BLOCKCHAINS

ARCHITECTURE, DESIGN AND USE CASES

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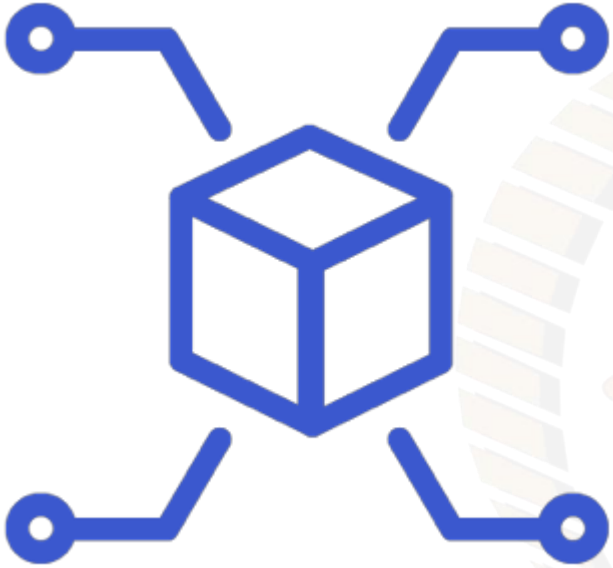


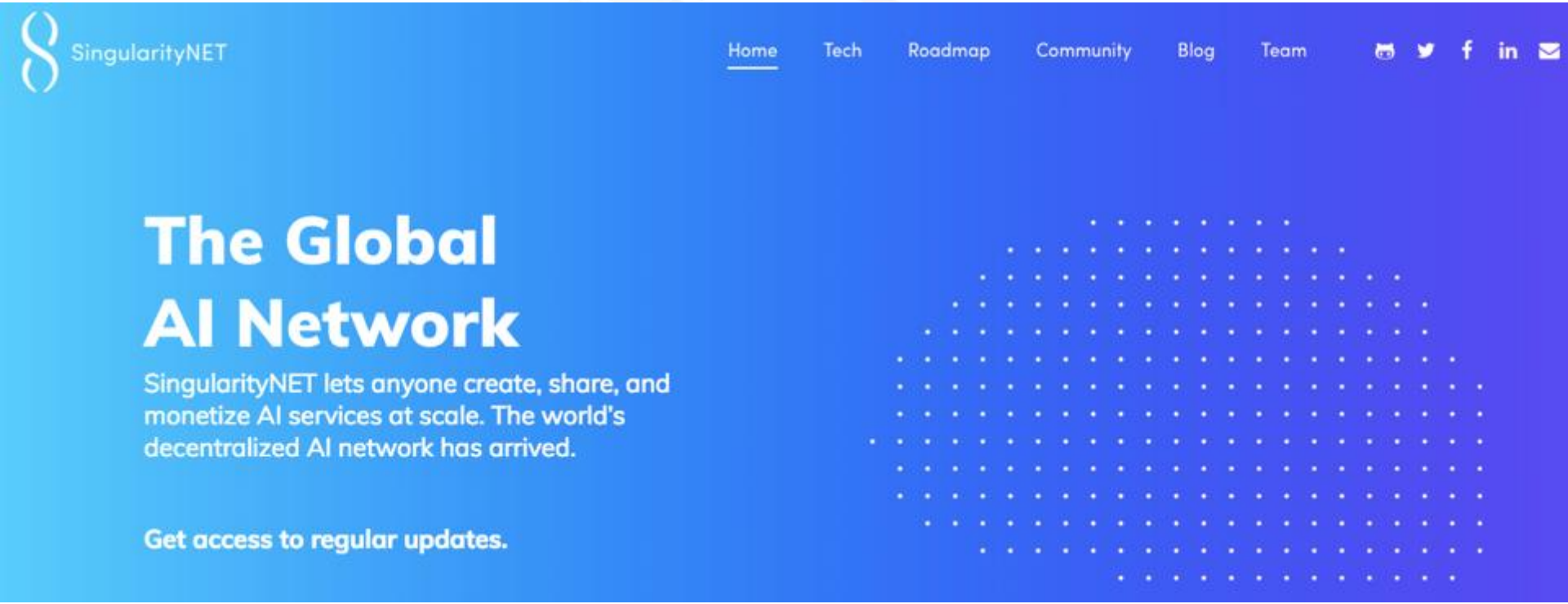
Blockchain for Data Analytics II
Blockchain and AI

Blockchain and AI

- Two disruptive technologies
  - **Blockchain:** Connect data storage and data usage
  - **AI:** Analytics over the data

- **Blockchain can provide an excellent backbone for the development of AI algorithms**
  - Secure the data input
  - Make every step visible to everyone
  - Create data marketplace (BigchainDB)

