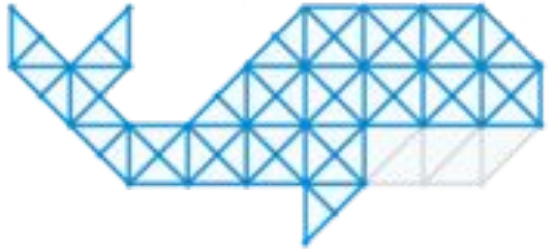


DeepVerse

A data company without your data.

Train AI models collaboratively on Blockchain and maintain data privacy

Data privacy:

- **GDPR** came into effect after a series of scandals: *Cambridge Analytica* had collected and exploited *Facebook* user data; vulnerabilities in *Google+* had exposed data from half a million users.
- The value of **collecting data** has **skyrocketed** ever since, like *GlaxoSmithKline* trying to get access to genetic data from *23andMe*. But they do not trust each other.
- Data are **essential** to advance science and technology for the good, e.g. fraud detection, drug design for COVID or cancer.

DeepVerse *is here to protect data privacy, while explore the value within the data.*

Problems:

- **High costs**

- Data collection is expensive, and face challenges from both legal, like GDPR and technological.

- **Low efficiency**

- Data utilisation is low, often the same data can be collected multiple times by different companies.

- **Hostile environment**

- Data sharing is rare, once you shared it, it's not 'yours' anymore!

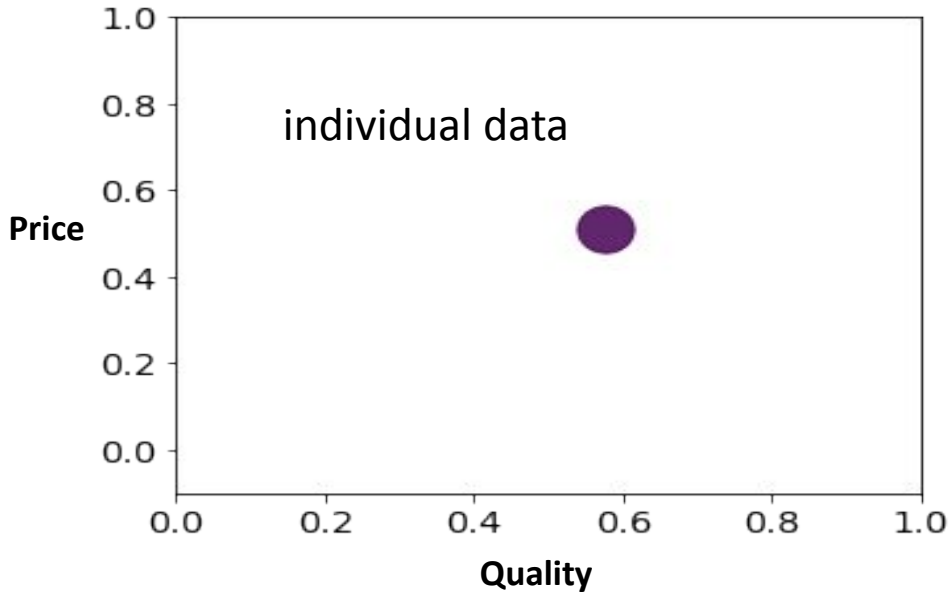
However, mutual benefits can be achieved if we collaborate together. We are building a platform to minimize the level of trust required, ***aggregate*** *all source of information,* ***reduce*** *costs, and* ***accelerate*** *discoveries.*

