Our original vision was to connect investors, data scientists, and businesses--marketplace

We started with a generic marketplace concept in which a business can post an RFS and Data scientists can respond. We built the Google platform in support of that vision.

Over the years we have learned a couple of things:

1. Users of the platform are not data scientists
2. Businesses don’t want a UI
3. Managing models is something that cloud service providers are doing
4. Most importantly, building industry specific marketplaces that have a very narrow focus is better than build generic or generalized marketplace capabilities, and
   1. The roles of data scientists and businesses are not discrete or clearly demarcated
      1. Data scientists can be businesses; businesses can be data scientists

So, what does that mean:

The difference between an Intelligence Exchange and the original AI marketplace is as follows:

|  |  |
| --- | --- |
| Marketplace | Intelligence Exchange |
| Connects businesses to data scientists | Connects businesses to businesses through data scientists |
| Investors invest in models produced by data scientists | Investors invest in business exchanges |
| Models are exchanged | Federated Intelligence is exchanged |
| Data scientists contribute | Members of the Exchange contribute |
| Data scientists are users | Businesses are users |

Our goal is to create an AI infrastructure that supports integration of multiple different data contributions using federated learning across decentralized and distributed data sources to form an intelligence ecosystem.

An intelligent ecosystem refers to an interconnected and adaptive system that leverages artificial intelligence (AI), machine learning (ML), data analytics, and other advanced technologies to facilitate the efficient flow of information, insights, and decision-making processes that connects multiple, distributed business units and partnerships in a decentralized manner.

Key components of an intelligent ecosystem include:

1. Data: Diverse and extensive data sources, including structured, semi-structured, and unstructured data, form the foundation of an intelligent ecosystem. These data sources provide the necessary input for AI and ML models to learn, adapt, and generate insights.
2. AI and ML models: Advanced AI and ML models, such as large language models, computer vision systems, and recommendation engines, are used to analyze, process, and extract insights from the data, enabling automation and more informed decision-making.
3. Knowledge representation: Knowledge graphs capture and organize information, entities, relationships, and concepts, enhancing the understanding and reasoning capabilities of AI models.
4. Connectivity and interoperability: Intelligent ecosystems rely on seamless connectivity and interoperability between different systems, platforms, and devices to facilitate data exchange, collaboration, and coordination.
5. Scalable infrastructure: Cloud computing, edge computing, and other distributed computing paradigms provide the necessary infrastructure to scale AI and ML models across vast and diverse datasets, as well as support real-time processing and analysis.
6. Security and privacy: Ensuring data security and privacy is critical in an intelligent ecosystem. Techniques like federated learning, encryption, and differential privacy help protect sensitive information while still allowing AI models to learn and generate insights.
7. Human-AI interaction: User-friendly interfaces, natural language processing, and other human-computer interaction methods are vital for enabling effective collaboration between humans and AI systems, resulting in more efficient and informed decision-making processes.
8. Continuous learning and adaptation: Intelligent ecosystems are designed to learn, adapt, and evolve over time, incorporating new data, technologies, and use cases to stay relevant and effective.

An Intelligence Exchange is a variation of the original marketplace concept, and it is designed to allow businesses to form an intelligence ecosystem without centralized management or control.

Our platform needs to support all requirements listed above. The flow is as follows:

1. Executing models
2. Capture model output
3. Executing new models on top of captured model output

So, what does an Intelligence Exchange platform need to be able to support:

These are handled will be handled by Omar, Dmitry and Isom

1. Integrate with Web 3.0 technologies to enable:
   1. Data scientists register ownership
   2. Investors can register investment
   3. Businesses can register their subscription
2. Ability for any data scientist to load a model which is then fingerprinted and encrypted on chain, with a token being issued to the owner

These need to be handled by us:

1. A private data lake can be constructed
2. A normalized data model (i.e., BNOM, etc.) can provide a canonical data structure for each model
3. A data lake has data cataloged and mapped to the normalized data model
4. A model can be executed by an external cloud service
5. A model’s performance can be tracked
6. A model’s performance can be evaluated and analyzed
7. A model can be executed against a decentralized data store either:
   1. A private data lake we construct
   2. A cloud environment controlled by a customer
   3. A customer can execute the model within their environment and provide us with results
8. A model’s outputs can be stored
9. Multiple model outputs can be analyzed either in aggregated data set
10. Multiple model outputs can be analyzed across decentralized and distributed data stores in a federated manner with a common data model
11. Multiple model outputs can be analyzed across decentralized and distributed data stores in a federated manner having multiple data model that are not similar
12. Alerts can be kicked off based on performance or performance anomalies
13. Access is managed to control who can contribute
14. Access is managed to control who can view
15. Data and model provenance and lineage is captured
16. Model output is accessible via API
17. Applications can be built on top of model APIs
18. Data can be encrypted using differential privacy or homomorphic encryption
19. System can extract reports on use from blockchain
20. System tracks data and model provenance and trust on blockchain and can provide reports
21. System tracks use of a specific model in federated modeling and tracks use
22. System tracks use of a specific model in aggregated modeling and tracks use
23. System tracks use of a specific model in ensembled modeling and tracks use
24. System tracks use of a specific model in hierarchical modeling and tracks use
25. System tracks model lineage
26. System tracks data lineage and addition of new data sets
27. System tracks if model has new filter or output format
28. System calculates model contribution
29. A knowledge Graph is deployed for each exchange and between exchanges. Knowledge graphs are critically important here