SingularityNET



SingularityNET

- Founded by **Ben Goertzel,** one of the creator of **robot Sophia**

- An open-source protocol and collection of smart contracts for a **decentralized market of coordinated AI services**
  - Plug two AI tools together - the tools may belong to different stakeholders
  - Execute applications by utilizing multiple AI tools belongs to multiple stakeholders

SingularityNET

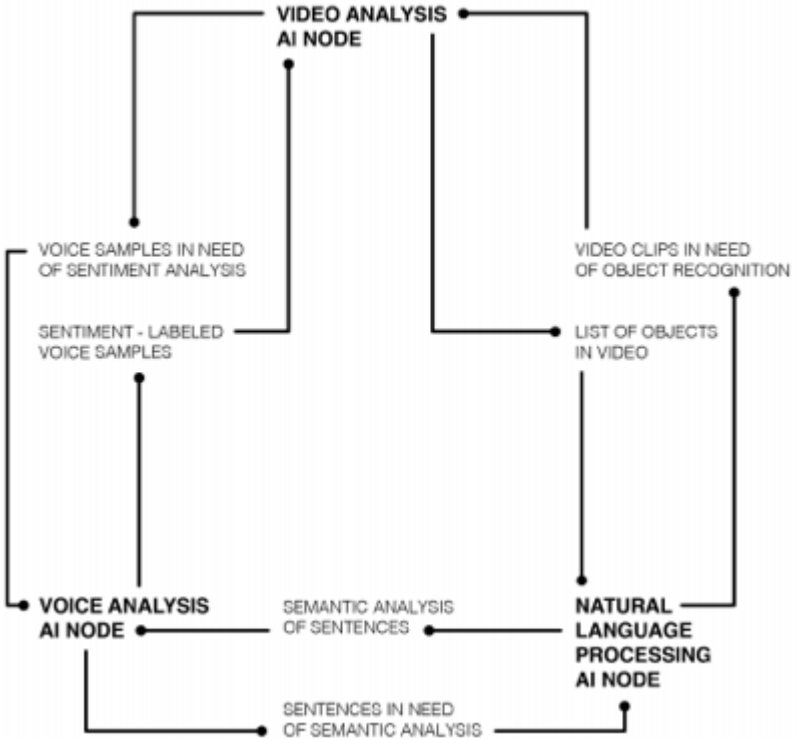
- Anyone can
  - Become a developer of a AI tool
  - Share his/her AI tool
  - Run applications by utilizing multiple AI tools

- The network
  - Maintains the business model
  - Incentivize and reward beneficial players

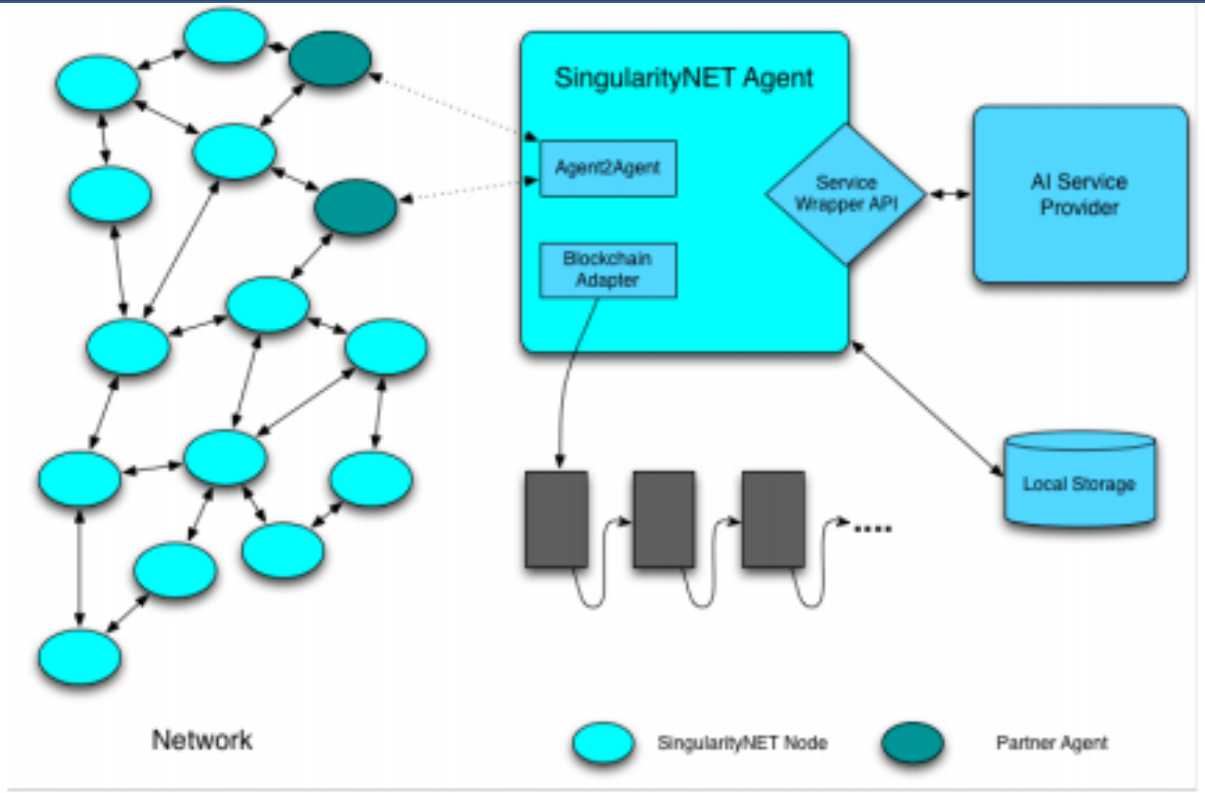
SingularityNET Features

- **Interoperability** - Able to interface with multiple blockchains
- **Data Sovereignty and Privacy**
  - Data access is controlled based on privacy policies
  - Access is validated through smart contracts
- **Modularity** - Create custom topologies, AI agent collaboration arrangements, failure recovery
- **Scalability** - Securely hosts both private and public contracts - scalable and resilient applications can be developed on top of it