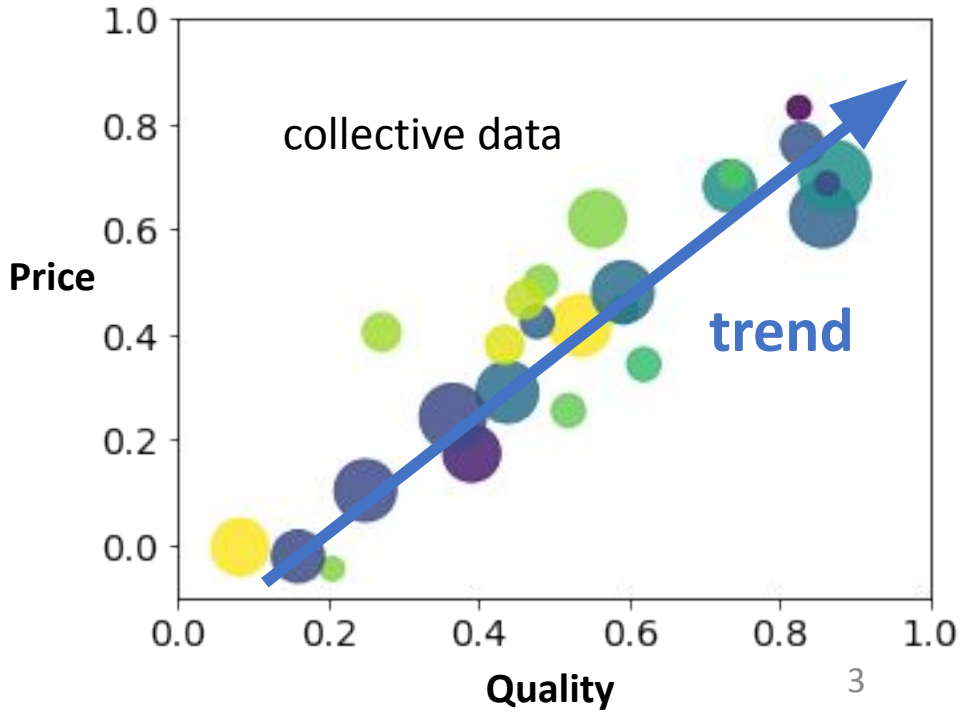
Value of the data:

- The individual data point is not interesting, it's the **collective phenomenon** emerged from many data that matters.

- **AI** can identify the **trend** or **model** that gives us descriptive or predictive powers.

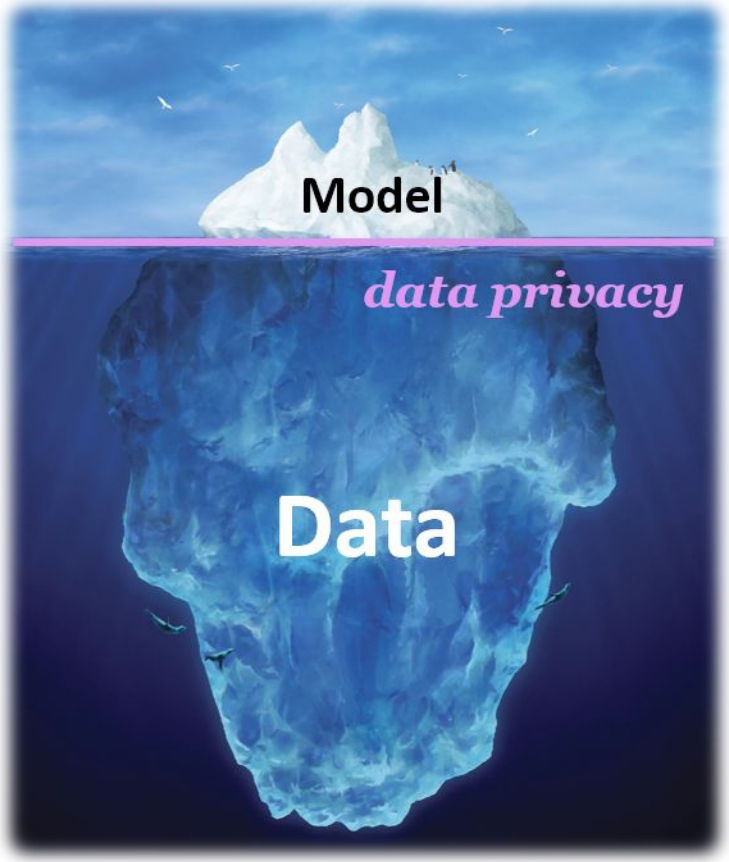
Instead of sharing data, we can share models and protect the data privacy.





Solution:

- We are the first to train **machine learning** models using private database, and store the models on the blockchain for others to validate and improve.
- **Share the model** instead of the data, **maximize** the value within the data using **AI**, and the data never leave you.
- With the model, you can easily verify the accuracy, but you can’t see the data or reverse-engineer the data from the model. This is similar to the asymmetric encryption used in blockchain.



Blockchain:

For a multi-party who don’t want to share their data, but would like to tackle a problem together.

Blockchain provides:

Static registry or Identity for who own the model,

Smart contracts to trigger actions automatically once the pre-defined conditions are met,

Payment registry updates the rewards for the contributing parties.