A knowledge graph plays a crucial role in an intelligence ecosystem by serving as a structured and interconnected representation of information, concepts, entities, and relationships. It helps in organizing, interpreting, and discovering knowledge from diverse data sources including:

1. Semantic representation: Knowledge graphs capture semantic relationships between various entities, allowing for a better understanding and interpretation of the information. This helps AI and machine learning models to comprehend the context and make more informed decisions.
2. Data integration: A knowledge graph helps in connecting information from various sources, such as structured databases, unstructured text, and multimedia content. This enables a more comprehensive view of the data and facilitates better insights for decision-making.
3. Querying and reasoning: Knowledge graphs facilitate advanced querying and reasoning capabilities, allowing users to extract relevant information and uncover hidden patterns in the data. This is particularly useful for answering complex questions, predicting outcomes, and making recommendations.
4. Personalization and recommendations: Knowledge graphs can be used to provide personalized content, recommendations, and experiences for users by understanding their preferences, behavior, and context. This can lead to improved user engagement and satisfaction.
5. Natural language processing: Knowledge graphs enhance natural language understanding by providing context and disambiguating the meaning of words, phrases, and sentences. This allows AI models to better understand and generate human-like responses in natural language interactions.
6. Data quality and consistency: By representing information in a structured and interconnected manner, knowledge graphs enable the detection and resolution of data inconsistencies, redundancies, and errors, leading to improved data quality.
7. Decision support and automation: Knowledge graphs can be used to support decision-making processes by providing relevant information, insights, and predictions. They can also help automate tasks by enabling AI systems to understand and execute complex instructions.

In a distributed business environment that uses federated learning to create integrated intelligence, a knowledge graph plays a vital role in facilitating collaboration, interoperability, and knowledge sharing across multiple systems and organizations including:

1. Data integration and interoperability: A knowledge graph connects and harmonizes data from various sources across different organizations and systems, enabling seamless sharing and utilization of knowledge. This helps create a unified view of the data, which is crucial for federated learning and integrated intelligence.
2. Data privacy and security: Federated learning requires data to remain on local devices or within organizational boundaries, with only model updates being shared. Knowledge graphs can help in this aspect by providing a way to share only relevant insights, relationships, and metadata without exposing raw data, thus preserving privacy and security.
3. Context-aware learning: Knowledge graphs provide semantic context to the data, helping federated learning algorithms better understand relationships and dependencies among different data points. This leads to improved model performance and more accurate predictions in the integrated intelligence system.
4. Collaboration and knowledge sharing: Knowledge graphs facilitate collaboration between different organizations participating in federated learning. They enable the sharing of insights, best practices, and model improvements while respecting data privacy and security requirements.
5. Continuous learning and adaptation: In a dynamic business environment, knowledge graphs can help capture and update changes in real-time, ensuring that the federated learning models and integrated intelligence systems remain up-to-date and relevant.
6. Enhanced natural language processing: Knowledge graphs can improve the understanding and generation of human-like responses in natural language interactions across the federated learning systems, making them more effective in handling user queries and providing insights.
7. Decision support and automation: Knowledge graphs can help federated learning models provide better decision support by offering relevant information, insights, and predictions. This can lead to more informed and efficient decision-making processes and automation of tasks across the distributed business environment.

In a world of large language models like GPT algorithms, knowledge graphs serve as a valuable resource for enhancing the capabilities and performance of these models including:

1. Structured knowledge representation: While large language models can generate human-like text and understand natural language, they often lack structured representations of knowledge. Knowledge graphs offer a structured, interconnected representation of entities, concepts, and relationships that can help AI models better understand and reason about the world.
2. Context and disambiguation: Knowledge graphs provide rich context and semantics that can help language models disambiguate meanings of words, phrases, and sentences. This allows for better natural language understanding and generation of more accurate and contextually relevant responses.
3. Factual accuracy and consistency: Large language models sometimes generate text that is plausible but factually incorrect. Knowledge graphs can be used to ensure the factual accuracy and consistency of the generated content by grounding it in verified and structured data.
4. Enhanced reasoning capabilities: Knowledge graphs support advanced querying and reasoning capabilities, allowing AI models to extract relevant information, uncover hidden patterns, and answer complex questions. This can improve the performance of language models in tasks like question-answering, summarization, and recommendation.
5. Personalization and recommendations: By incorporating knowledge graphs, language models can provide more personalized content, recommendations, and experiences for users. Knowledge graphs help in understanding user preferences, behavior, and context, leading to improved user engagement and satisfaction.
6. Data integration and interoperability: Knowledge graphs facilitate the integration of information from various sources, such as structured databases, unstructured text, and multimedia content. This can be used to enrich and extend the knowledge base of language models, allowing them to generate more comprehensive and useful responses.
7. Domain-specific applications: Knowledge graphs can be tailored to specific domains or industries, enabling language models to provide more targeted and specialized responses. This can be particularly beneficial for use cases in fields like healthcare, finance, and legal services.

Examples of items 20 through 28 above:







