native token

The TAO token has several utilities within the Bittensor network. One of the key utilities that the TAO token is the native token of the network and is used for gas fees, also known as transaction costs. Furthermore, for users to access the AI models on the network, the token is used as an entry ticket.

Bonding

Bittensor's bonding mechanism allows participants to stake tokens as collateral, showcasing their dedication to the network's integrity. By locking up tokens as a guarantee, individuals demonstrate their commitment to supporting the network's operations. These bonded tokens act as a security measure, incentivizing participants to act in the network's best interests. In exchange for this commitment, participants stand to gain rewards or privileges within the network. This bonding mechanism plays a crucial role in upholding security, encouraging active participation, and nurturing trust within the Bittensor ecosystem.

Governance

As Bittensor operates as a Decentralized Autonomous Organization (DAO), the community decides on important issues such as upgrading the protocol. To ensure that users think about the long-term prospects of the protocol, Bittensor decided that the TAO token could be used to vote. As a result, if wrong decisions are made, the chances are high that the token will decrease in value, negatively affecting the tokenholder.

Staking/Delegating

Since the successful launch of the Finney network, users can delegate a stake to any validator for a share of the validation rewards. This enables all holders of the TAO token to earn passive income rewards regardless of the size of their holdings. It is intended to encourage users to delegate to the Foundation validator or support the projects and teams promoting the growth of the network. Currently, the staking rewards are 18.72% annual percentage yield (APY), the real rate of return earned on an investment, taking into account the effect of compounding interest.

COINMETRICS

Insights into *Bittensor*

- Token type: Native
- Current circulating supply: 5,798,059

General

Total supply	21,000,000
Maximum supply	21,000,000
Market cap	$1.747.046.126
Fully diluted market cap	$1.747.142.246

Pricing

Price in USD	$297.66
All-time high in USD	$357.97
All-time low	$30.83
30-day range	$122 - $357.97

On-chain data

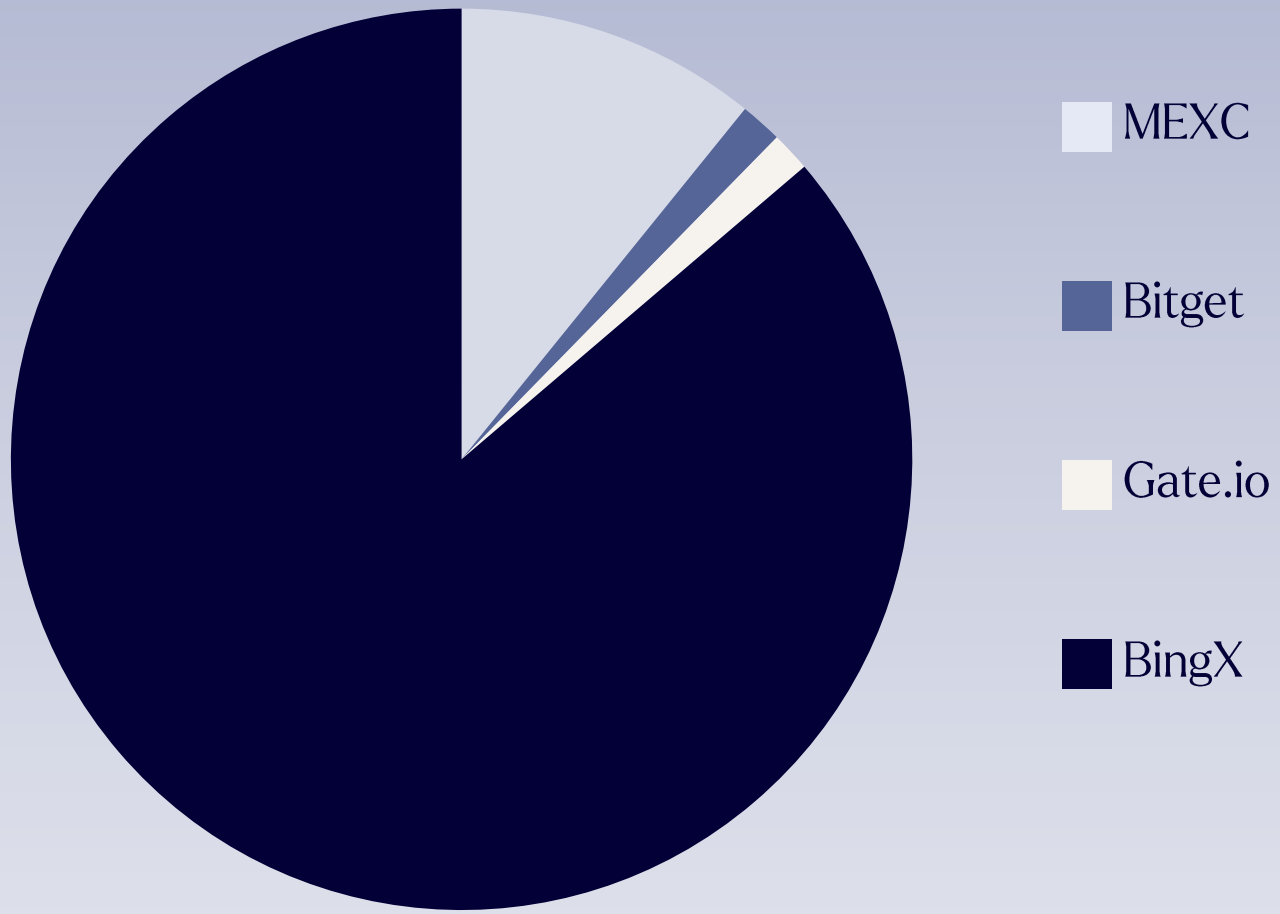
Holders	33,759
Top 10 holders	6.27% of the total supply
TVL	N.A.

