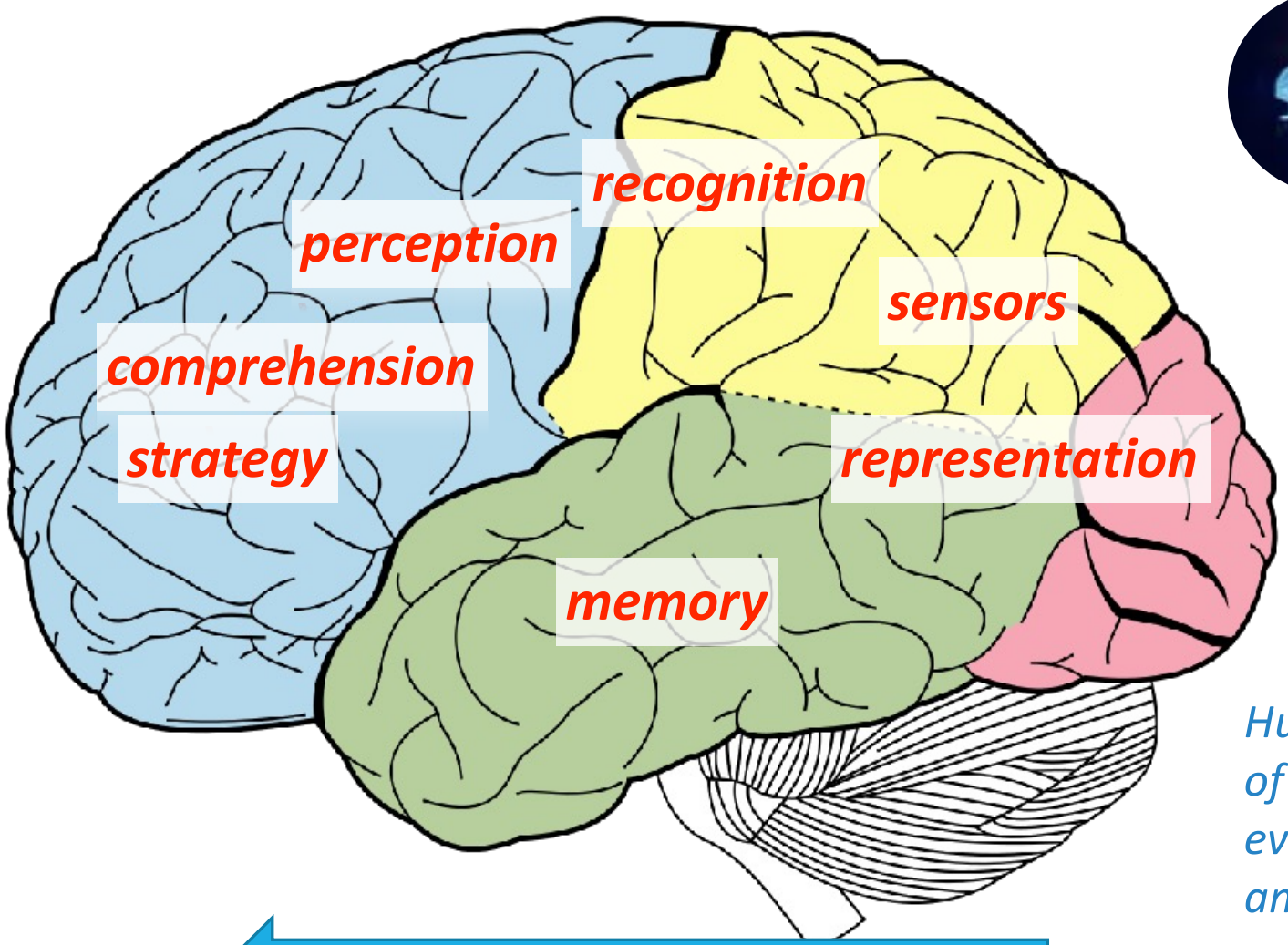
GRAPHEN
An Artificial Intelligence Company

AI PLATFORM INTRODUCTION - II

Prof. Ching-Yung Lin
Columbia University

February 23rd, 2024

Ardi Platform



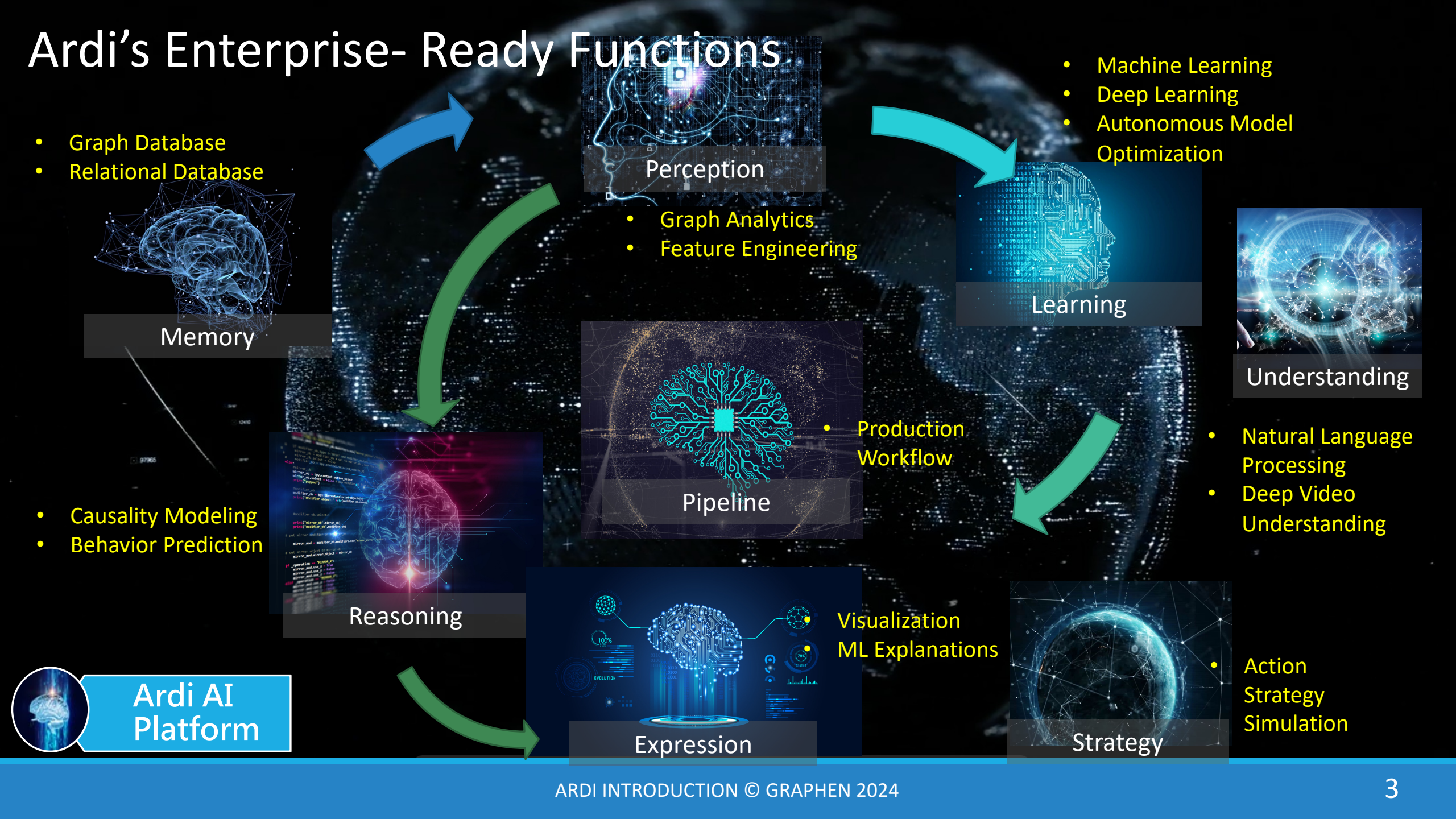
Ardi AI Platform

Contextual Analysis| Autonomous Learning

Advanced Enterprise Full-Brain AI Platform to build solutions – Scalability, Stability, and Advanced AI Technologies

Human Brain – a graph network of 100B nodes and 700T edges evolved and became smarter and smarter.