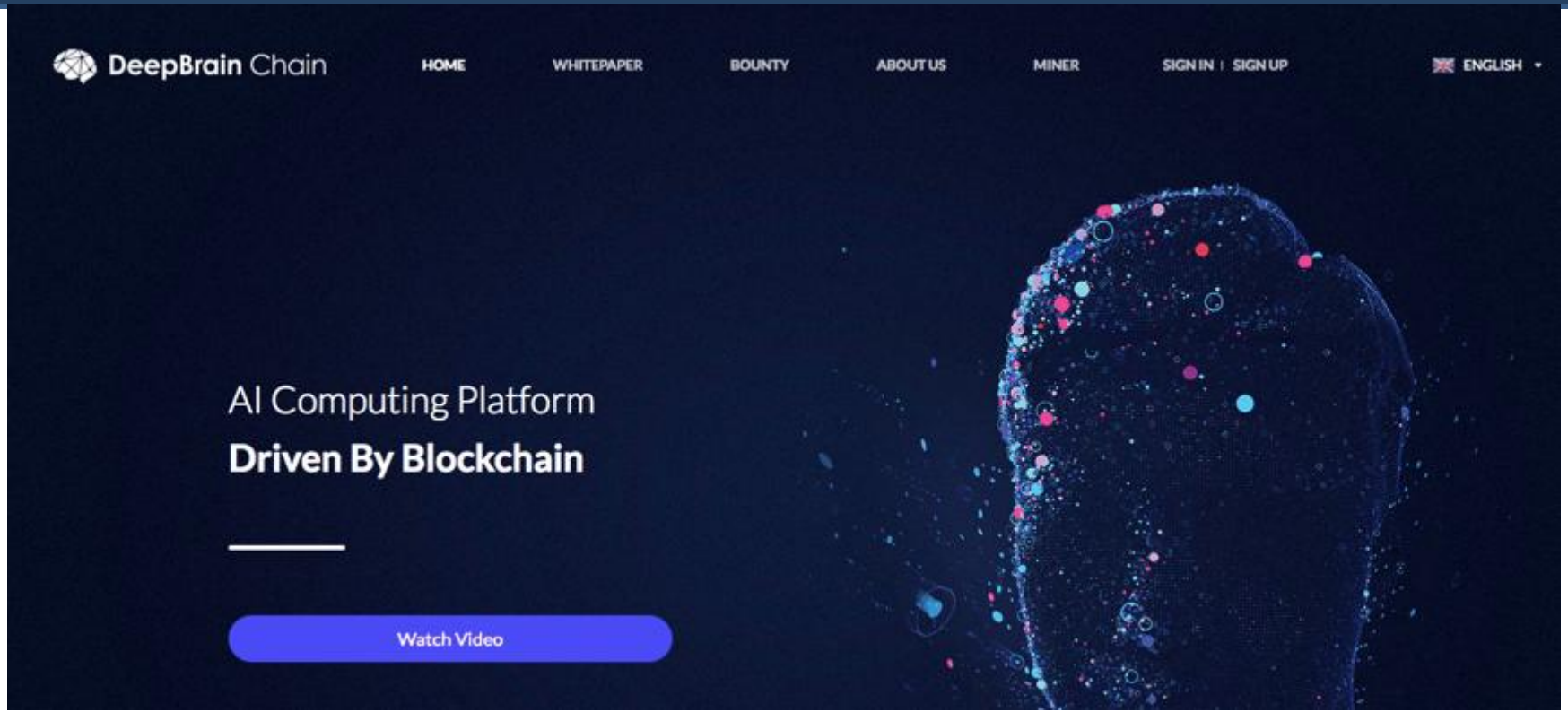
SingularityNet: An Example



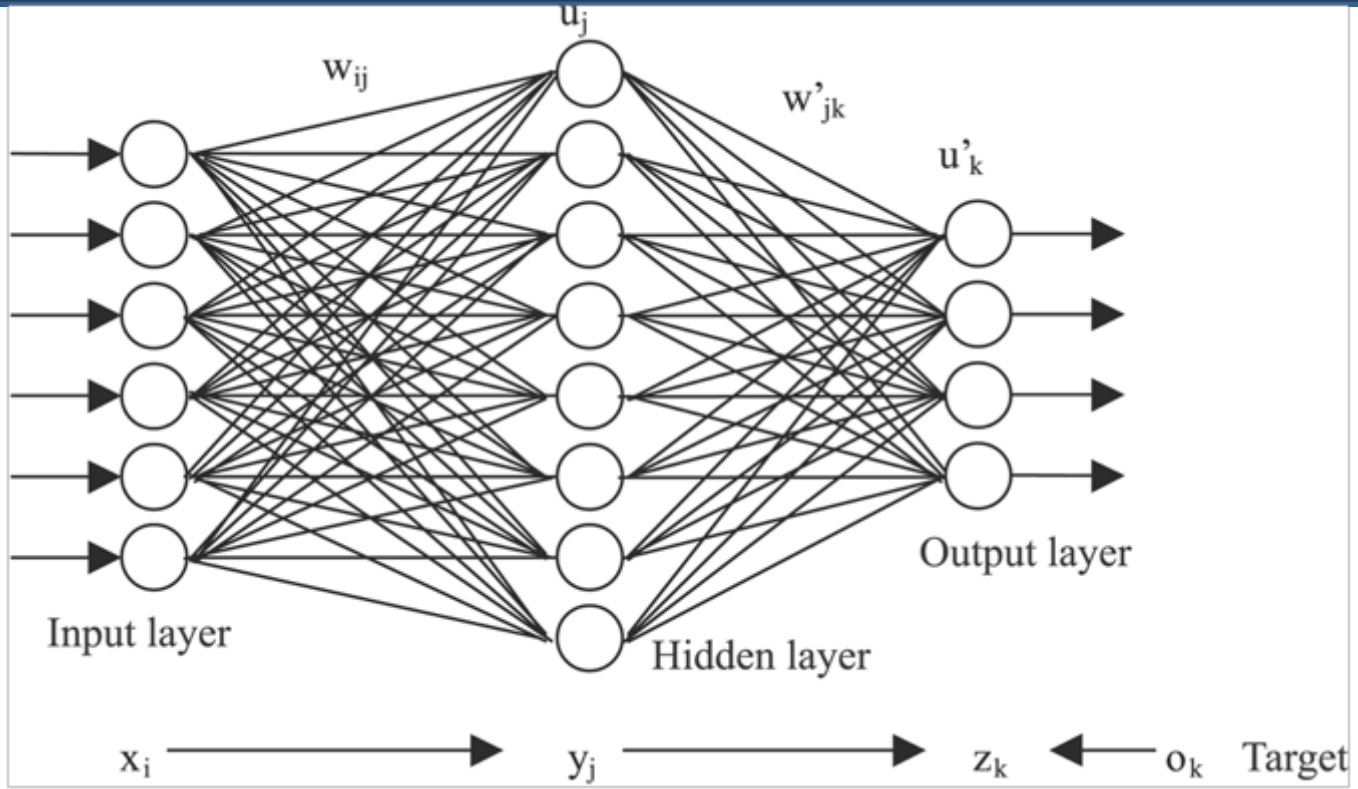
SingularityNET: Architecture



DeepBrain Chain (DBC)



Artificial Neural Network



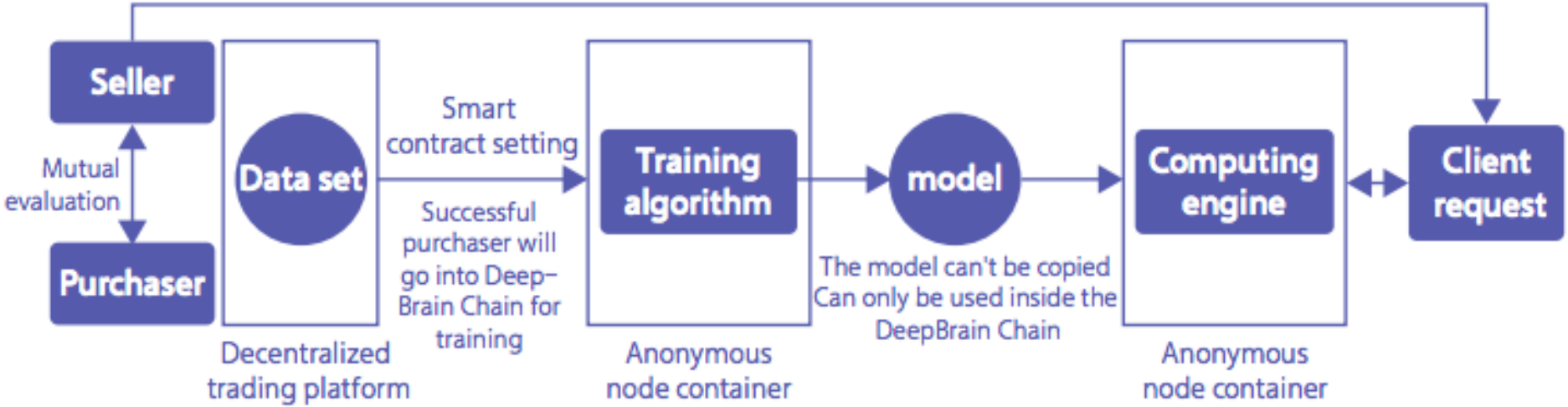
DBC and ANN

- ANN algorithms require huge computing power
- A computing platform to support the creation of AI algorithms - DBC aims to reduce the computation cost by 70%
- A decentralized neural network - used to describe a complex ANN based AI system for training applications

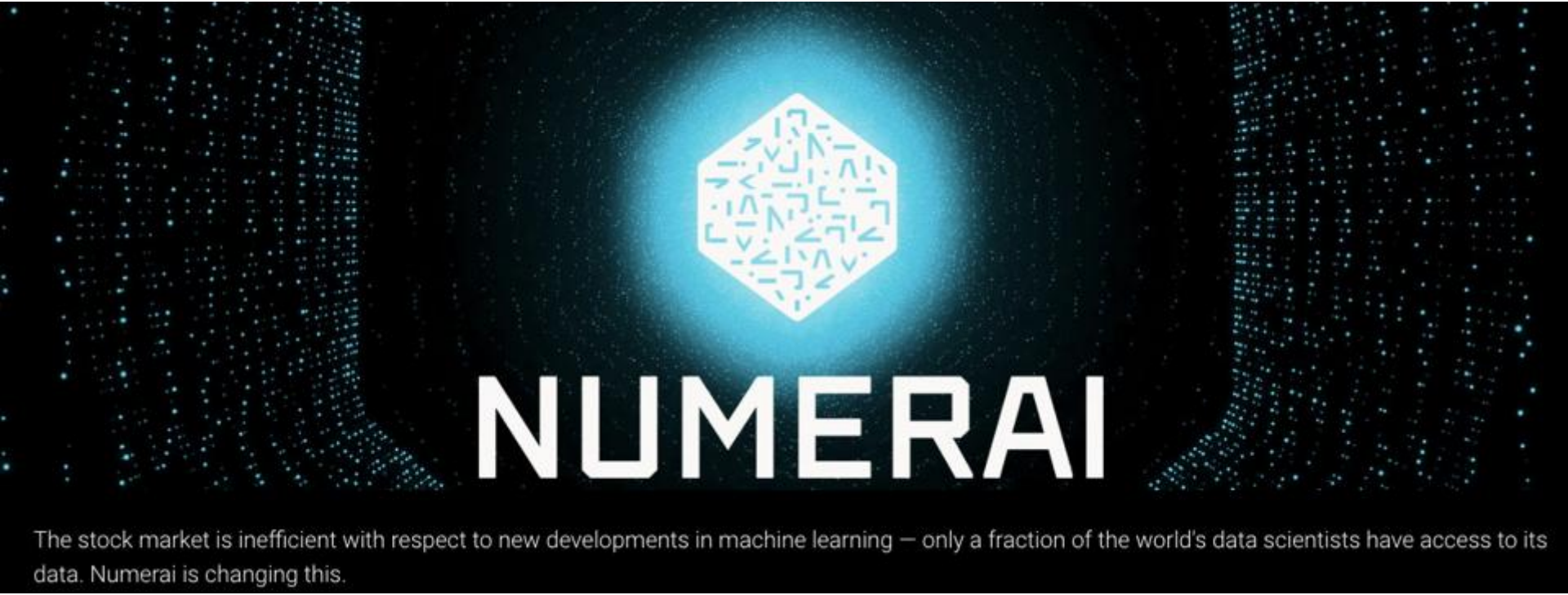
DBC - Objectives

- Make artificial neural network operation decentralized and distributed over the mass nodes of the whole world through blockchain technology
- Via smart contract, data provider and data training parties are physically separated, protecting their privacy
- The computing nodes can be adjusted dynamically according to the amount of calculation of the user application

DBC: Process Flow



Numerai


NUMERAI
The stock market is inefficient with respect to new developments in machine learning – only a fraction of the world's data scientists have access to its data. Numerai is changing this.