ROADMAP

While the team lacks a specific roadmap, their ultimate aim is evident: to decentralize AI development. Initially concentrating on attracting miners to sustain the network, they have shifted focus to incentivizing developers to upload AI models onto the platform.

However, their scope is limited; the team envisions a fully decentralized network, requiring community and miner involvement to drive further protocol development. This parallels the evolution of the Bitcoin network.

Volume share on *Exchanges*



EXCHANGES

The TAO token is only available on four centralized exchanges: MEXC, Bitget, Gate.io and BingX.

Currently, the majority of the TAO trading volume occurs on MEXC, with Bitget taking second place. Although nothing is wrong with these exchanges, no leading exchange such as Binance or Coinbase currently offers the token.

This is both an advantage and disadvantage, when the asset becomes listed it can cause a surge in trading volume and subsequently a value increase. However, it now offers a disadvantage as it has a low audience reach, plausibly resulting in less trading volume and liquidity.

FINAL CONCLUSION

General remarks

Since 2020, the artificial intelligence (AI) industry has undergone rapid growth and transformation. Major advancements have been made, with technologies like Chat-GPT reaching a vast user base rapidly.

However, this growth is shadowed by significant centralization, with a few large companies like Google and OpenAI dominating the market. This centralization poses challenges for newcomers, who face high barriers to entry due to the lack of shared data and the need for substantial resources to develop competitive AI models.

Long term investment

Bittensor offers a promising solution to these challenges by establishing a decentralized machine-learning network. This network allows developers to monetize their AI models and contributes to a more inclusive and expansive AI ecosystem.

The unique approach of Bittensor, combining AI with blockchain technology, presents an innovative investment opportunity. Its decentralized nature and incentive mechanisms for model development and validation could reshape the AI industry's future, making it a potentially lucrative long-term investment.

Risks and threats

Despite its innovative approach, Bittensor faces several risks and threats. The network is still in its early stages, with a relatively small community and ecosystem compared to established players. The reliance on the TAO token for transactions within the network and its disinflationary model could pose challenges in terms of accessibility and price stability. Additionally, the lack of widespread recognition and the limited presence on major exchanges might affect its growth and adoption. Furthermore, the absence of recent security audits could raise concerns about the network's resilience against potential threats.

In conclusion, while Bittensor presents a groundbreaking approach to decentralized AI and offers a potential solution to the industry’s centralization issues, it is not without its challenges. Investors and participants in this space should consider both the innovative potential and the inherent risk associated with such an emerging technology.

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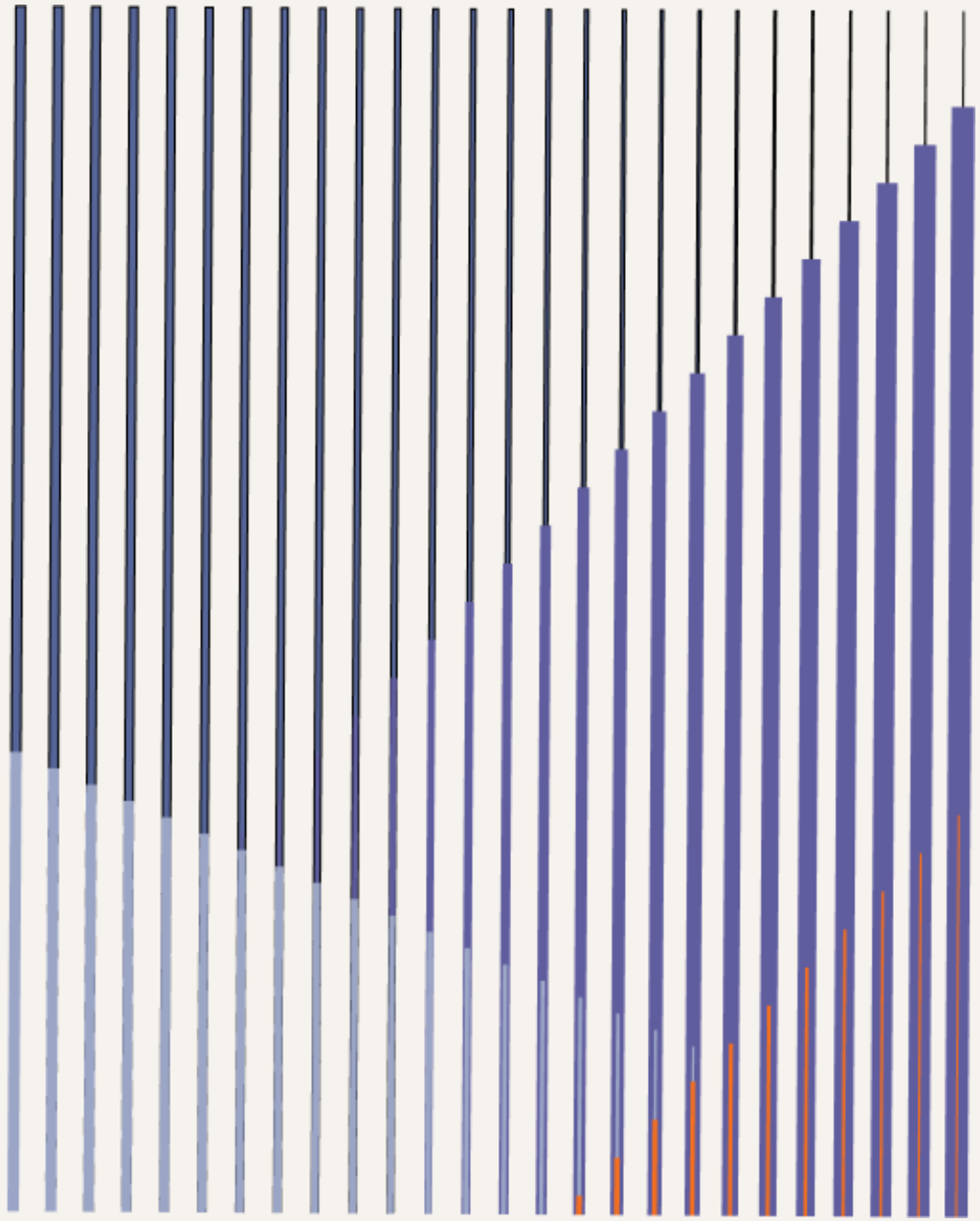

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