Ardi's Enterprise- Ready Functions



- Graph Database
- Relational Database

Memory

Perception

- Graph Analytics
- Feature Engineering

- Machine Learning
- Deep Learning
- Autonomous Model Optimization

Learning

Understanding

- Natural Language Processing
- Deep Video Understanding

Pipeline

- Production Workflow

- Causality Modeling
- Behavior Prediction

Reasoning

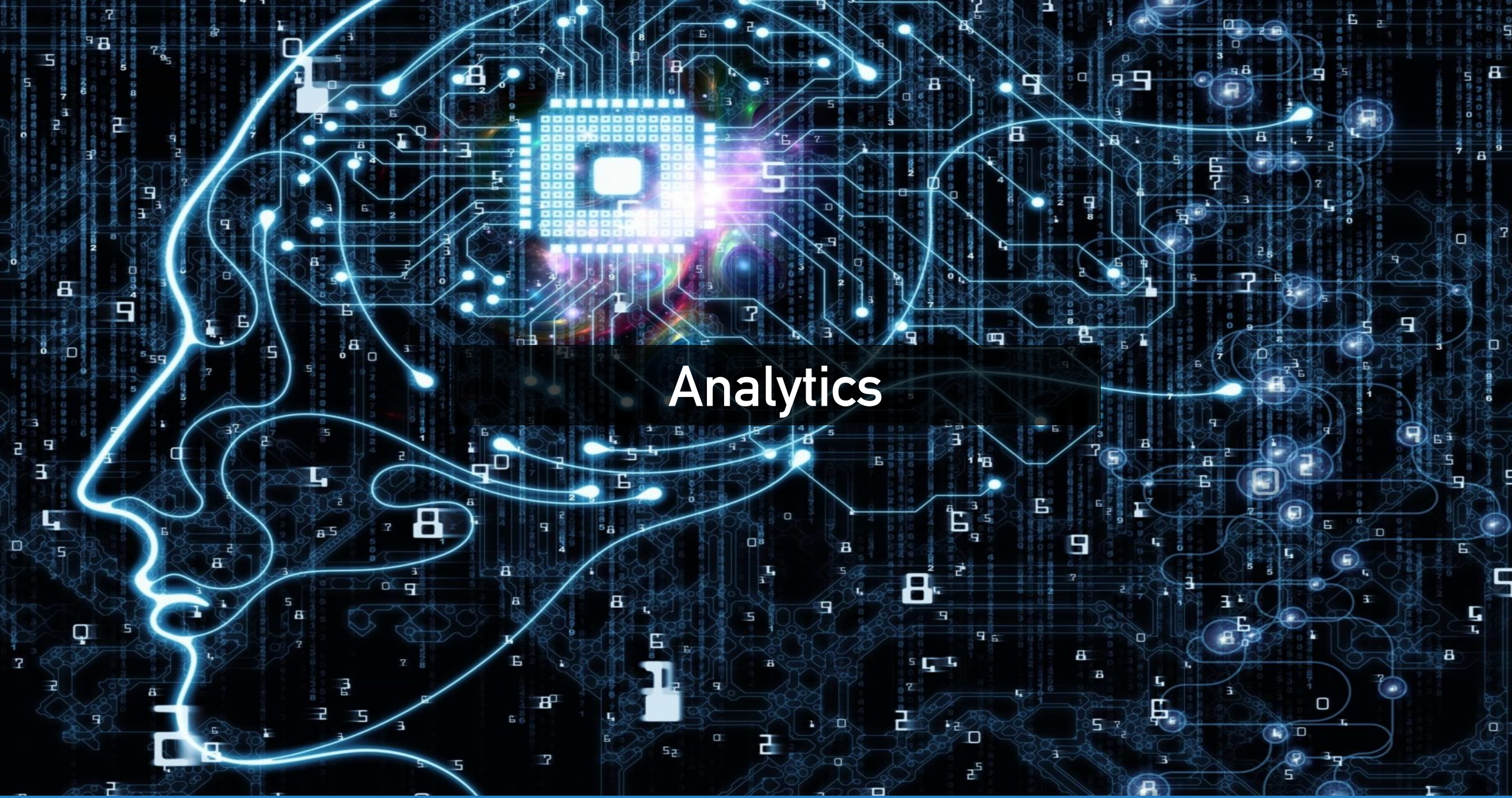
Expression

- Visualization
- ML Explanations

Strategy

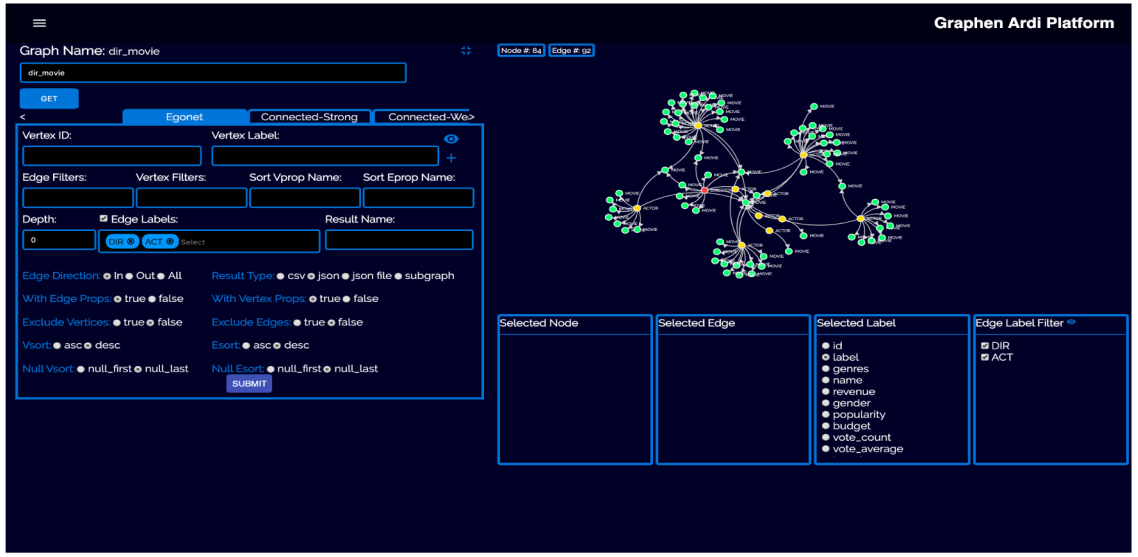
- Action
- Strategy
- Simulation

Ardi AI Platform


Analytics

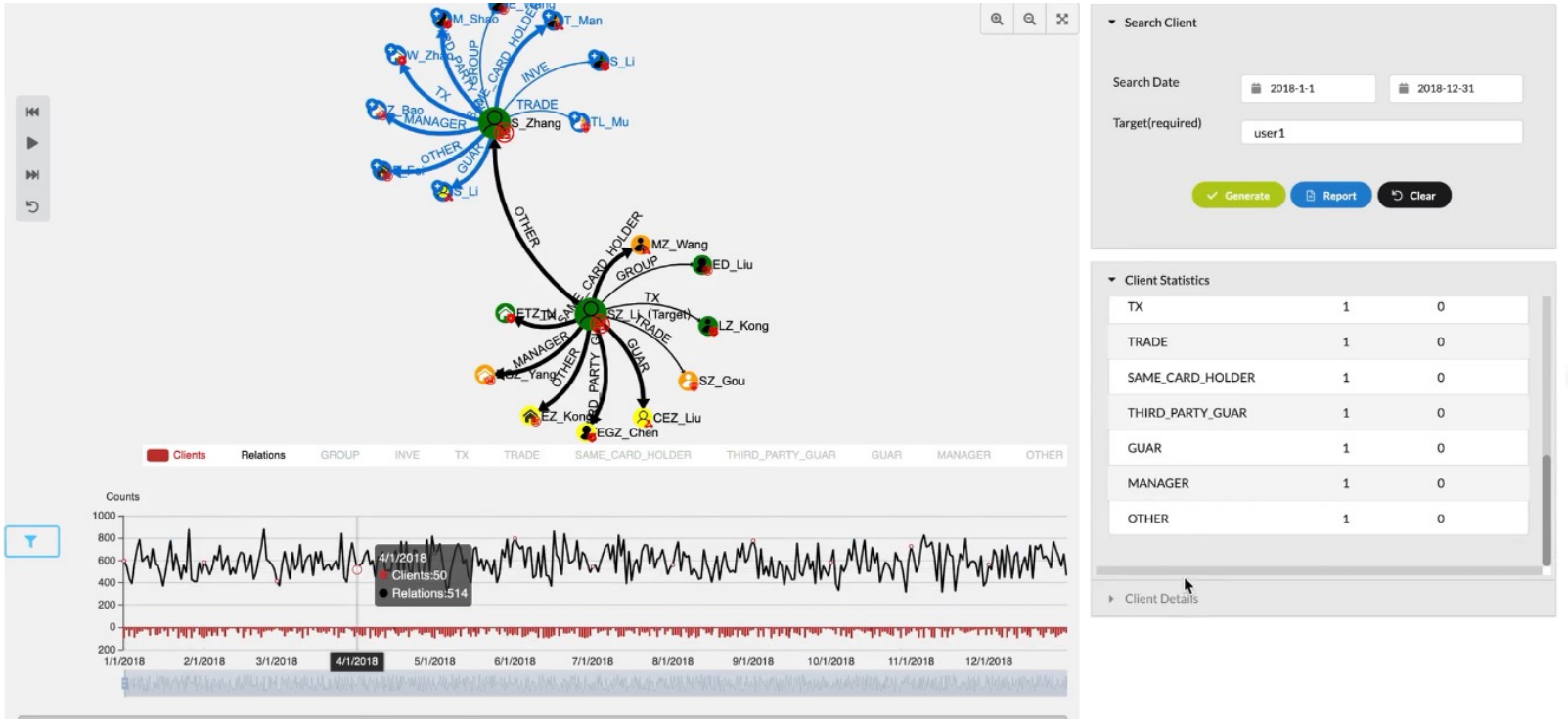
Ardi Graph Analytics Tools

- Support graphical analysis without any coding
- Efficient Analytics
  - Topological Analysis
    - Traverse
    - Shortest Paths
    - K-core
    - Minimum Spanning Tree
  - Metrics
    - Centrality and metrics
    - Compute PageRank
    - Link Prediction Indices
    - Clustering Coefficients
    - Similarity Ranking
  - Component Analysis and Retrieval
    - Cycles
    - Egonets
    - Strongly/Weakly Connected Components
    - Louvain Communities
    - Cliques
    - Graph Spectral Clustering
  - Prediction
    - Missing Links Prediction
    - Entity Resolution
    - Risk Propagation



Example: Graph Analytics for Non-Performing Loan (NPL) Prediction

- Using Graphen Graph DB and Analytics, realized analysis of several millions of commercial customers. Processing time in customer's original system: **3 to 10 days**. Processing time using Graphen: **14 mins**.
- Using Graphen Cognitive Computing, Machine Learning, and Risk Propagation to realize NPL detection and prediction. Based on Graphen NPL Prediction to predict companies that might go default in the next month, the Average Precision of Top4 was **100.0%** and the Average Precision of Top10 was **92%**。



Relationship Generation for NPL

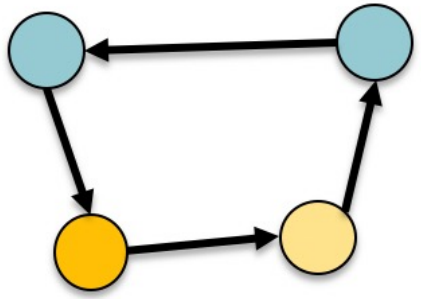
GRAPHEN
An Artificial Intelligence Company

	Basic Elements	Implicit Relations
Investors & Shareholders	Investment • Majority Shareholder • Top Non-controlling Shareholder Executives • Corporate Representatives/Other Executives Other • Relatives/Spouse/Non-Spouse	• Same corporation legal representative • Legal Representative Outward Investment (Controlling/Non-Controlling) • Legal representatives with multiple jobs in different companies
Behavior Relations	Guarantee	General guarantee, Joint guarantee, Mutual guarantee, Guarantee Cycle
	Third-party asset collateral	Corporation legal third party
	Money Transaction	Transaction Cycle
	Trade • Factoring and Invoice Financing • Supply Chain Financing • Bank Notes • Letter of Credit • Entrusted Payment	Trade Cycle
United Credit Management of Group Customers		United Credit Management of Group Customers
Other Connection		• Inferred Relationship by Credit Card • Same Address/Phone number

Critical Pattern Detection

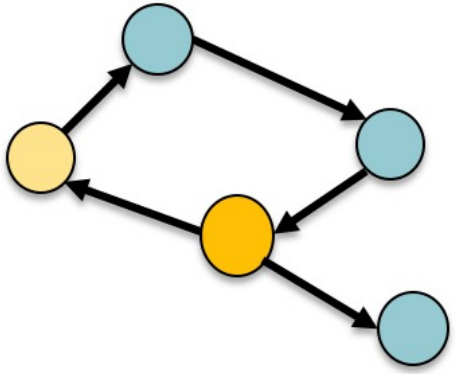
GRAPHEN
An Artificial Intelligence Company

Circular Flow of Funds



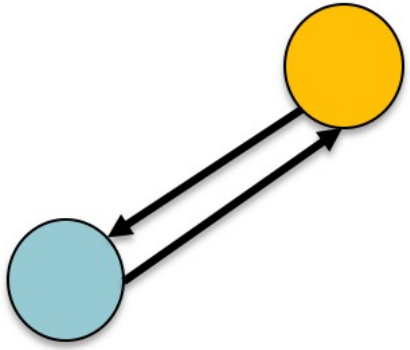
The presence of a defaulting entity in the circular flow will increase the entity's risk

Circular Trade Activity



When the entity at the core of the relationship defaults, the risk of customers with large transaction amounts will increase

Mutual Guarantees

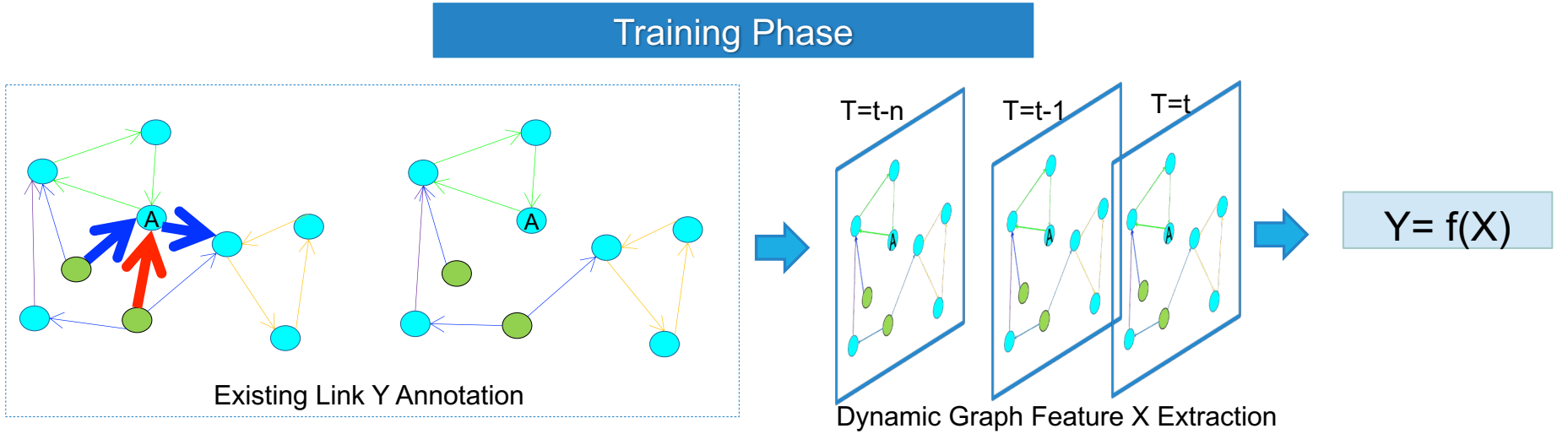


Mutual guarantees relationships are inherently suspicious

Critical Link Prediction

- Target: Given information on money transaction, trade and guarantee behavior pattern, Graphen's Link Prediction tool predicts the existence of potential connections between a pair of customers (or customer and corporation) among which at least one is loaned. We focus on the following relations.
  - Whether the customer is the spouse of the other
  - Whether the legal representative has invested in other companies
  - Whether the legal representative has another manager position in other companies.
- Using Ardi's Graph Analytics to extract graph topological features
  - Neighboring Coefficients: Common Neighbors, Jaccard's coefficient, Adamic/Adar Index
  - Distance Metrics: Weighted shortest path distance, Katz distance, Hitting Time
  - Cycle Analysis: Whether two vertices are in the same cycle
  - Missing Link Indices

Predicting Hidden Relationships



Detect potential missing links by predicting the probability of link existence between two nodes using supervised machine learning methods.

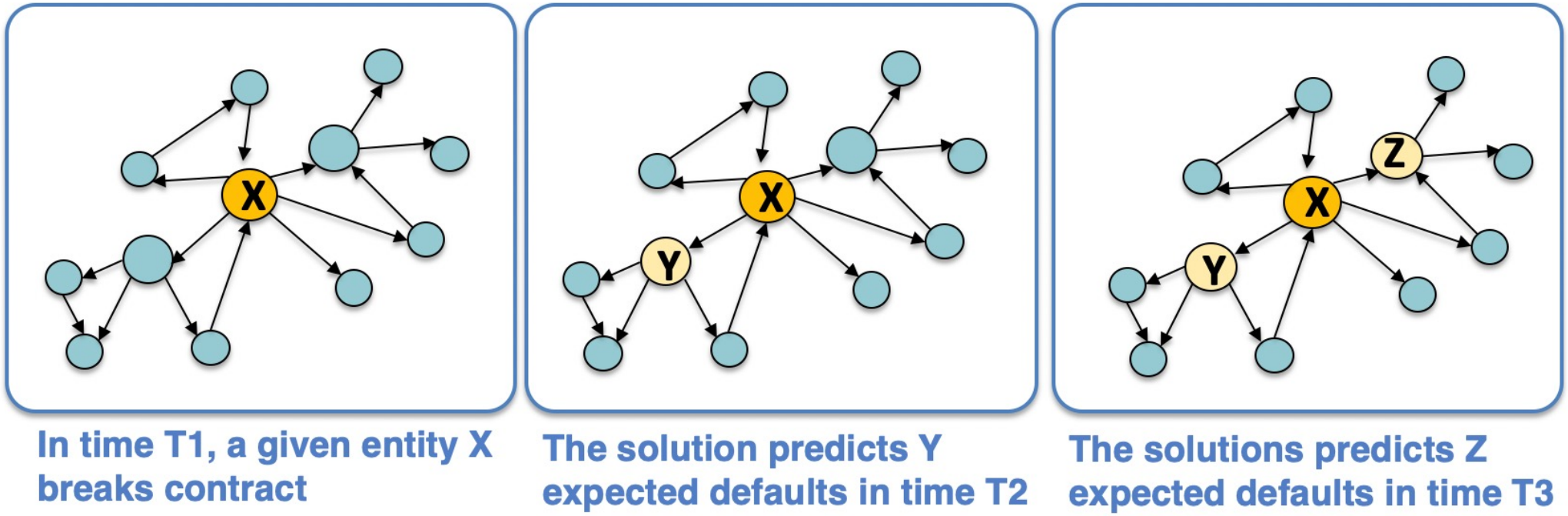
- Training Phase

  Model the relationship between X and Y using supervised machine learning algorithms

- Prediction Phase

  Calculate the link existence given the new graph and the relationship learnt in the training phase.

Risk Propagation

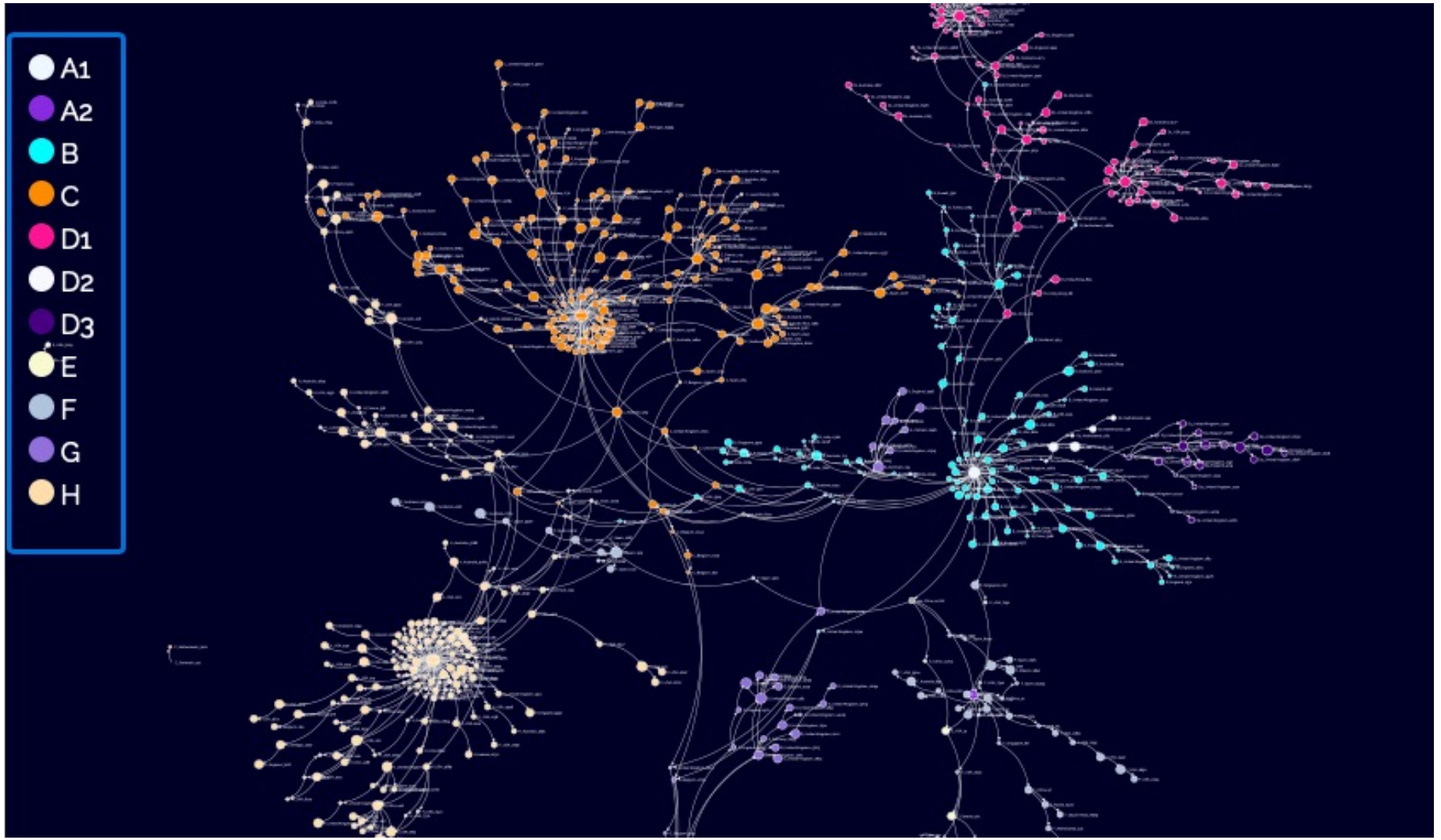


In time T1, a given entity X breaks contract

The solution predicts Y expected defaults in time T2

The solutions predicts Z expected defaults in time T3

Graph Spectral Clustering



- Multi-Resolution on Graph Topologies:
  - Finding key communities
  - Finding key bridges
  - Finding hubs
  - Finding visual analytics results that keep the original structure.
- Example: COVID-19 Worldwide Genome Evolution Graph

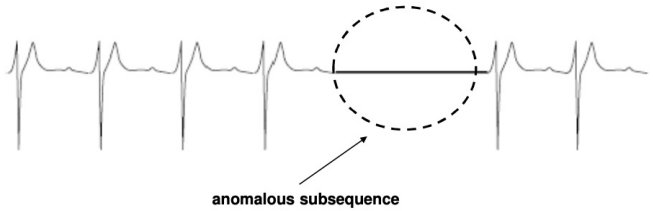
Anomaly Detection Tools

Unsupervised Abnormal nodes/links detection by estimating discrepancies with self or peer group behavior.