Hedge Fund

- An investment fund that pools capital from accredited individuals or investors and invests in a variety of assets, often with complex portfolio-construction and risk-management techniques (Wikipedia)

- Prediction of success for investors?

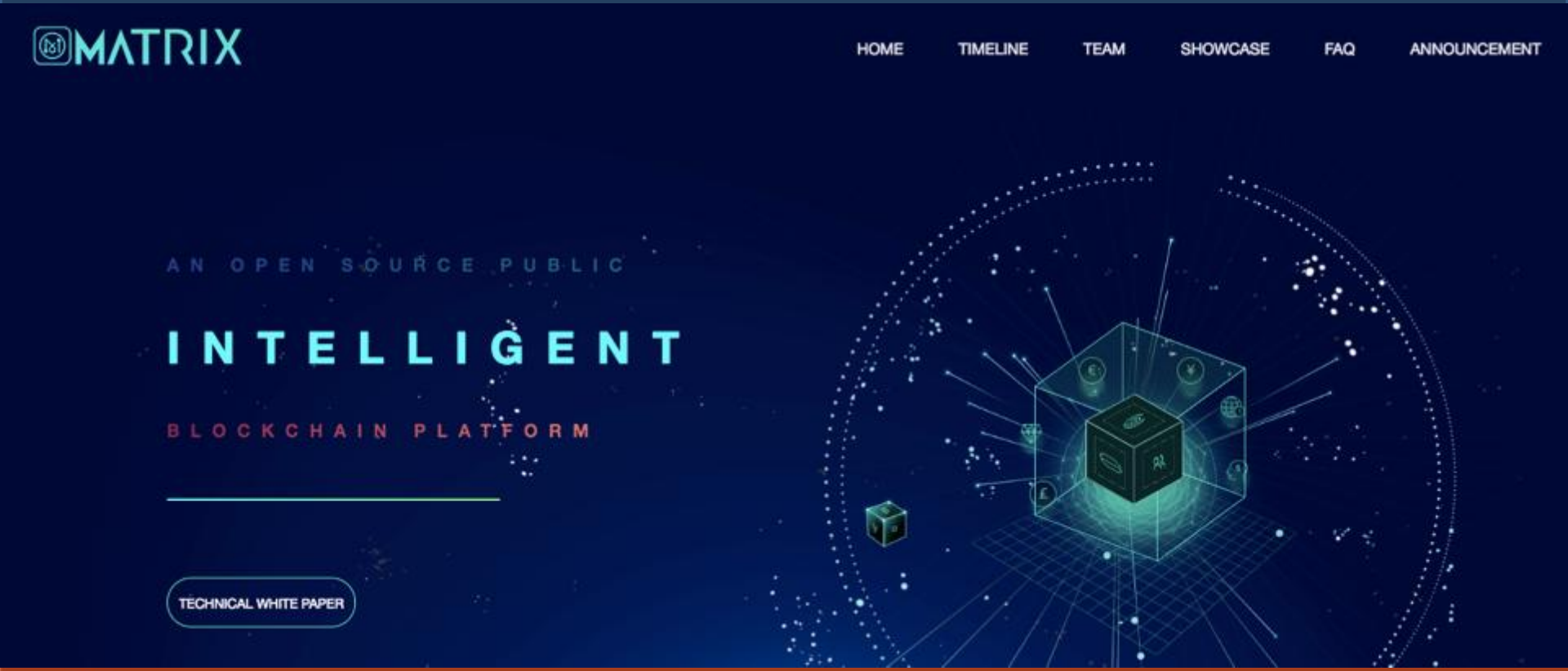
Image source:
http://www.visualcapitalist.com/what-is-a-hedge-fund/

Numerai

- A blockchain-powered, AI-coordinated hedge fund

- Why Blockchain?
  - Allows data scientists from all over the world to submit predictions based on machine learning models to improve the AI that manages the hedge fund
  - Weekly competitions for data scientists for submission of prediction models

Matrix AI Network



Matrix AI Network

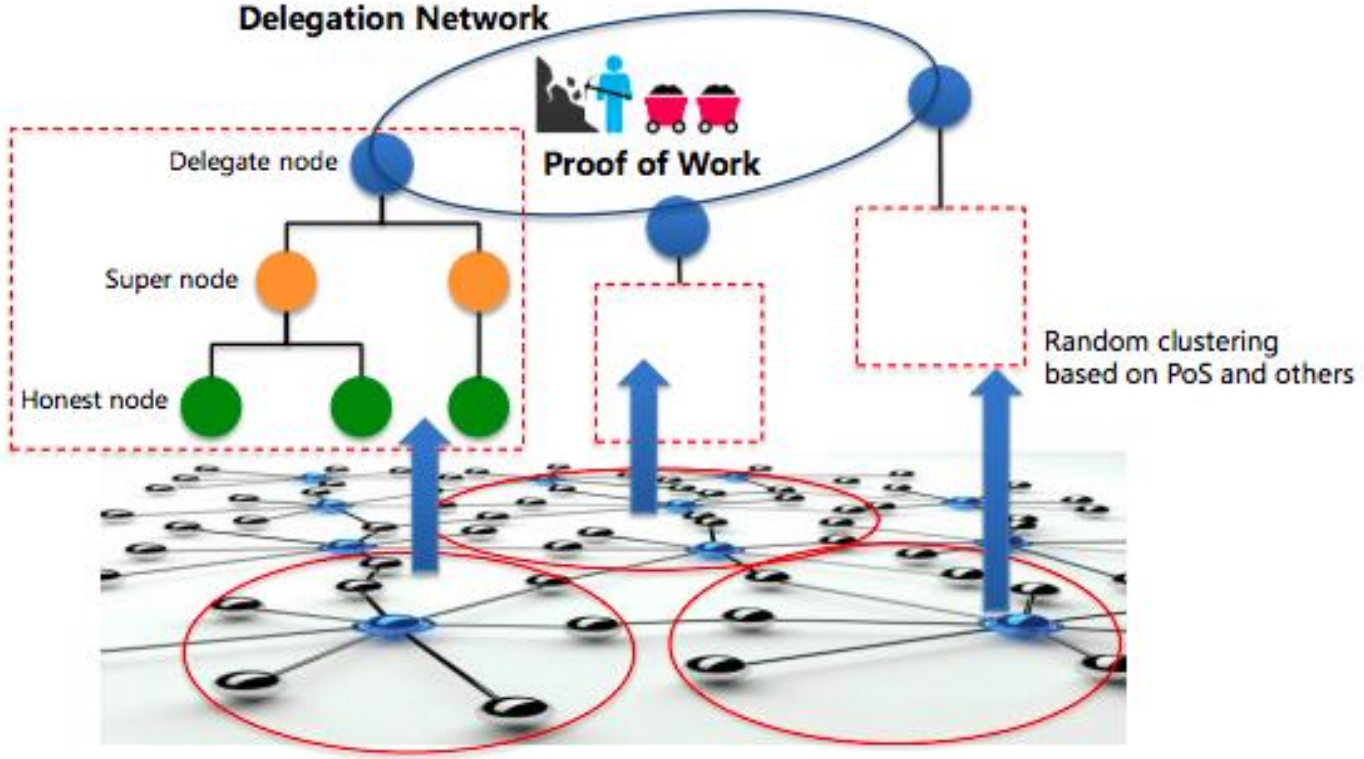
- An open-source, intelligent blockchain platform
- Supports smart-contracts and machine learning services
- AI is used to automatically self-optimize the blockchain network
  - Optimized network for smart contract execution
  - Natural language smart contract creation

Objectives of Matrix

- Automatic generation of smart contracts
  - No programming expertise is required

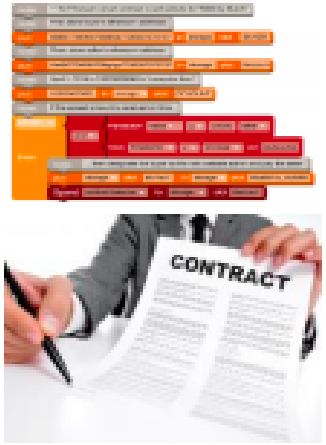
- Secured smart contracts
  - AI security engine for (1) rule-based semantics and syntactic analysis, (2) formal verification toolkit to prove the security properties of smart contracts, (3) detection engine for transaction validations, (4) deep learning based platform for dynamic security verification

MATRIX PoW + PoS

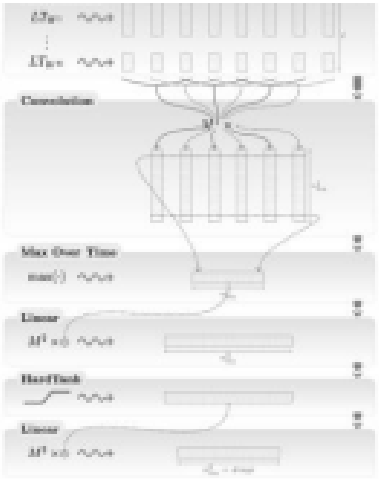


MATRIX - Automated Smart Contract Generation

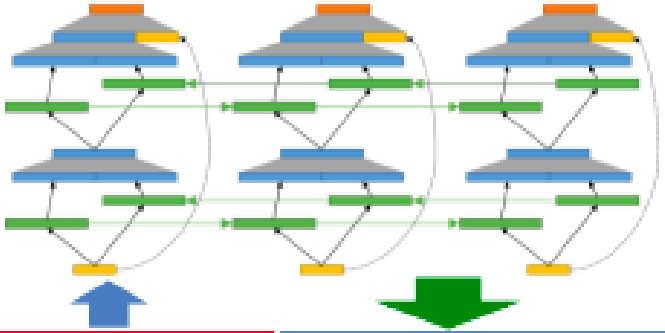
Script or natural language

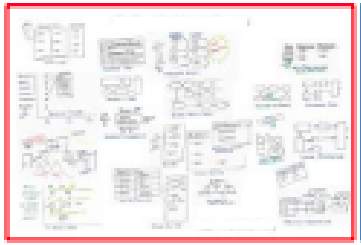


Convolutional neural network for text feature recognition



Recurrent neural network for code generation

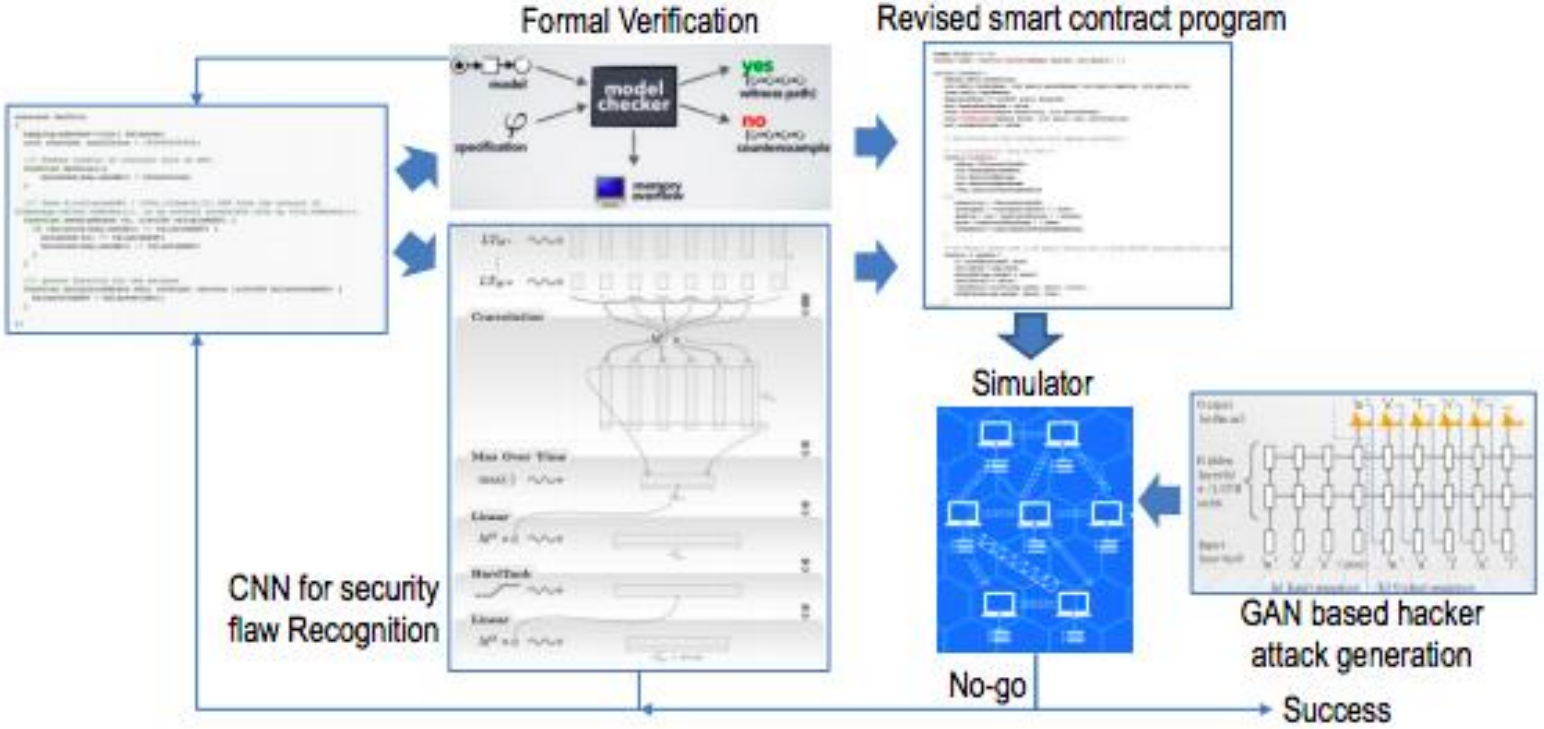




Code library

Program for smart contracts

MATRIX - Security Validation



thank you!