Illustration:

DeepVerse leverages AI and Blockchain technologies to create a platform, which facilitates advances in discovery and protects data privacy.

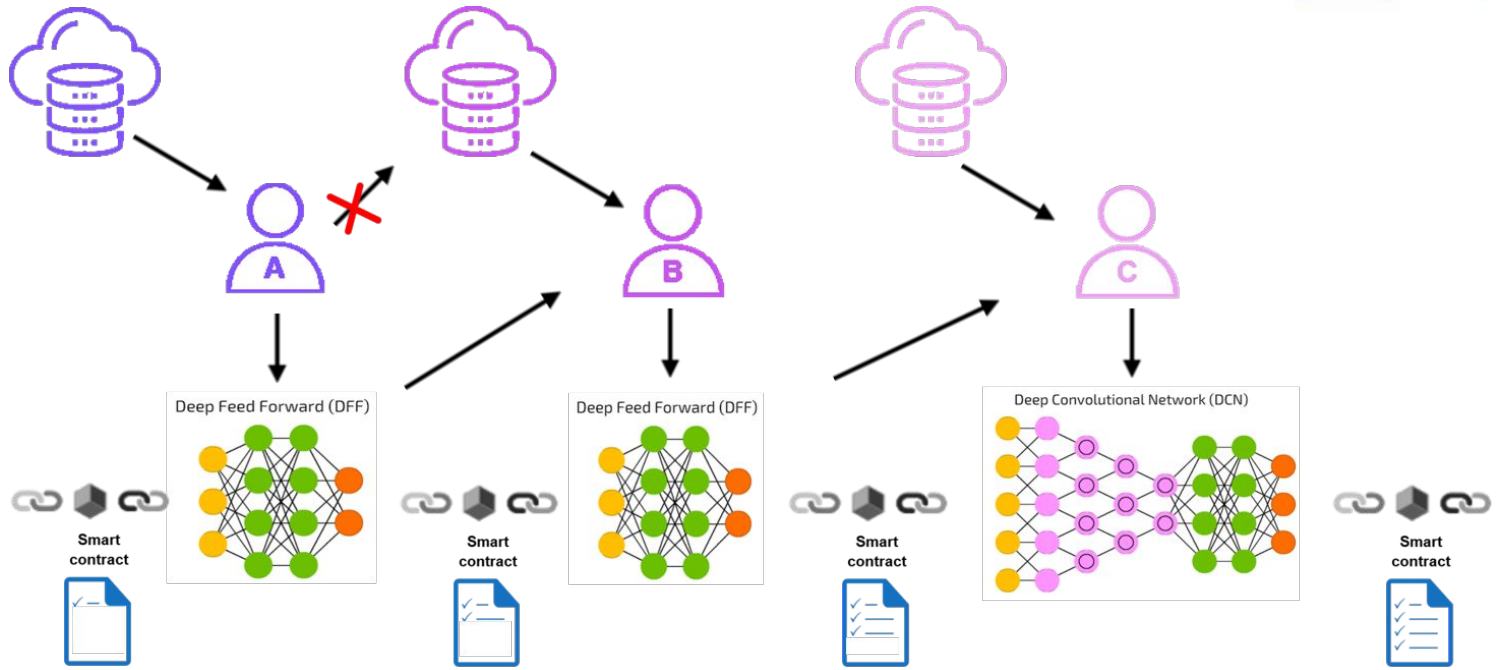
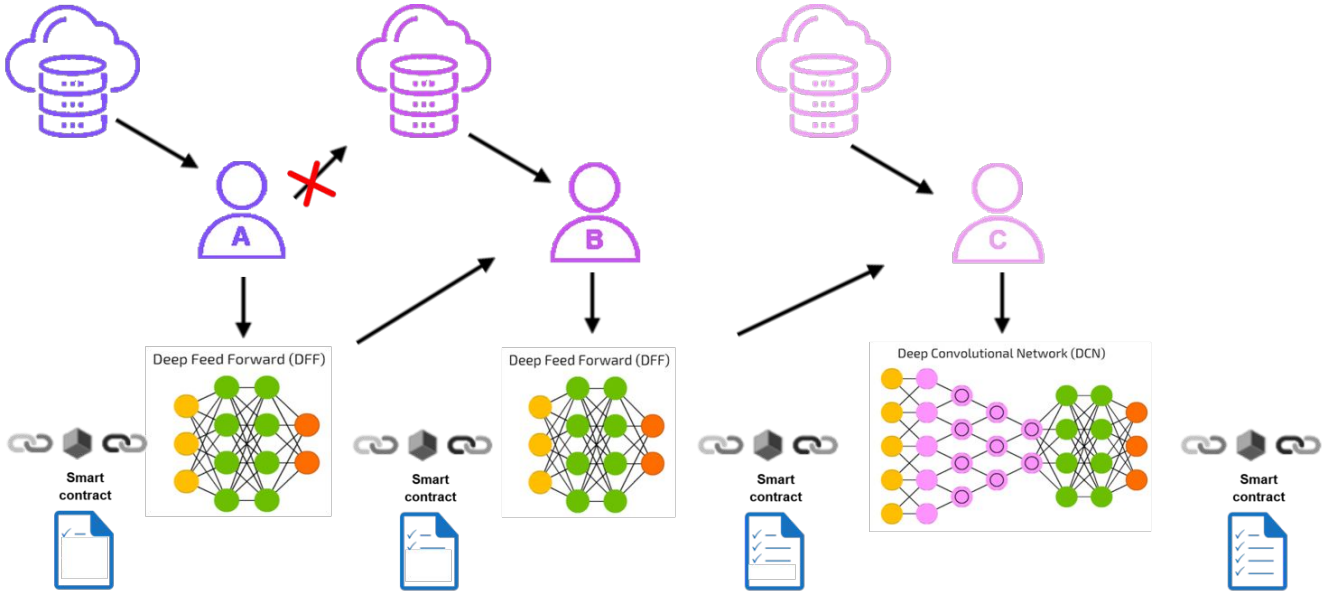


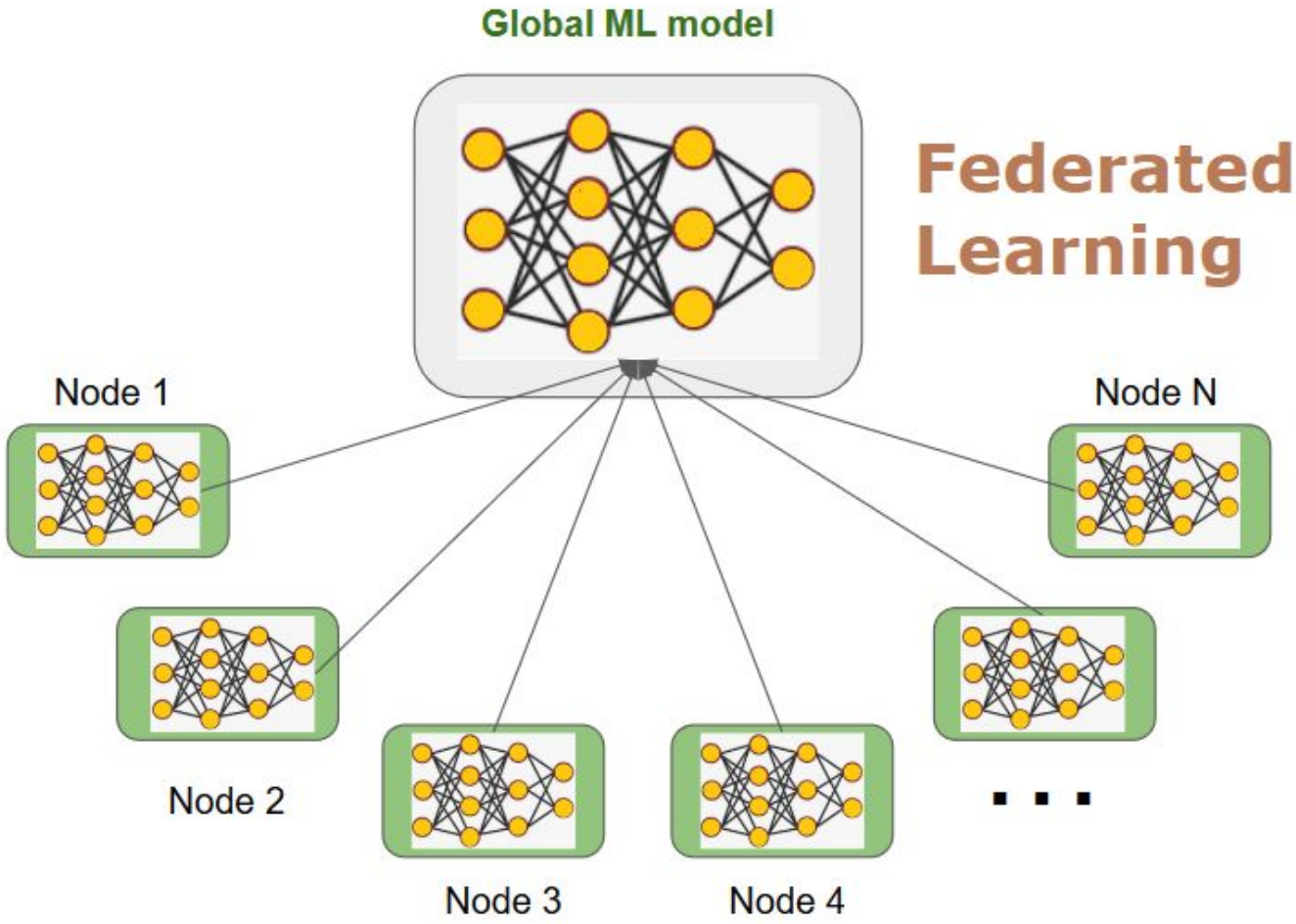
Illustration:

Alice, Bob, and Charlie, who are *pharmaceutical companies* and each has a private database of potential drug molecules with their efficacy and assay information. They all want to build a neural network (NN) model for new drug discovery, e.g. vaccines for COVID. They can either share the database on the blockchain directly with access control or keep their database private and train the model together.

With DeepVerse, Alice can propose and upload a NN model to the blockchain. Bob can continue on Alice's model and train with his data and upload the improved model to the chain. (Note, Alice can't access others' data). Charlie can evaluate both models, and make a more creative model which outperforms previous ones. With an active community with data & model, the performance would boost under this iterative process. We developed smart contract to reward contributions based on pre-defined conditions, such as the accuracy.



Federated learning:



machine learning without centralizing data, and with privacy by default.

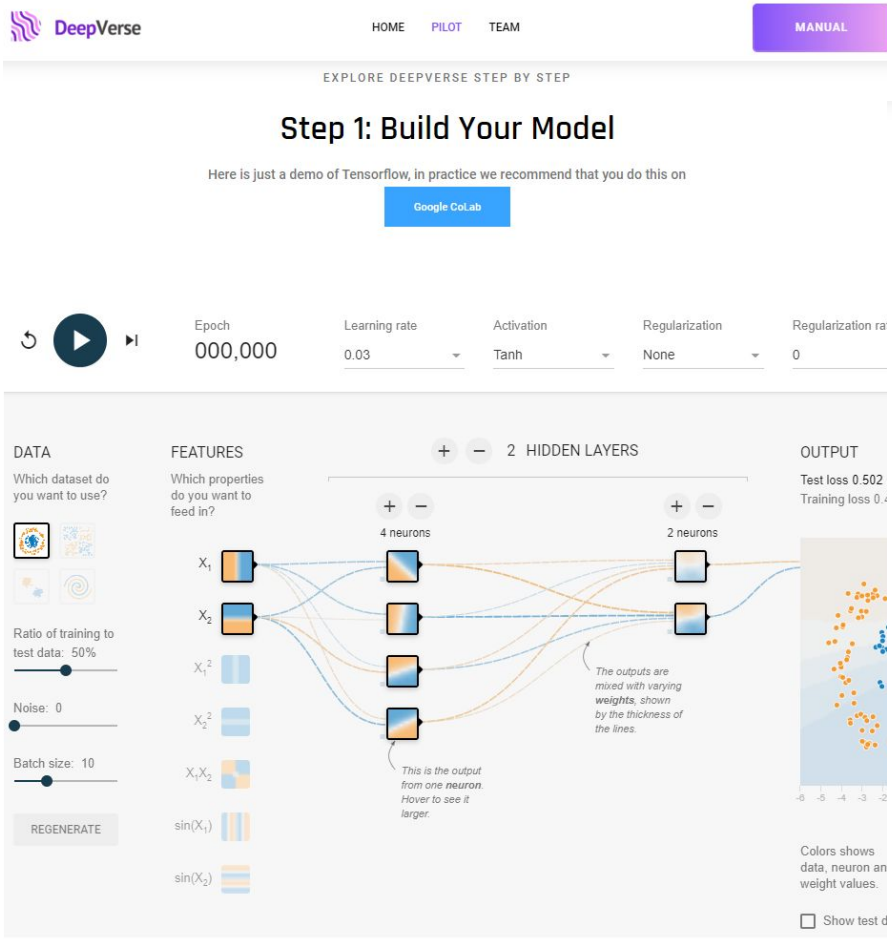
Advantages:

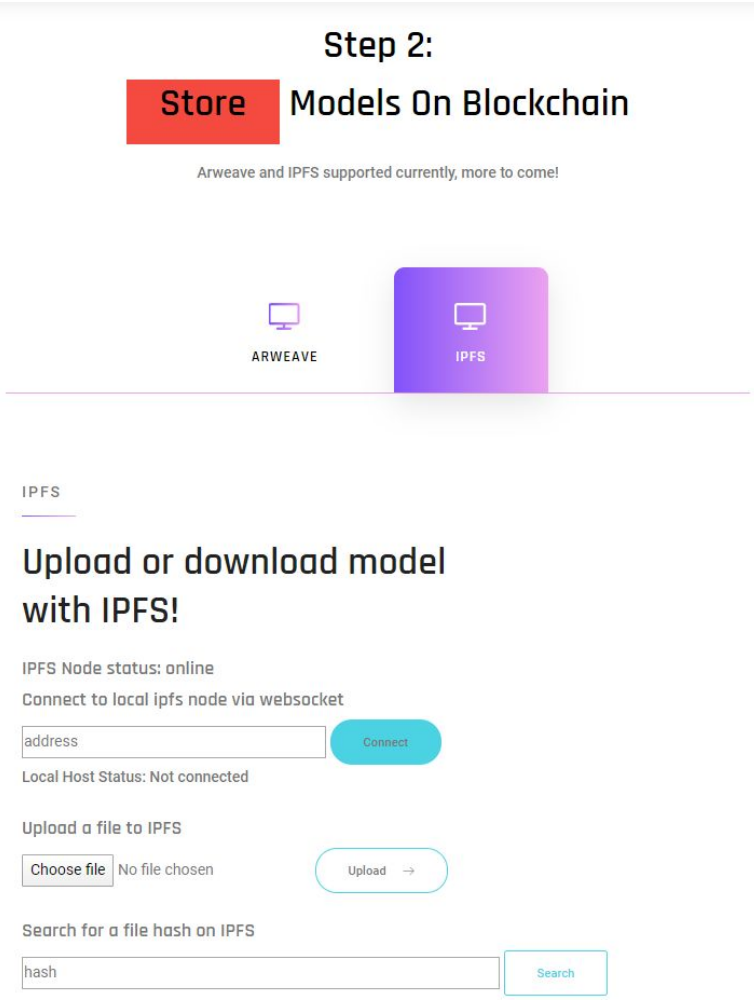
Common Collaboration	DeepVerse
Not “your” data anymore	Data privacy
Credit unknown	Contribution quantified
Reward system unknown	Fair reward system
Execution not guaranteed	Automated execution
Closed community	Open community

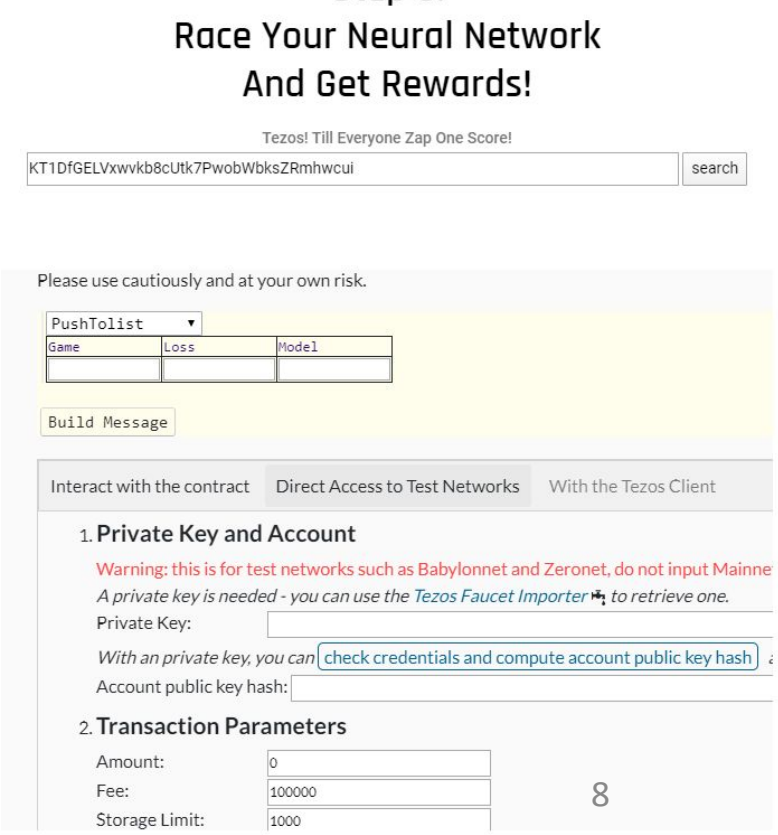
Working prototype

website: https://deepverse.co.uk

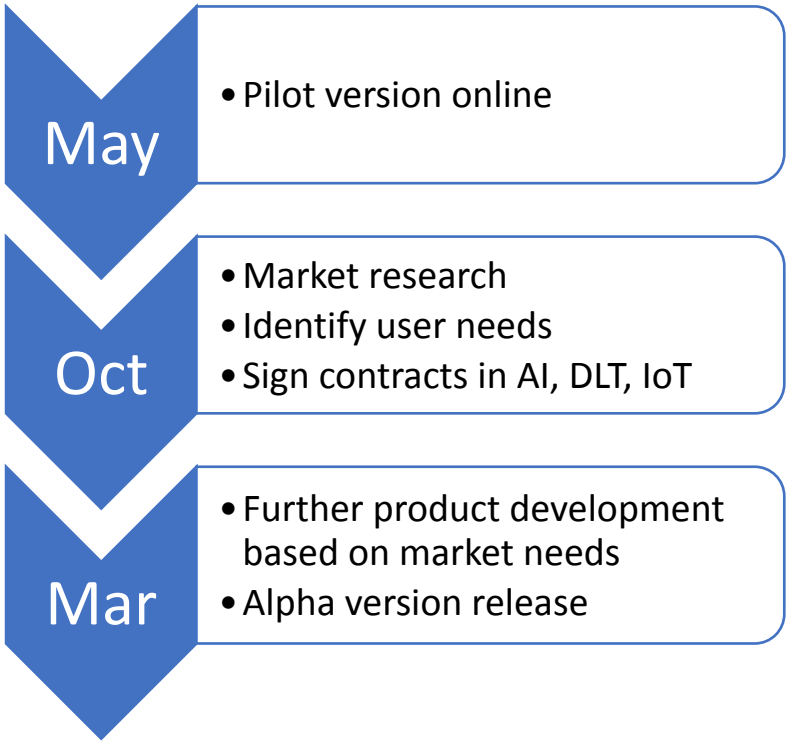
video demo:
https://lnkd.in/dhSEXQX







Plan



Phase 1. to Business

Identify user cases and sell services for inter-company collaborations or intra-company collaborations.

Phase 2. to Customer

Build a private medical record for individuals, which can be requested by clinicians when treated in hospitals. Additionally, Pharma/Research institutes can start offering individuals rewards for access to their masked record.
Data trading platform/marketplace will be established with clearly defined data ownership and usage.

Team:

3 Cambridge PhDs in theoretical physics and computing each with 6 years+ programming experience

- **Fredrik Liu**, Blockchain and AI (full stack), Fortran, Python. developed decentralized in-game items trading platform, novel AI algorithms for materials and drug discovery. won G-research algorithm trading competition.
- **Lupeng Yang**, Blockchain (back-end), Fortran, Python, Javascript. won G-research algorithm trading competition.
- **Siyu Chen**, Machine learning and scientific computing (back-end), Python, C++. Lead programmer with a trach record of publications.

We sail together.
Lupeng(first mate), Fredrik(skipper), Siyu(crew)
Fredrik & Siyu

ABI: AI+Blockchain+IoT

We understand the limitations of individual technology, e.g. blockchain can only solve the traceability and trust mechanism construction at the electronic data level. For the end points (data inputs) problems that cannot be solved by blockchain alone, we must rely on other technologies or ideas to promote practical solutions.

AI advantages:

- We have AI algorithms to exploits **all available** information
- Apply deep learning to high-value **fragmented/sparse** data
- Understand and exploit **probability distribution** to focus on most confident results
- Developed algorithms to deliver insights from machine learning models spanning **different private datasets**
- **Broadly applicable** with **proven** applications in healthcare, drug design, and materials discovery
- Designed and experimentally **verified** alloys and cell therapies.