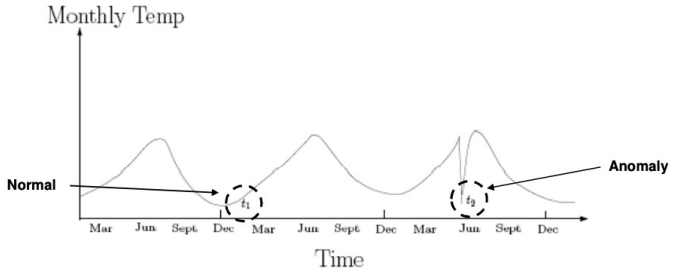
Technologies

- Statistical: Estimate a parametric model describing the distribution of the data;
- Proximity-based: Identify data points far away from the majority;
- Density-based: Identify data points in regions of low density;
- Clustering-based: Identify data points that do not belong strongly to any cluster.

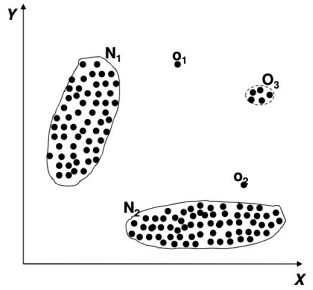
Types of Anomalies



Collective Anomalies



Contextual Anomalies



Point Anomalies

Example: Anti-Money Laundering

- Known entity risk
- Industry/occupation risk
- Geo-location risk
- Watch list hit
- Negative news hit

Entity Risk

Network Risk

- Related individual risk
- Related company risk
- Transacting individual risk
- Transacting company risk
- Network change

Risk Score

- Rejected transactions
- Alert/case/SAR history
- Rules triggered in alerts from existing systems
- Sanctions against organization/ location

Red Flags

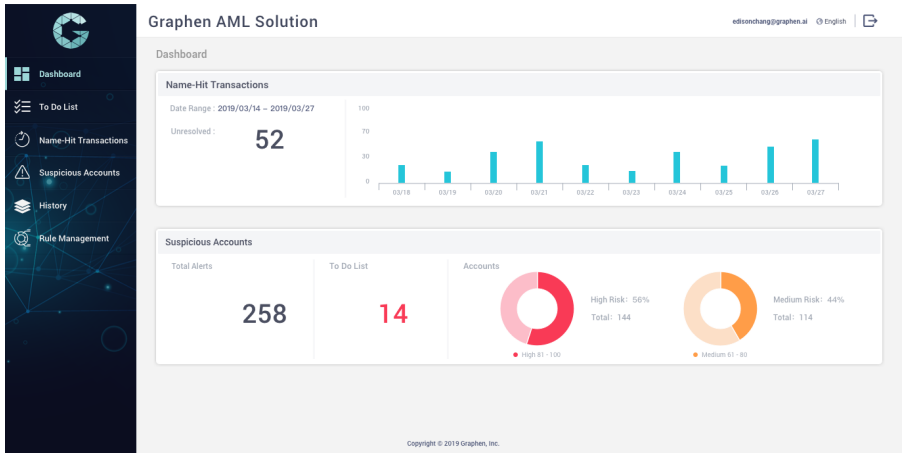
Machine Learning

- Abnormal Behavior: Deviate from historical data and peer behavior
- AML Model: Trained by historical dataset

1. Decreasing False Positive
2. Finding Unknown Unknowns

Deployment Examples:

- ~80,000 SARS *-> reduced 80%*
- ~100,000,000 Clients
- ~200,000,000 Accounts
- ~1,000,000,000 Relations
- ~200,000,000 Transaction



Example: Entity Risk

Industry

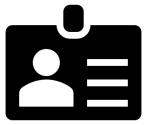
- Discrepancies between KYC data and external data

Geography

- AML risk identified with customer's location
- Discrepancy between self-reported location and external data

Negative News

- Negative news related to the customer, their employer, associates, etc.



PEP

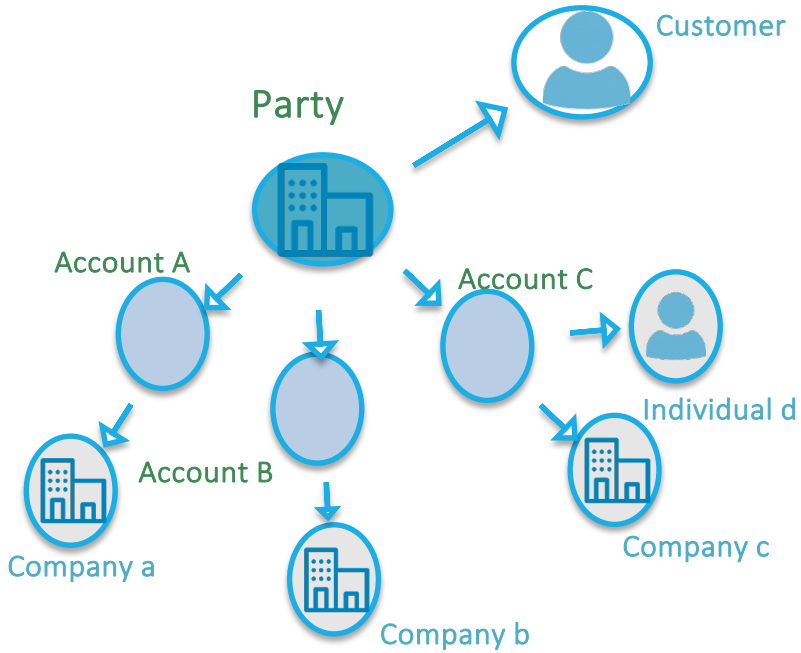
- The customer
- appears on a PEP list

Information Source

• Onboarding/KYC data • CDD、EDD data • Client location • Bank Branch location	• Open Internet / social media • Online news sources • Third-party vendors

Example: Network Risk

A graph depicting all entities connected to the “party” (the customer being analyzed)



- **Determining risk from the network graph:**

  The graph will be analyzed for certain features used to calculate a Network Risk Score.

Relationship Types

- Funds/Capital Relationships
- Transaction Relationships
- Business Relationships (employer/employee, contractors, etc.)
- Stock Ownership
- Other Relationships (marriage, etc.)

Party

Focus of analysis

Company Individual

Account

Ardi Applications - AI Finance

GRAPHEN
An Artificial Intelligence Company

– A Full-Spectrum AI Finance Solution Provider

Central Monitoring

Real-Time monitoring the operation of entire bank(branches, ATMs, mobile banking, customer services, social media, etc.)

Anti-Money Laundering

Using AI to detect risking money laundering schemes.

Regulation Inference

Using ML, NLP, and Reasoning to effectively track and analyze regulations for better compliance.

Market Intelligence

Building Knowledge Graphs by gathering news, judging company's public ESG images, and predicting financial markets.

Cybersecurity

Protecting Financial Hubs with advanced behavior understanding system and intention prediction.

Non-Performing Loan Prediction

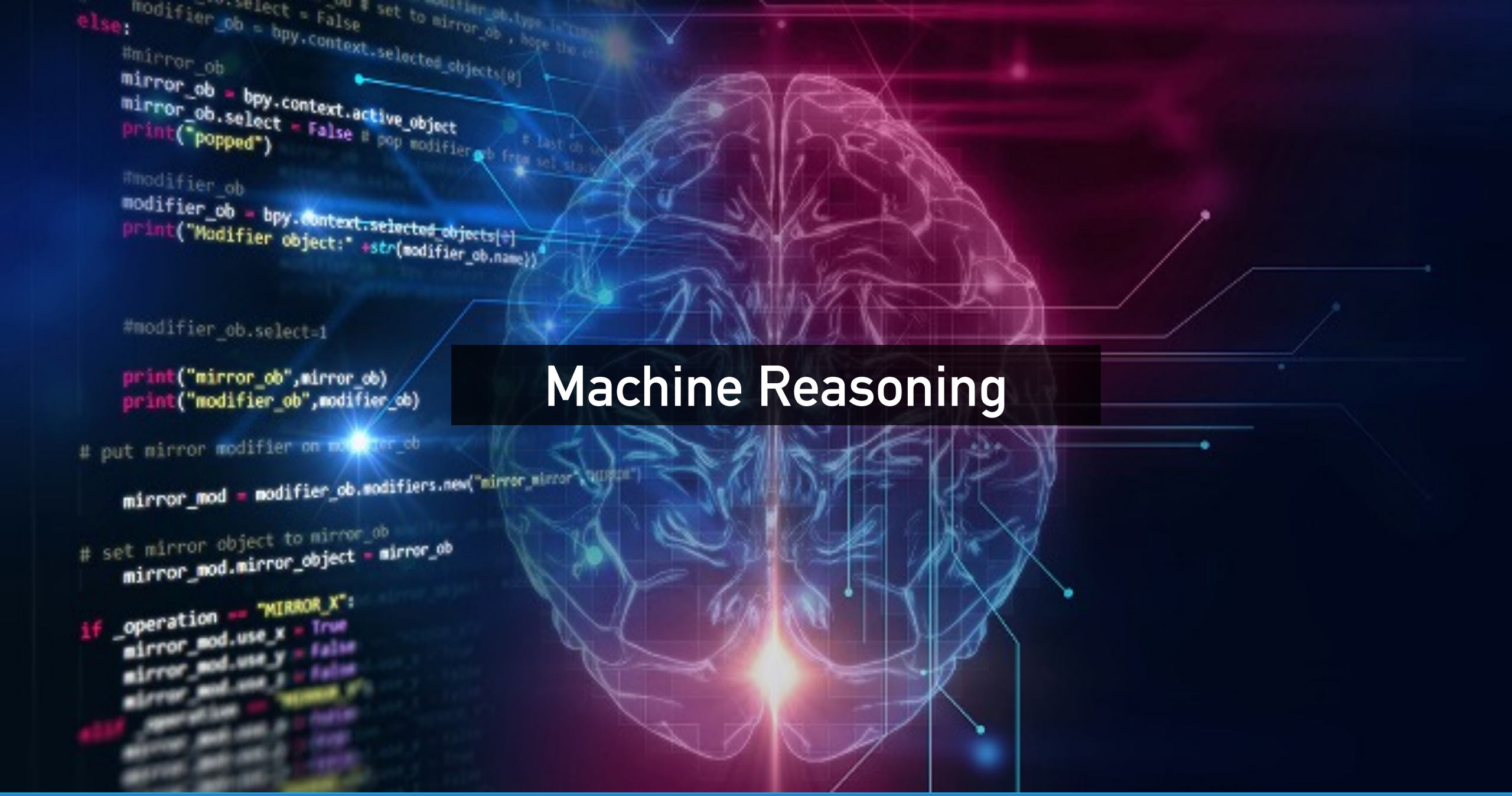
Analyzing relations of accounts and their risk propagations.

Fraud Detection

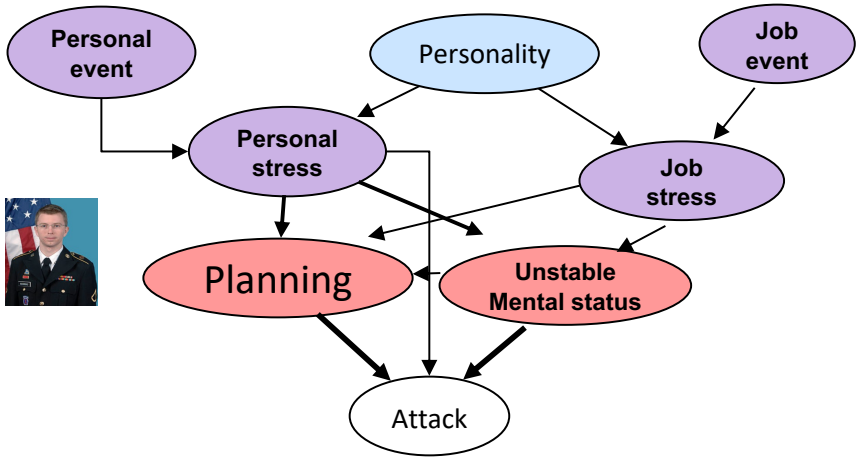
Using Advanced AI to automatically detect all kinds of fraud behaviors, including agents in banking & insurance industries, and customers.

Trade Finance Due Diligence

Automatic process to crawl data and investigate trade entities.


Machine Reasoning

Ardi Machine Reasoning



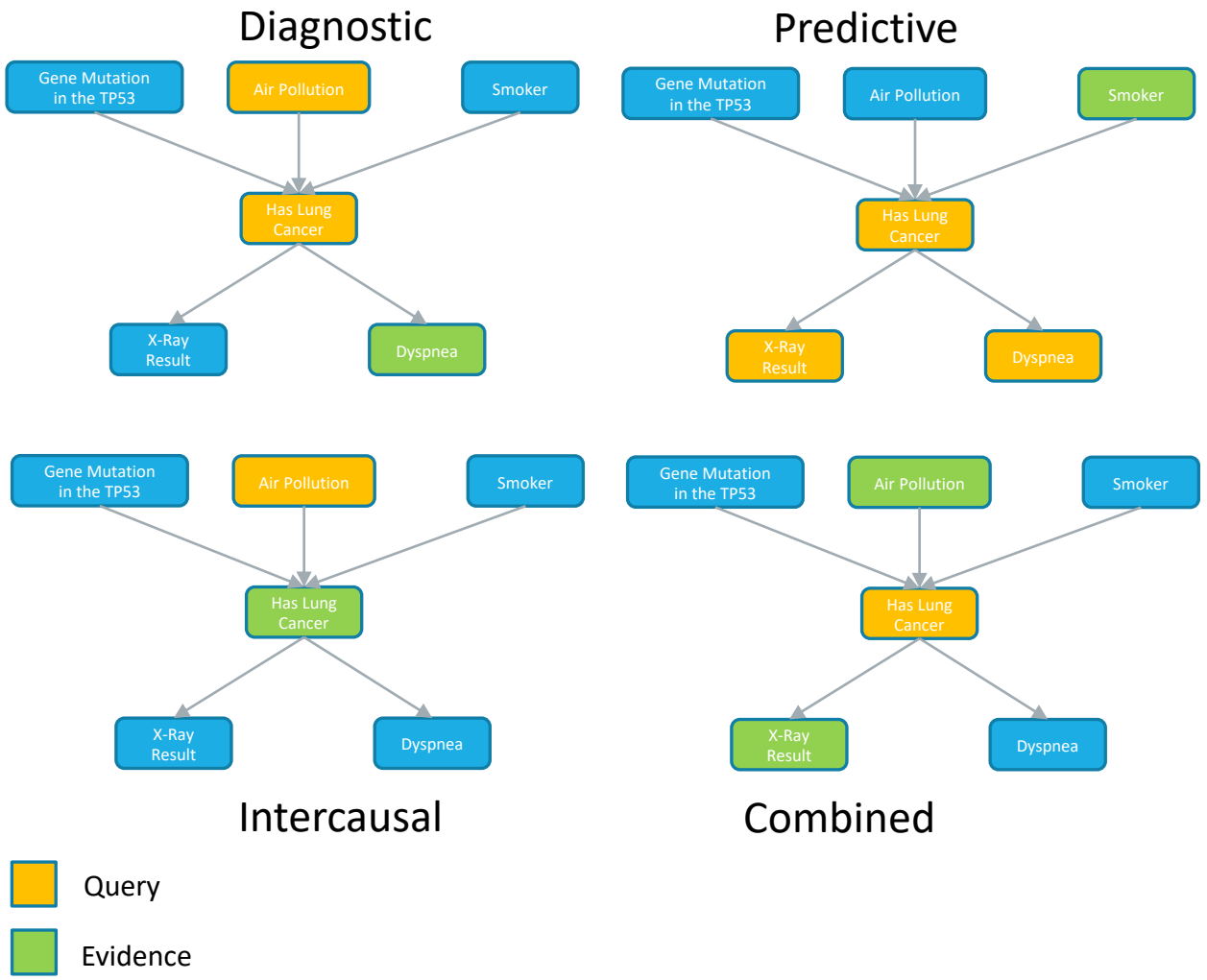
One of the main challenges in building an efficient system is the ability to learn and to reason under uncertainty, and one of the most successful approaches for dealing with this challenge is based on the framework of Bayesian Networks.

Bayesian Networks offer an expressive visual and quantitative tool for

- Learning and representing reasoning procedures
- Understanding causality among variables

- Machine Reasoning may improve risky behavior prediction accuracy up to 10x.

Types of Reasoning



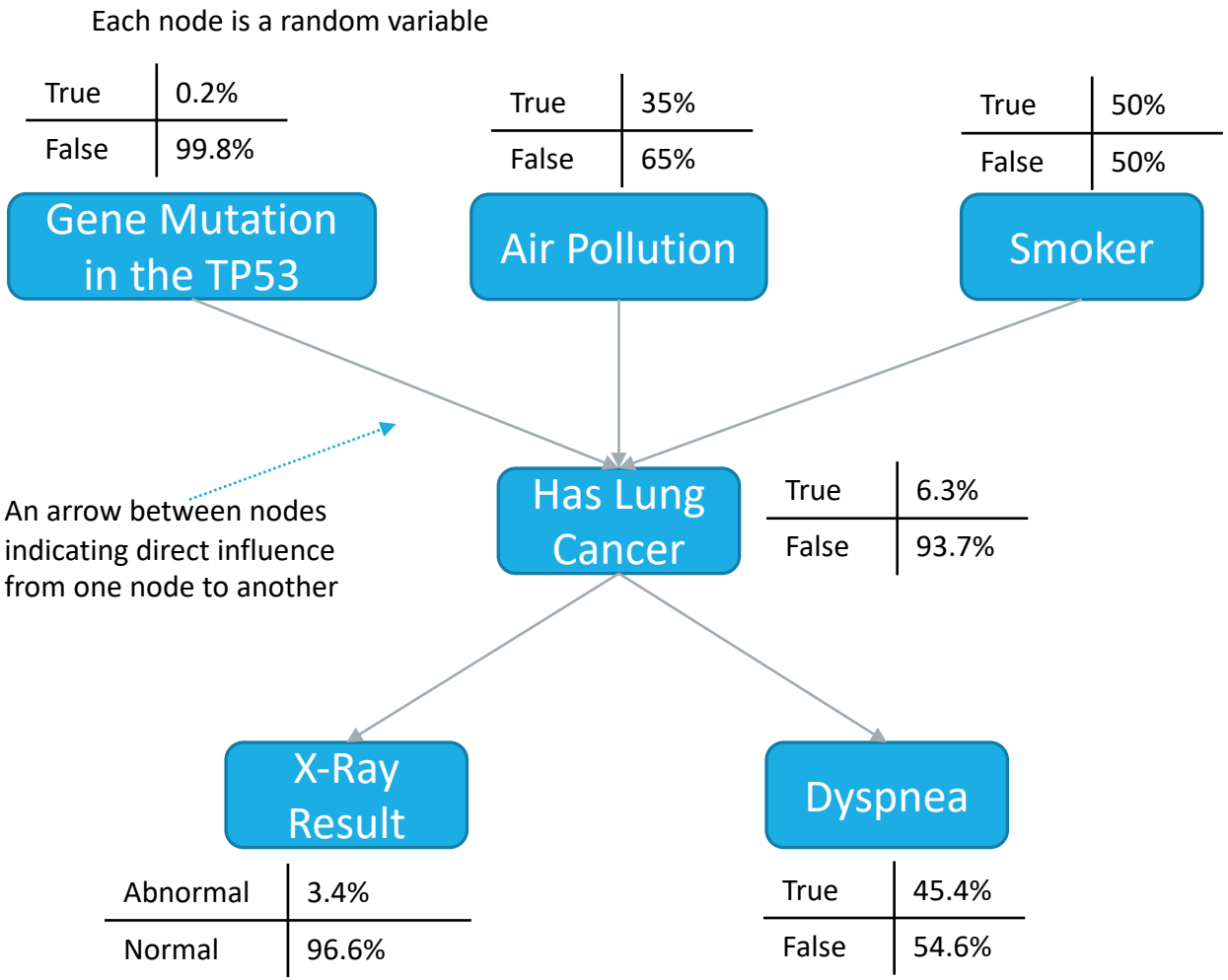
- **Diagnostic:** Given evidence about an effect, how does this change the belief in this causes?
- **Predictive:** Given evidence, what are the predicted outcome?
- **Intercausal:** Given evidence about a cause and about its effect, how does it change the beliefs in other causes?
- **Combined:** Given evidence about background causes and effects, what are the new beliefs in intermediate nodes?

Why using Bayesian Networks for Reasoning?

GRAPHEN
An Artificial Intelligence Company

- Graph representation of real-world data
  - Conditional independencies & graphical language capture structure of many real-world distributions
  - Graph structure provides more insight into domain and allows in-depth domain knowledge discovery through network construction
  - Expert prior knowledge may often be incorporated when learning the graph structure
- Learned Bayesian model solves analytical limitations
  - Learned model can be used for many tasks
  - Supports all the features of probabilistic learning
  - Deal with missing data & hidden variables

Bayesian Networks



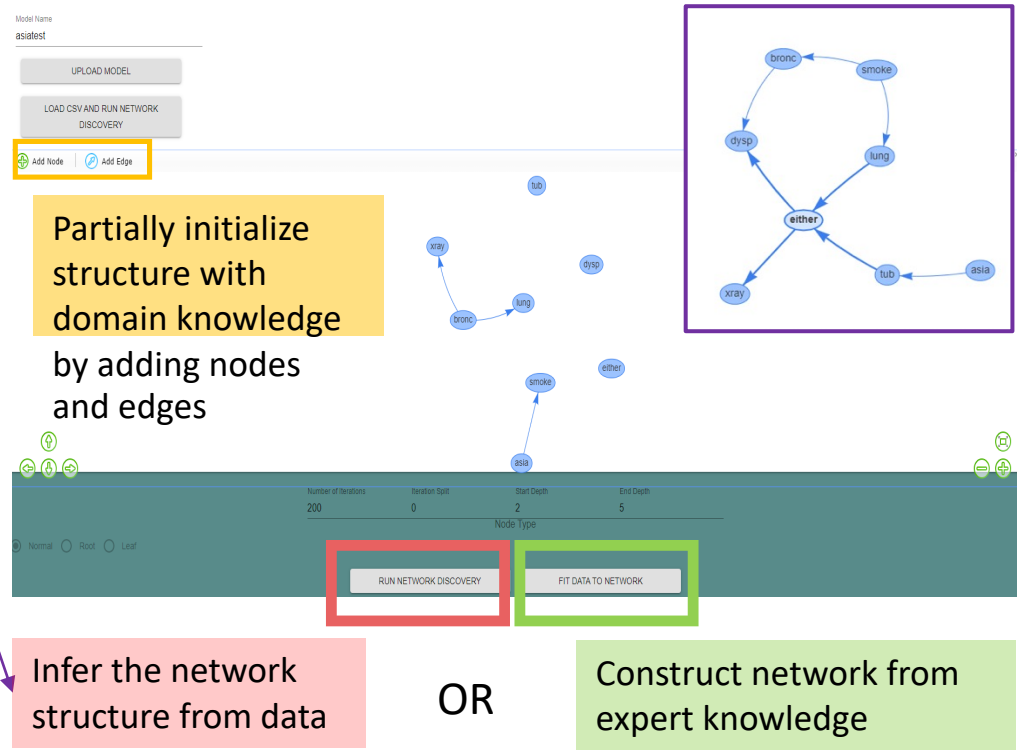
- A network model that follows the structure of a directed acyclic graph (DAG), G=(V,E), where V denotes nodes and E denotes edges;
- Encode the conditional independencies of each vertex given its parent, measuring how the change of one variable affect others at different levels;
- A Generative model that allows arbitrary queries to be answered.

Reasoning Structure Inference

- Target
  Given a set of random variables, find the optimal Bayesian network with best structure and parameters that captures the casual relations between variables.

- Score-based Model Selection Criteria
  - Cooper-Herskovits (CH) Criterion
  - Bayesian Information Criterion (BIC)
  - Minimum Description Length (MDL)
  - Akaike Information Criterion (AIC)

- Model Optimization
  - K2 search for model with highest CH Criterion
  - Random restart hill-climbing
  - Tabu Search



Partially initialize structure with domain knowledge by adding nodes and edges

Infer the network structure from data

OR

Construct network from expert knowledge

Graphen Ardi Bayesian Network GUI

Example: Bayesian Inference in Cyber Security

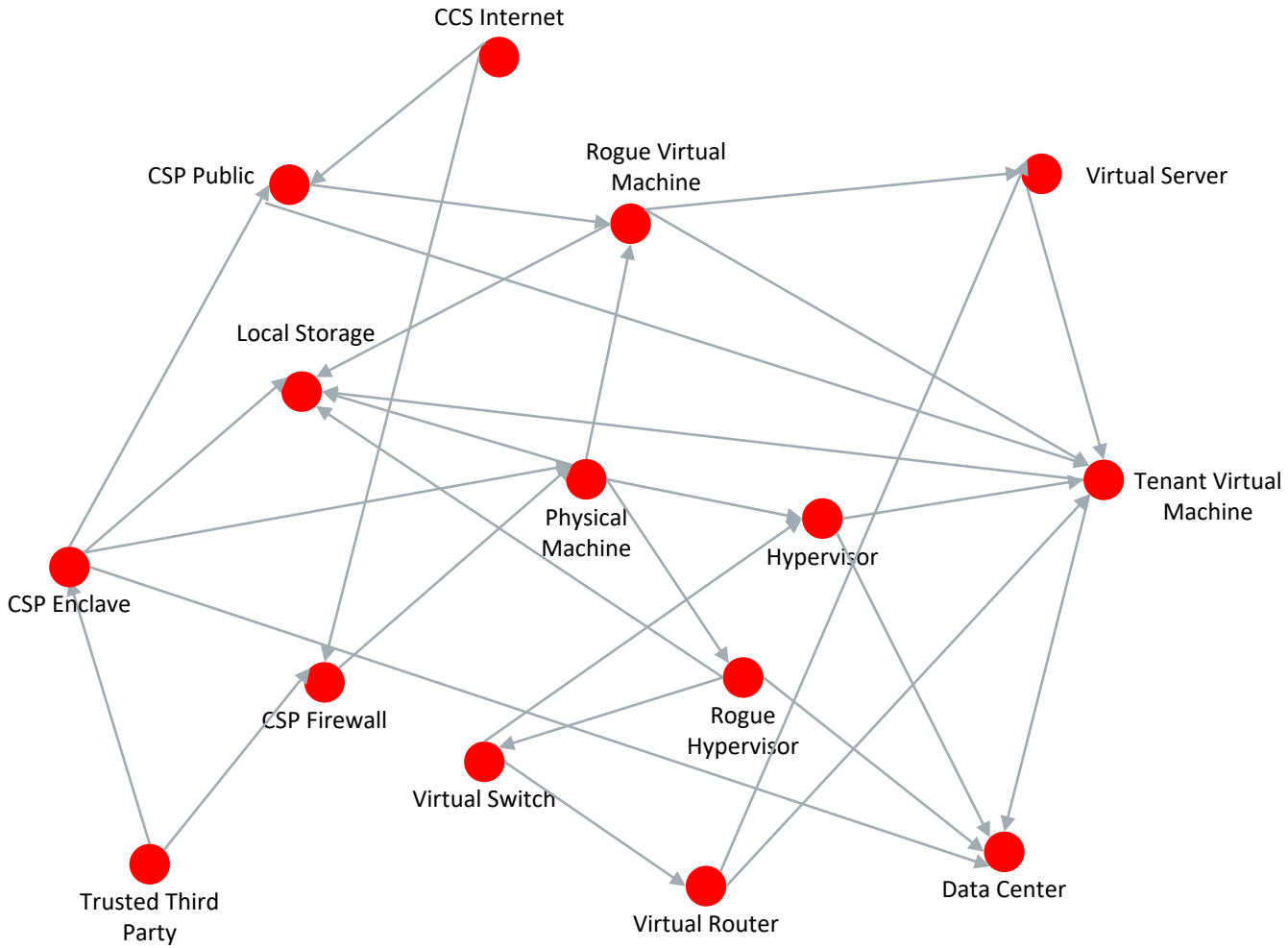
GRAPHEN
An Artificial Intelligence Company

APT attackers possess high levels of technical skills and have extensive resources at their disposal, and this has enabled them to effectuate sophisticated stealthy reconnaissance, surveillance and data exfiltration attacks with little traceability if any at all. The threat actor executes a series of coordinated actions to obtain a set of assets needed to reach the goal(s).

Target:

- Predict potential attack in the next stage
- Evaluate the likelihood of an APT occurring
- Model the uncertain aspects in cyber security
  1. The uncertainty on attack success
  2. The uncertainty of attacker choice
  3. The uncertainty from imperfect IDS sensors

Bayesian Inference on Cyber Anomalies



Construct attack graph from domain knowledge

Conditional Probability Assignments

Inference
Query the probability of the vulnerability when a new event occur

Detection Long-Term Anomalies and Threats

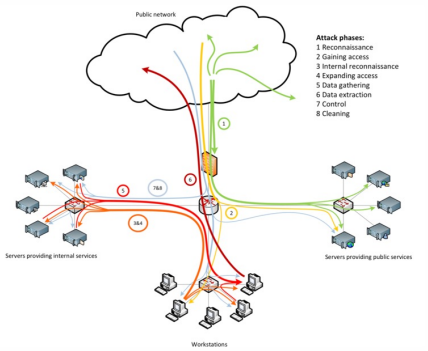
GRAPHEN
An Artificial Intelligence Company

Stage 1

External Reconnaissance

- Web Activity
- Email Activity

- Uncharacteristic site usage
- Threat intelligence feeds
- Dark Web forum chatter



Stage 2

Gaining Access

- Exploits delivered through phishing mails or infected websites

- Attachments
- Difference in file sizes
- Common traits of phishing mails

Stage 3

Internal Reconnaissance

- Using malware, botnet and rootkit to obtain local privileged access

- Network usage changes
- Query Network information

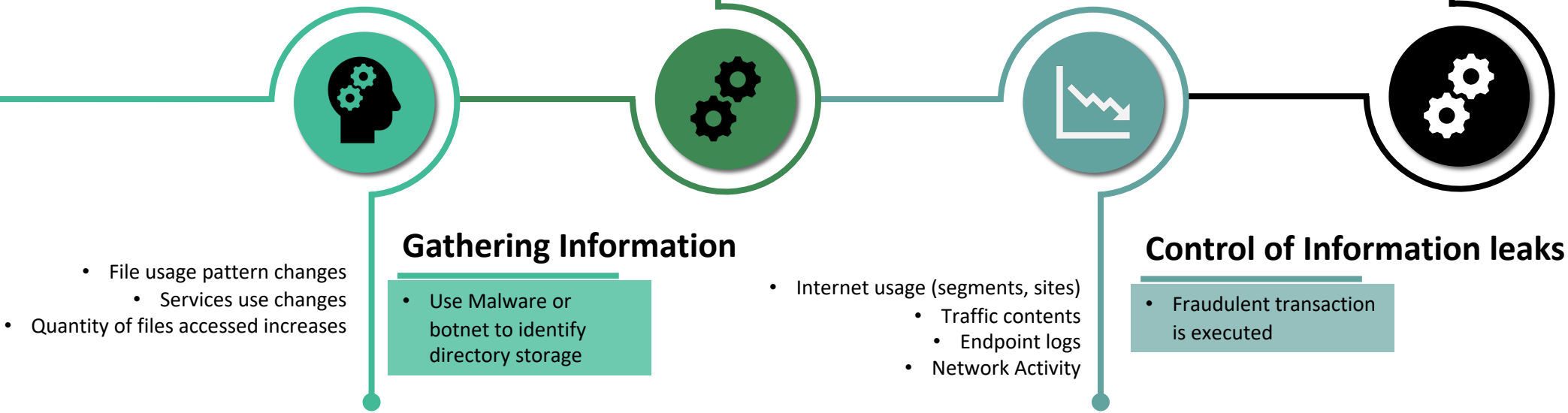
Stage 4

Expanding Access

- Use malware and exploits to achieve domain-level accounts

- Different traffic patterns
- Traffic content
- AD logs
- Network Activity

Detection Long-Term Anomalies and Threats



Stage 5

Gathering Information

- Use Malware or botnet to identify directory storage

- File usage pattern changes
- Services use changes
- Quantity of files accessed increases

Stage 6

Information Extraction

- Data is encrypted and extracted

- Volume of traffic
- Network Activity

Stage 7

Control of Information leaks

- Fraudulent transaction is executed

- Internet usage (segments, sites)
- Traffic contents
- Endpoint logs
- Network Activity

Stage 8

Erasing Tracks

- Data, logs are removed

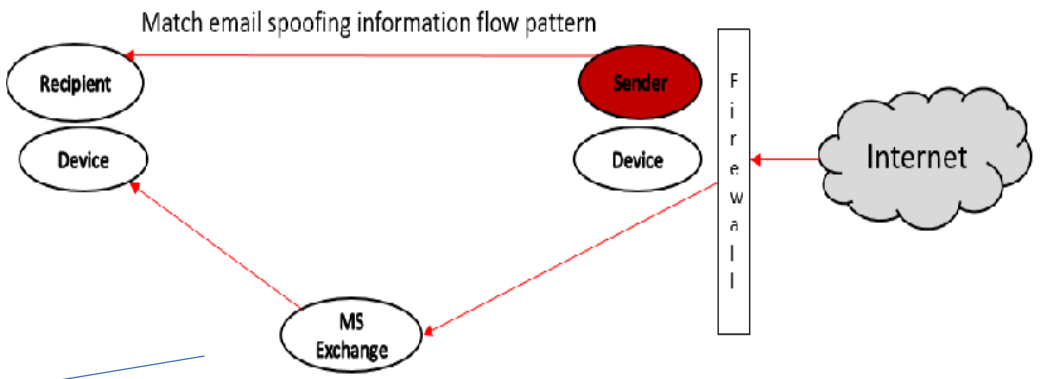
- Changes to system
- Changes in file sizes
- Gaps in log files
- Usage of erasing tools

Machine Reasoning to Aggregate Risk

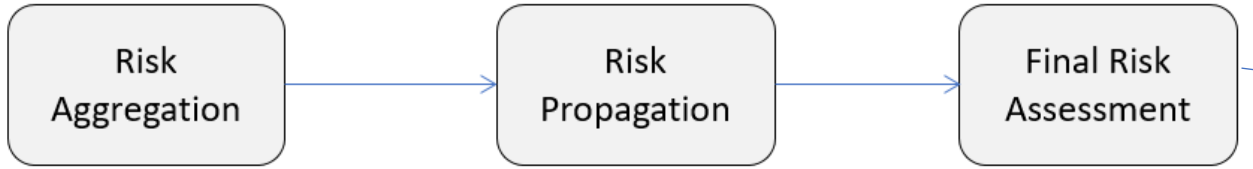
Behavior-based anomaly identified

- **Historical/group behavior: a small number of emails to a few frequent contacts per day during business hours**
- **Current behavior of employee A: an email sent outside normal business hours to all his contacts**

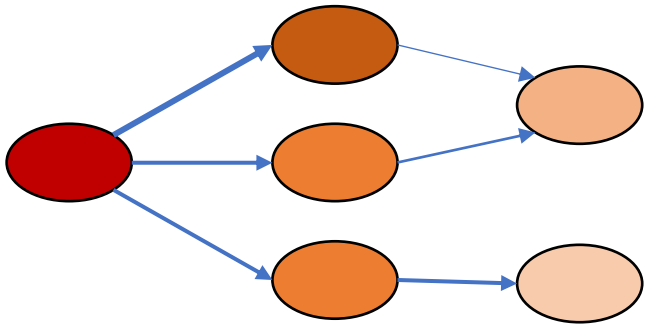
Flow-based anomaly identified



An email that appears to be from employee A sent to all his contacts matches email spoofing information flow pattern



A single risk score for each entity to indicate its overall risk



For the entity that has elevated risk, propagates risk to other entities connected to it

Graphen Automobile – AI Car Doctors

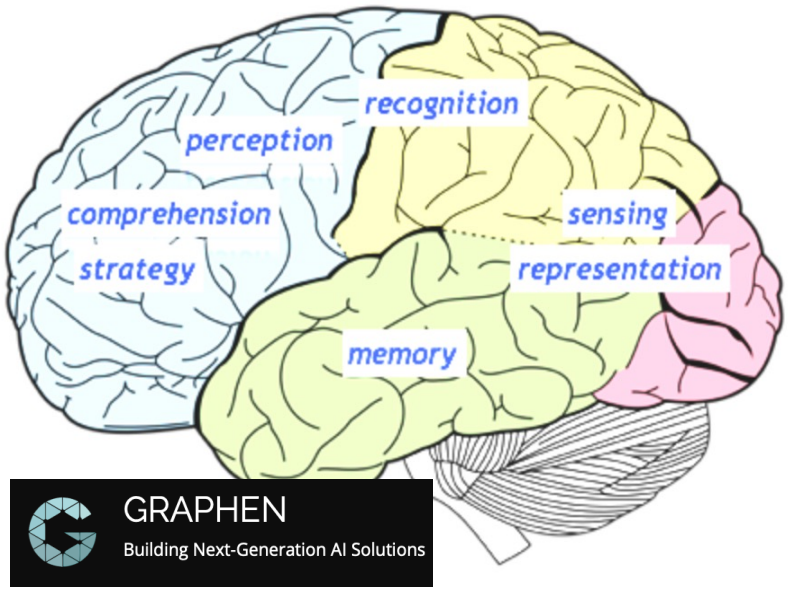
GRAPHEN
An Artificial Intelligence Company

Graphen Automobile – working with the North America market dominating leader to develop Car Doctor AI technology for the world

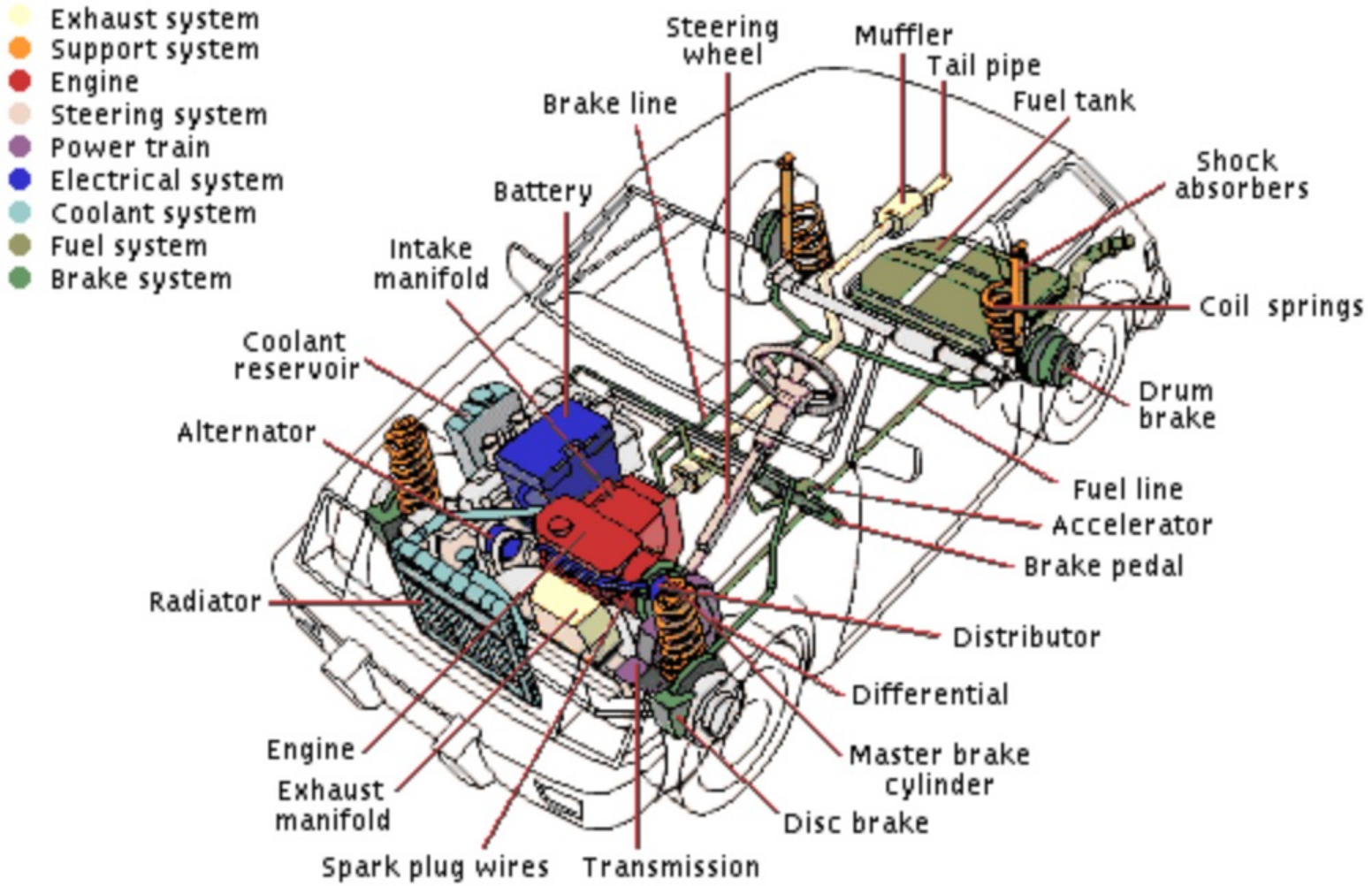
- Graphen AI was able to achieve almost 99% accuracy of car diagnosis and fix suggestions.
- Graphen AI was able to achieve 91% accuracy of car diagnosis and fix suggestions with just 1% of training data..

FixName1	Total present invalidation data	Total correctlypredicted by model	Accuracy Percentage
Inspect Cooling System and Repair As Necessary	77	77	100
Inspect Engine Oil Level and Fill or Replace as Necessary	285	285	100
Repair Engine Wiring Harness	59	59	100
Repair Fuel Injector Wiring	8	8	100
Repair Ignition Coil Wiring	184	184	100
Repair Mass Air Flow (MAF) Sensor Wiring	26	26	100
Repair Transmission Output Shaft Speed (OSS) Sensor Wiring	42	42	100
Repair Faulty Wiring in Engine Compartment	4	4	100
Replace Air Filter Element	299	299	100
Replace Camshaft Timing Gear	317	317	100
Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	2960	2960	100
Replace Cylinder Head Temperature (CHT) Sensor	84	84	100
Replace Differential Pressure Feedback (DPFE) Sensor	4	4	100
Replace Electronic Oil Temperature Sensor (EOT)	243	243	100
Replace Engine Coolant Temperature Sensor (ECT)	363	363	100
Replace Evaporative Emissions (EVAP) Canister Vent Solenoid	160	160	100
Replace Evaporative Emissions (EVAP) Purge Solenoid	20	20	100
Replace Fuel Gauge Sending Unit	7	7	100
Replace Fuel Injector(s)	161	161	100
Replace Fuel Pump	190	190	100
Replace Fuel Pump Control Module	7	7	100
Replace Fuel Rail Pressure (FRP) Sensor	52	52	100
Replace Ignition Coil Boot(s) and Spark Plug(s)	15	15	100
Replace Intake Manifold Runner Control (IMRC) Actuator	224	224	100

Graphen Automobile built Knowledge Graph of Cars

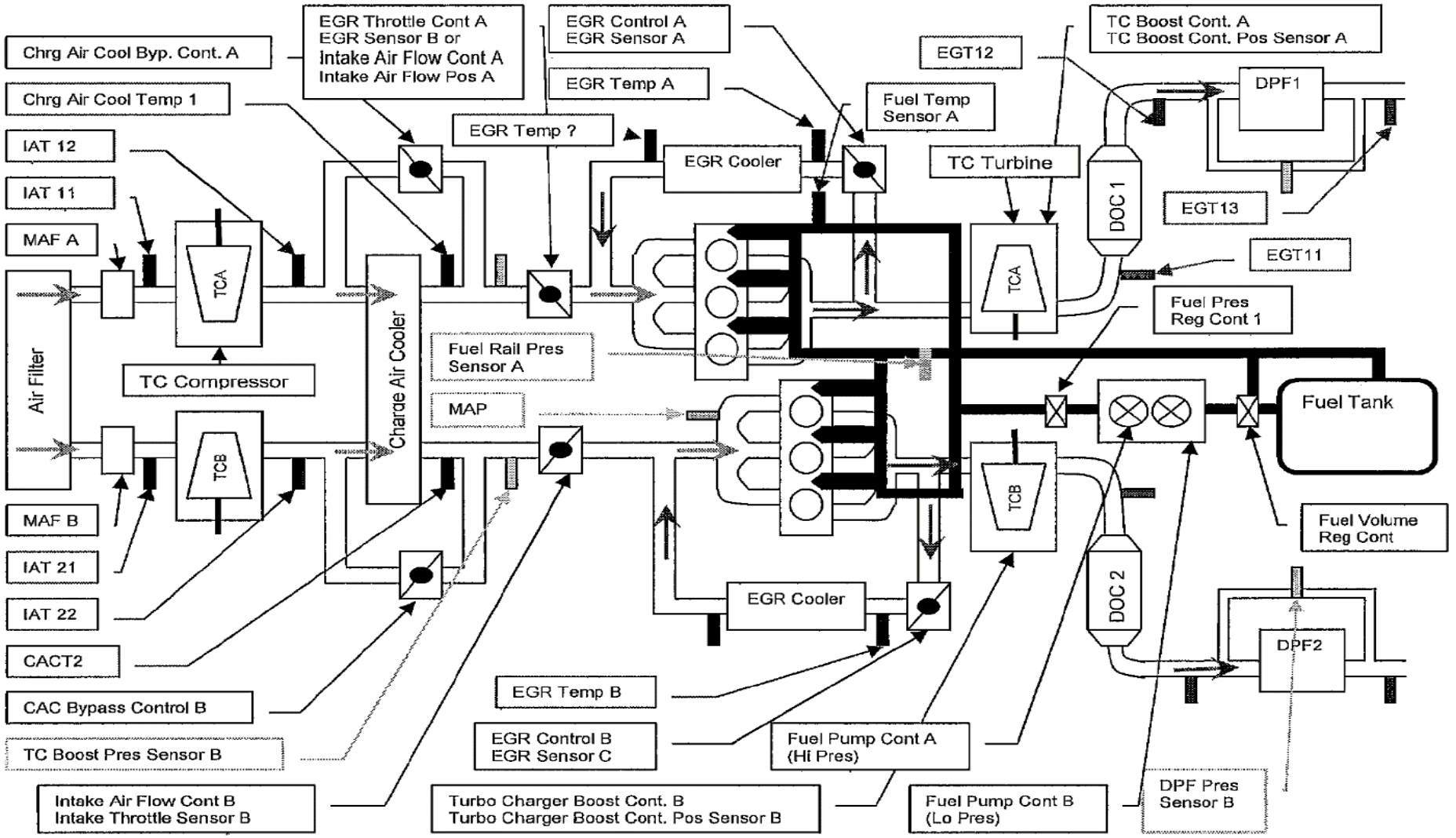


+



Graphen Automobile Car Sensor Knowledge Graphs

GRAPHEN
An Artificial Intelligence Company

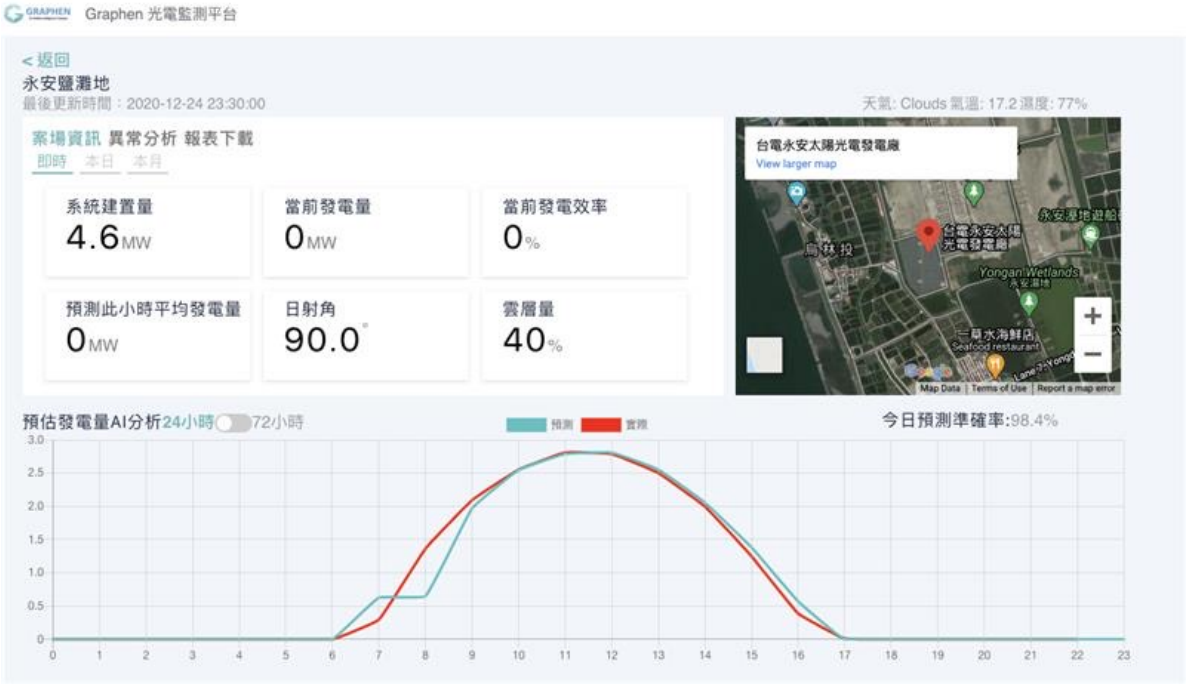


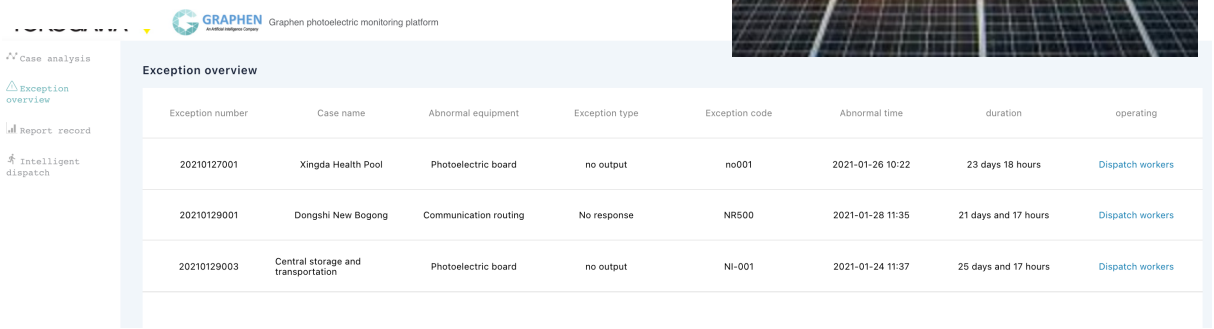
Ardi Applications – Graphen Energy

GRAPHEN
An Artificial Intelligence Company

Graphen Energy – AI Reasoning & Strategy to realize Smart Grids

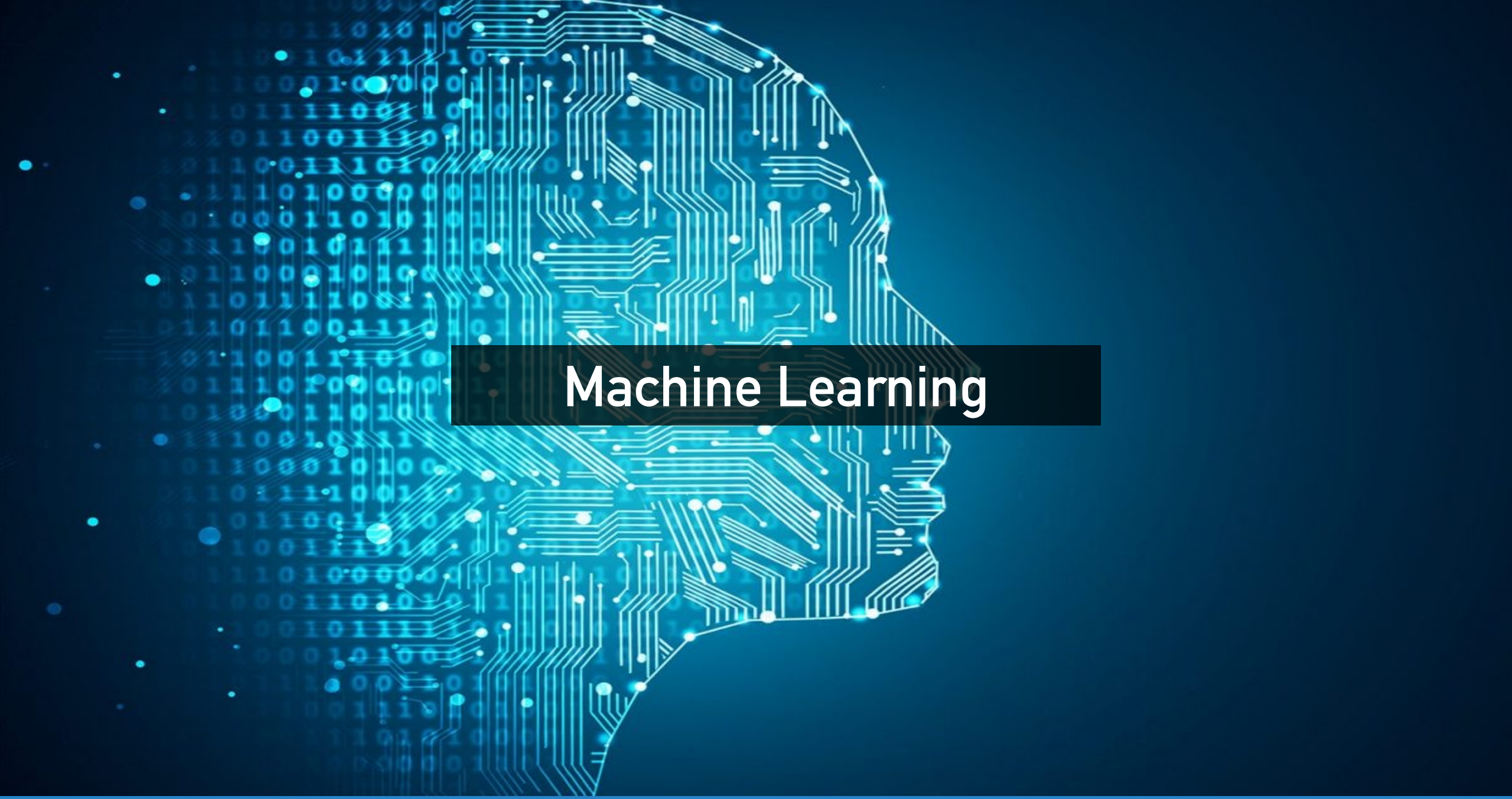
- **Renewable Energy Prediction**
- **Power System Anomaly Detection**
- Distributed Load Prediction
- Power Flow Analysis
- **Predictive Maintenance**



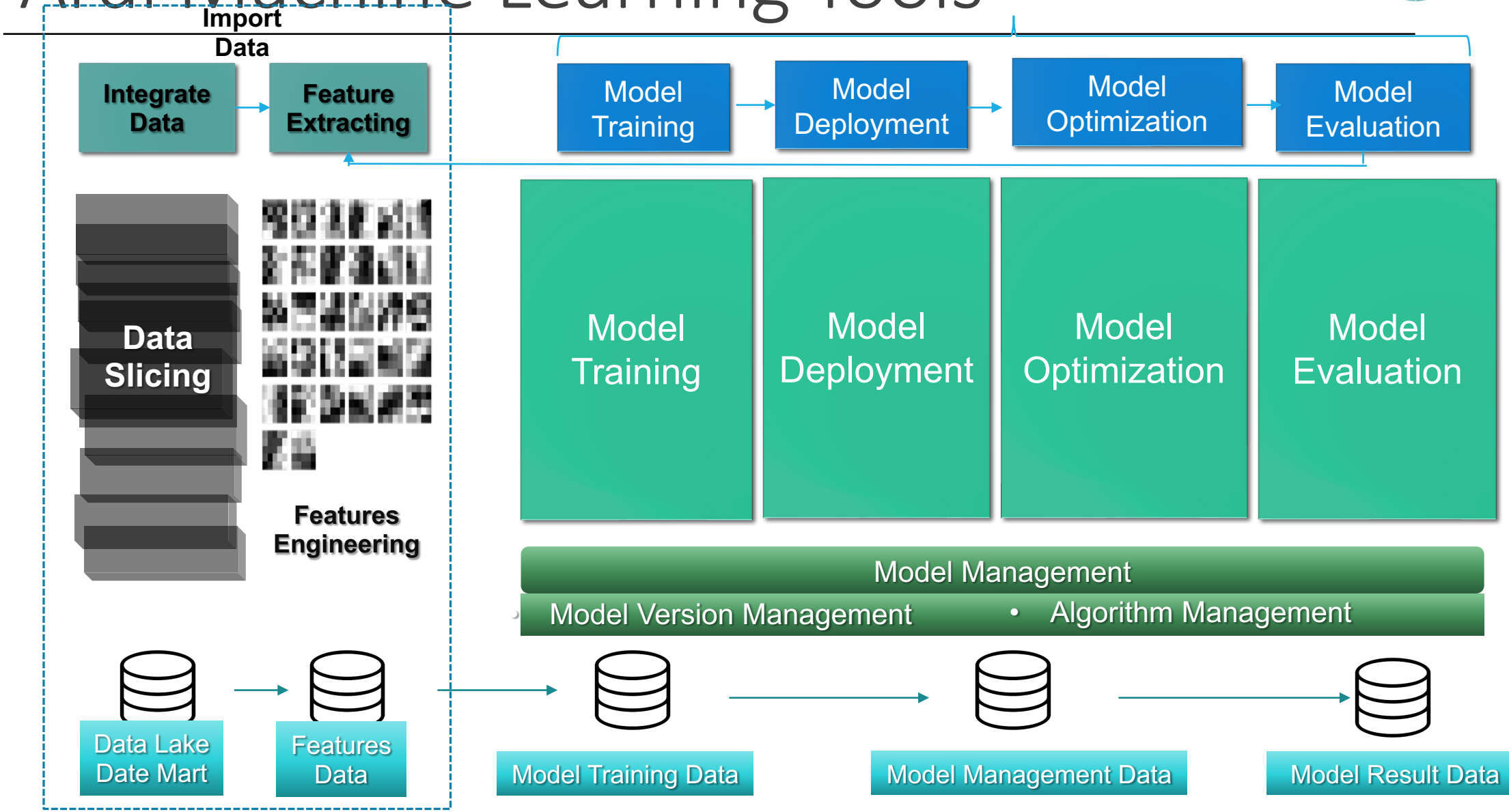


Exception number	Case name	Abnormal equipment	Exception type	Exception code	Abnormal time	duration	operating
20210127001	Xingda Health Pool	Photoelectric board	no output	no001	2021-01-26 10:22	23 days 18 hours	Dispatch workers
20210129001	Dongshi New Bogong	Communication routing	No response	NR500	2021-01-28 11:35	21 days and 17 hours	Dispatch workers
20210129003	Central storage and transportation	Photoelectric board	no output	NI-001	2021-01-24 11:37	25 days and 17 hours	Dispatch workers

Graphen Energy's live system monitors all solar power stations in Taiwan and predicts power generations. Its accuracy is around 98.5%, far better than the customer's requirement of 90%.


Machine Learning

Ardi Machine Learning Tools



Ardi ML Algorithms Support

Classification

- Support Vector Machine
- XGBoost
- LightGBM
- Random Forest
- Decision Tree

Regression

- Ordinary Linear Regression
- Ridge Regression
- Logistic Regression

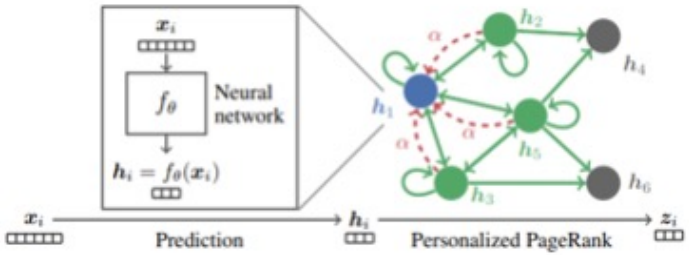
Clustering

- K-means
- Birch

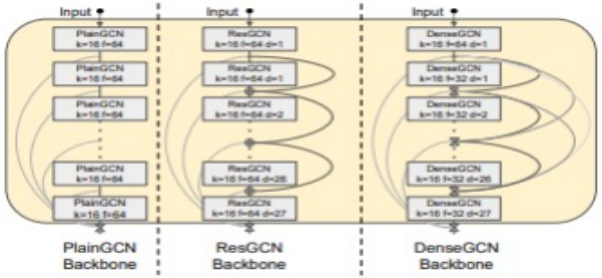
Deep Learning

- Insert/delete layers
- Recurrent Neural Network (RNN)
- Deep neural network (DNN)
- Convolutional neural network (CNN)
- Graph neural network

Principal neighborhood aggregation



Approximate personalized propagation



Deep GCN architecture

Ardi ML Modules

Model Training– Provides convenient functions such a features importing and preprocessing to model developer，user can choose machine learning model and algorithm and tune parameters flexibly

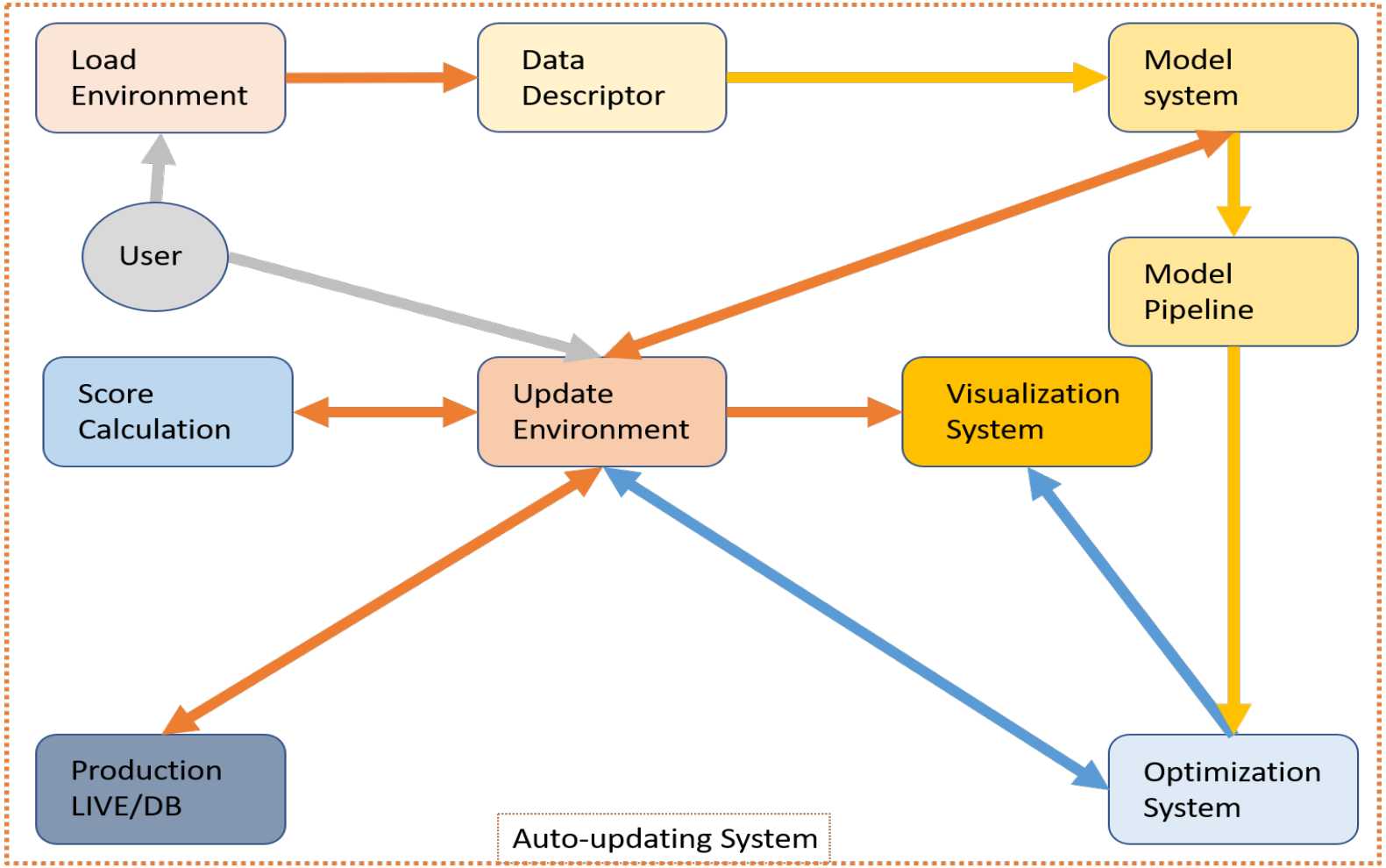
Model Deployment– Support user to set the frequency of model execution，model deployment and execution。

Model Optimization – Support users to optimize model flexibly

Model Evaluation– Support general evaluation criteria to regression and classification like accuracy and recall。

Model Management– Integrated supports of importing various features data, choosing model type, saving model, setting access right and deployment. Support importation of models trained on outer platforms. Support automatically generate version of models.

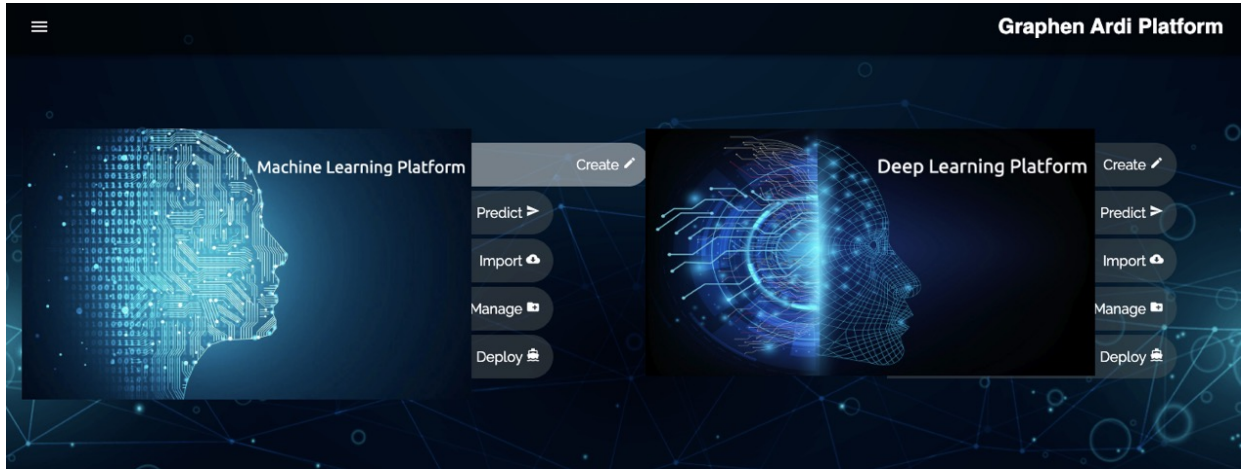
Ardi Automatic ML Optimization

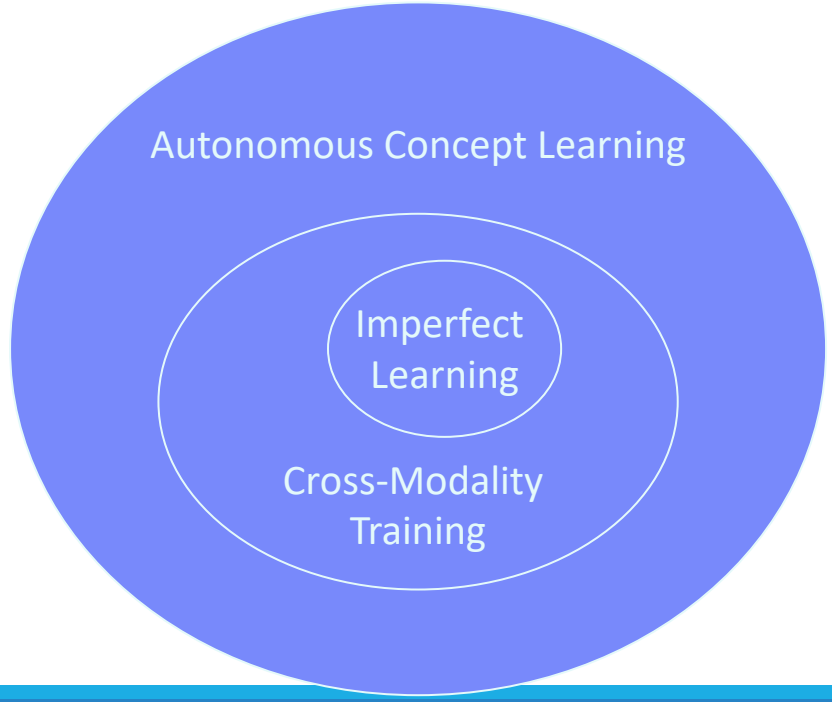


Autonomous Learning

Example: Autonomous Learning through Imperfect Training Labels

- Developed Machine Learning theories and algorithms for supervised concept learning from imperfect annotations -- imperfect learning
- Developed methodologies to obtain imperfect annotation – learning from cross-modality information or web links
- Developed algorithms and systems to generate concept models – novel generalized Multiple-Instance Learning algorithm with Uncertain Labeling Density





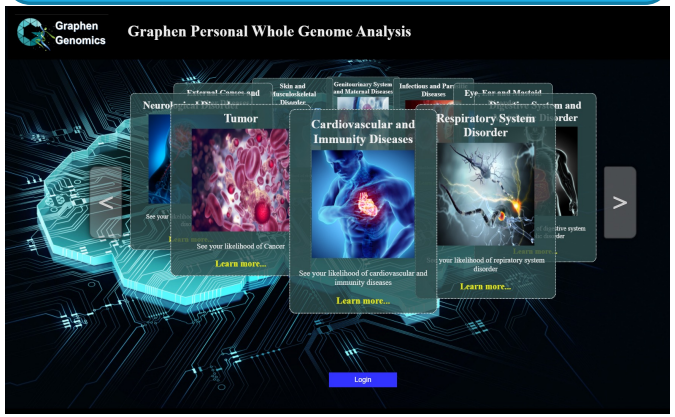
Ardi Applications – AI Medical

GRAPHEN
An Artificial Intelligence Company

Graphen Medical – AI Meets the Central Dogma of Biology

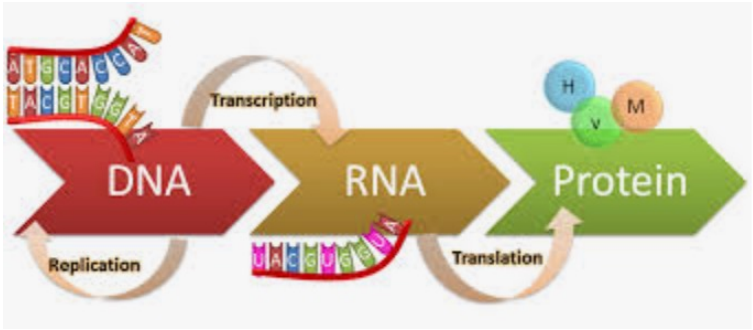
Personalized Whole Genome Disease Analysis

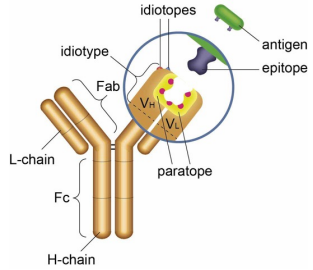
Large-Scale AI Medical Article Understanding

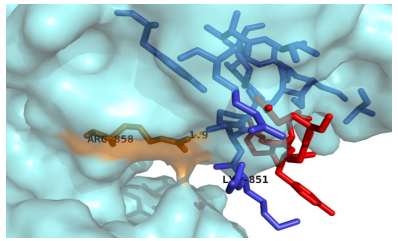


- Utilizing AI technologies to read tens of thousands of medical articles;
- Combining with Whole Genome Sequencing of 3.2B pairs of human genome;
- Predicting risks of ~400 diseases

AI Tools for Drug Development



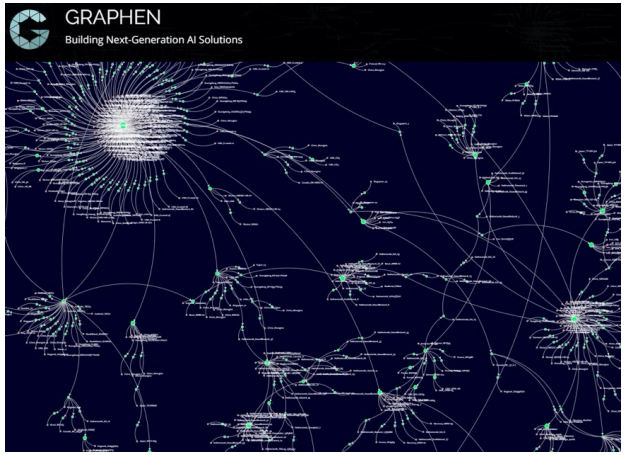




- Using AI to build Protein Structure and Function prediction models, and predict Drug Target Affinity, ADME, and Antibody/Antigen selection models

Virus Mutation Surveillance

Personalized Precision Medicine



- Strain surveillance and mutation function prediction to the detail of countries, states, and cities.
- Disease progress prediction and personalized therapy solution suggestions.

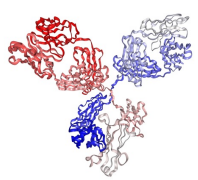
Graphen AI Tools for Drug Development

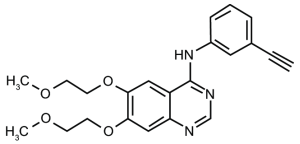
GRAPHEN
An Artificial Intelligence Company

Personal Druggable Candidates Finding 1

Well-Known Candidates 1

Candidates Preprocessing 2





Small molecular/ Biosimilar Drug Development 3

Precision Drug Development 4

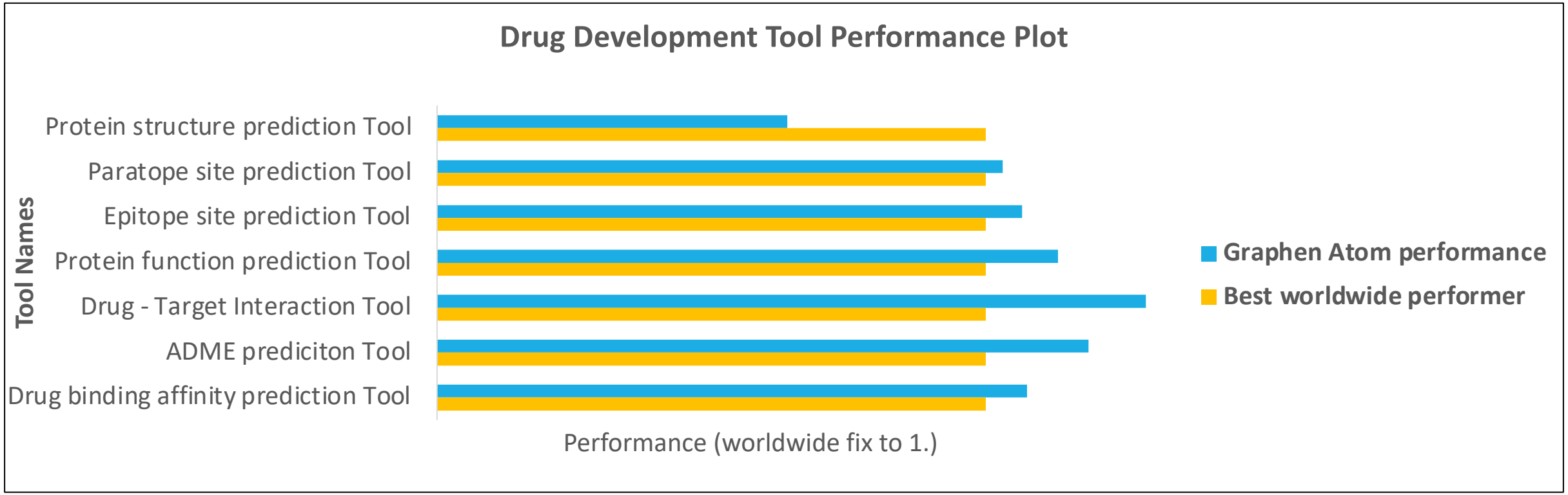
Precision Medicine

Common Drug Development

All but one Graphen Atom Drug Tools outperformed the bests in the world

Atom Protein Drug / Small Molecular Drug de novo Development Tools

- Computing requirements > 1 x Nvidia V-100 GPU (32 GB)
- Only comparing our tools when there are other tools to compare in the literature
- Graphen Atom (AI tools for Medicine) outperforms known best worldwide performers in all tools except the protein structure prediction Tool (by Google DeepMind).




Strategy

What-If Assessment

GRAPHEN
An Artificial Intelligence Company

Holistic Approaches

- To analyze the customer's behavior vs. control groups:
  - Evaluate customer risk via analysis of customer behavior and relationship changes
  - Discrepancies with self or peer group behavior within the same industry
  - Detect anomalous transaction behavior, including frequency and suspicious counterparties

Machine Learning Solutions

- Time Series Analyses
- Graph Analysis
- Supervised Machine Learning:
  - Regression, Clustering, etc.
- Unsupervised Machine Learning:
  - Clustering, Local Outlier Factorization, etc.

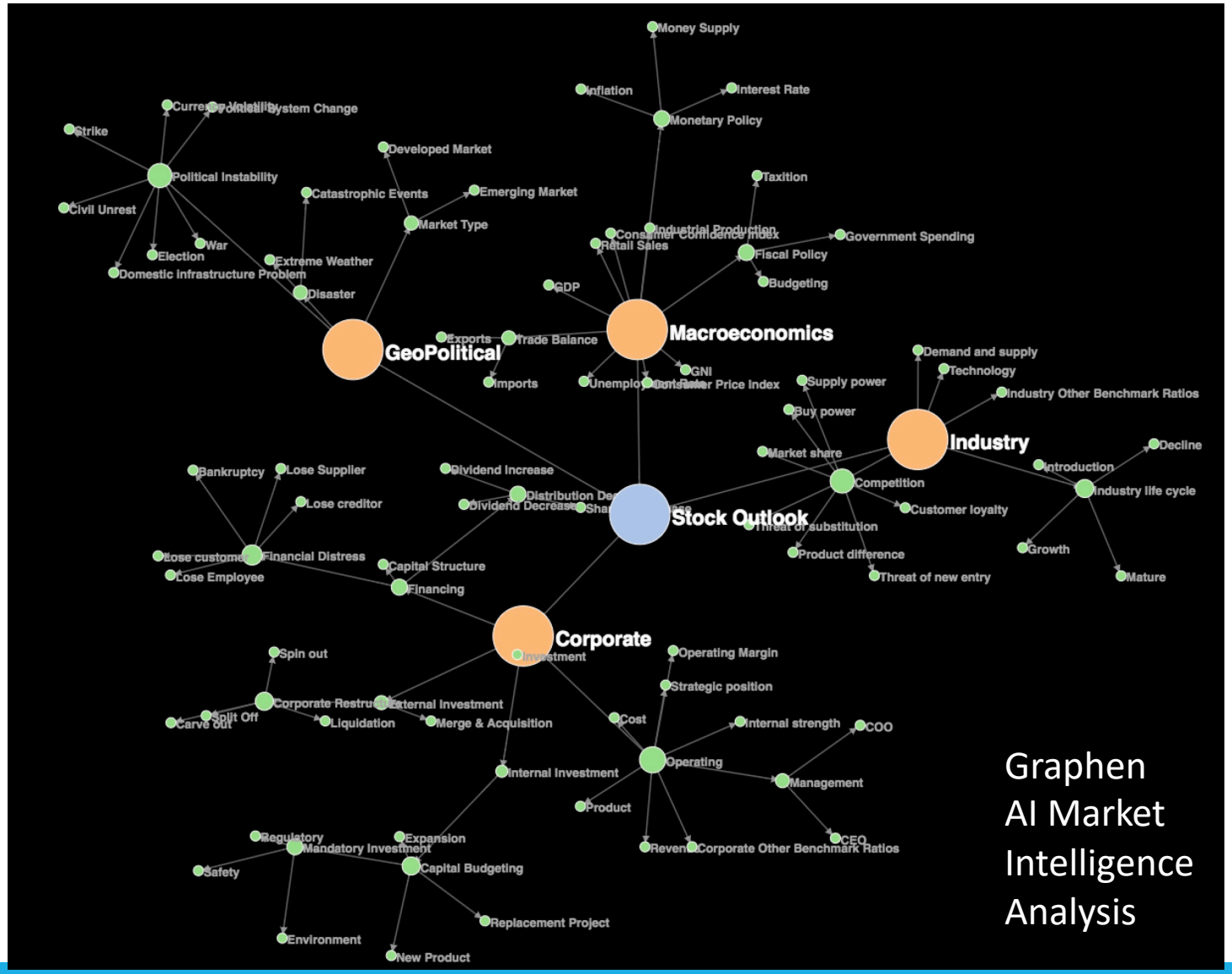
Underwriting criteria:

Pricing	Per CRE pric
Min. DSCR	**1.25X 1.x** ba appraiser's p
Stress test: current + 2%, 25-yr	**1.0X** Cash flow, i.e increasing op
Operating expenses	Based on the historical per expenses
Tenant estoppels	Per loan poli
Auto payment debit	Yes – per CR

AI-powered risk scoring with continuous application monitoring

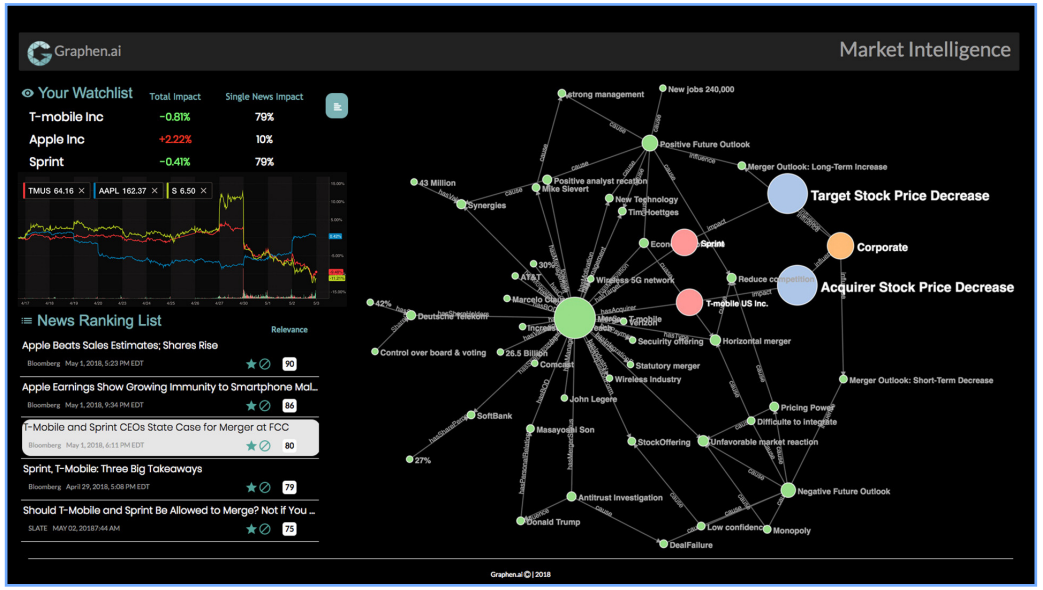
Scoring on various scenarios of stress tests and what-if conditions, assign predictions on incomplete fields, scores update as new info discovered or provided.

Example: Market Intelligence

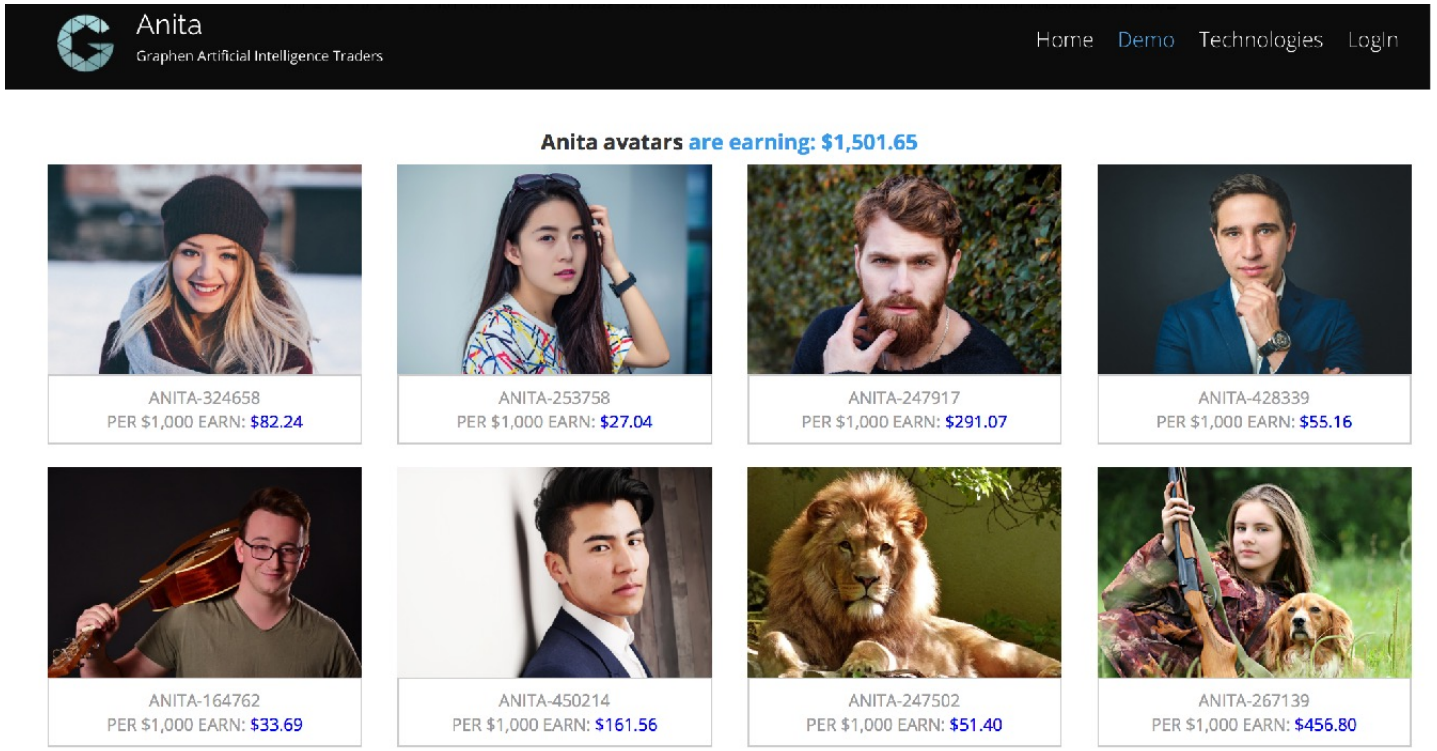


Graphen AI Market Intelligence Analysis

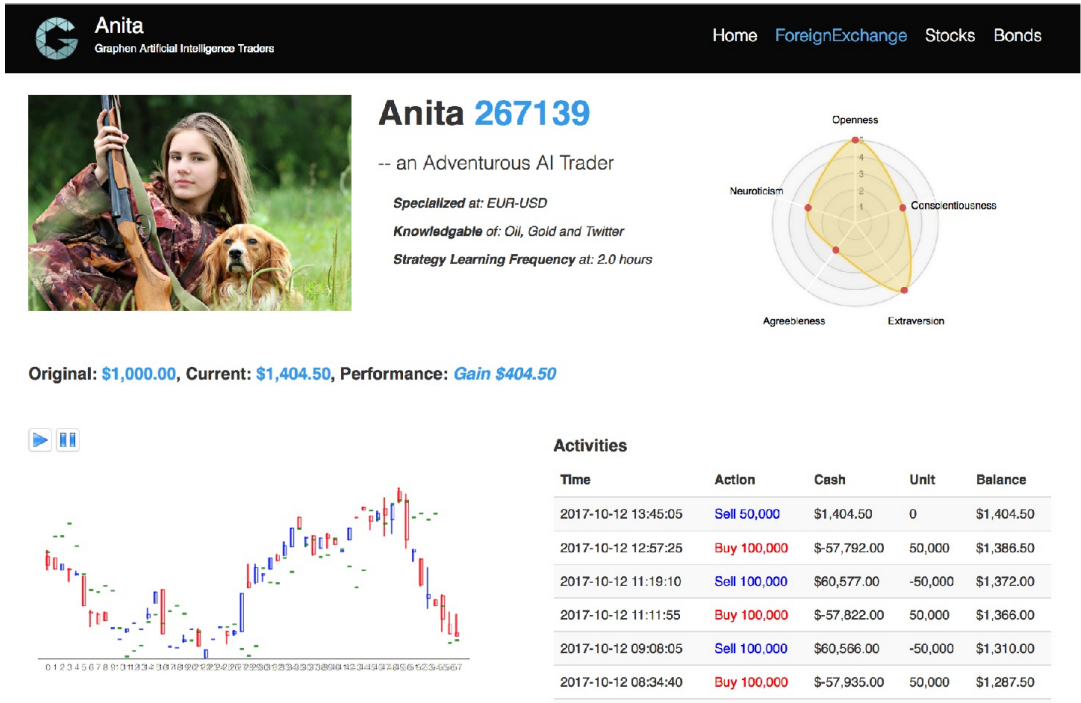
- Construct Factors that impact company's performance
- Construct the Influence Knowledge Graphs that interconnect between companies
- Simulate What-If Scenarios



Example: AI Trader



- Avatars with different trading strategy
- Simulate personalities



Explanation

Graphen AI Explainer

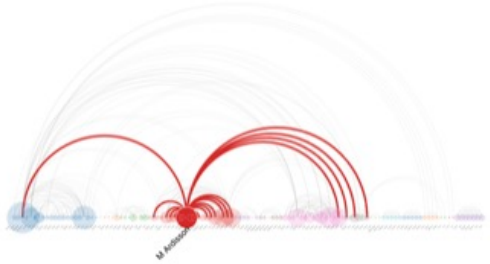
GRAPHEN
An Artificial Intelligence Company

- Local interpretable model-agnostic explanations
- Approximates the model to closest linear model at a local level
- Takes a point and generates several point in vicinity
- Generates a linear model based on result of above points
- Calculates the weightage of each input feature

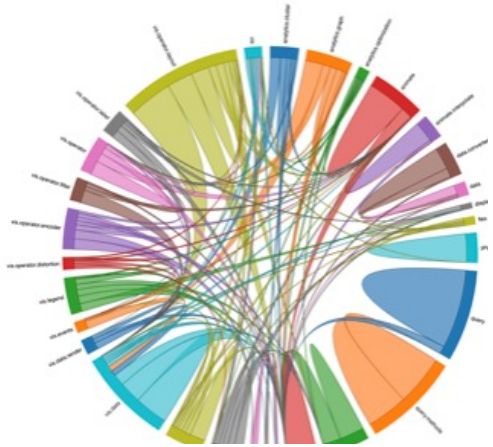
Graphen Visualization Tools

GRAPHEN
An Artificial Intelligence Company

Arc Diagram Hover:

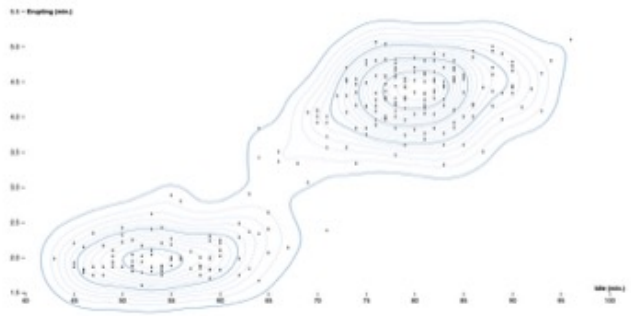


Chord Dependency Static:



Tree Map Static:

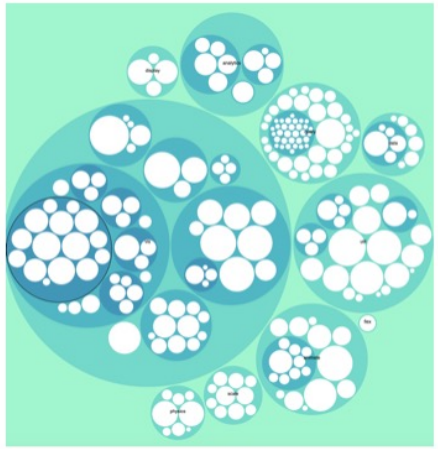
Density Contours Static:



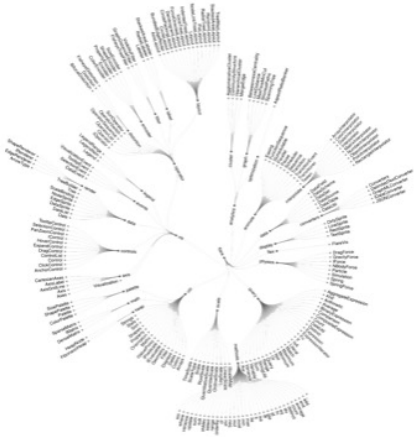
- 30+ different types of graphics

Sunburst Zoomable:

Circle Packing Zoomable:

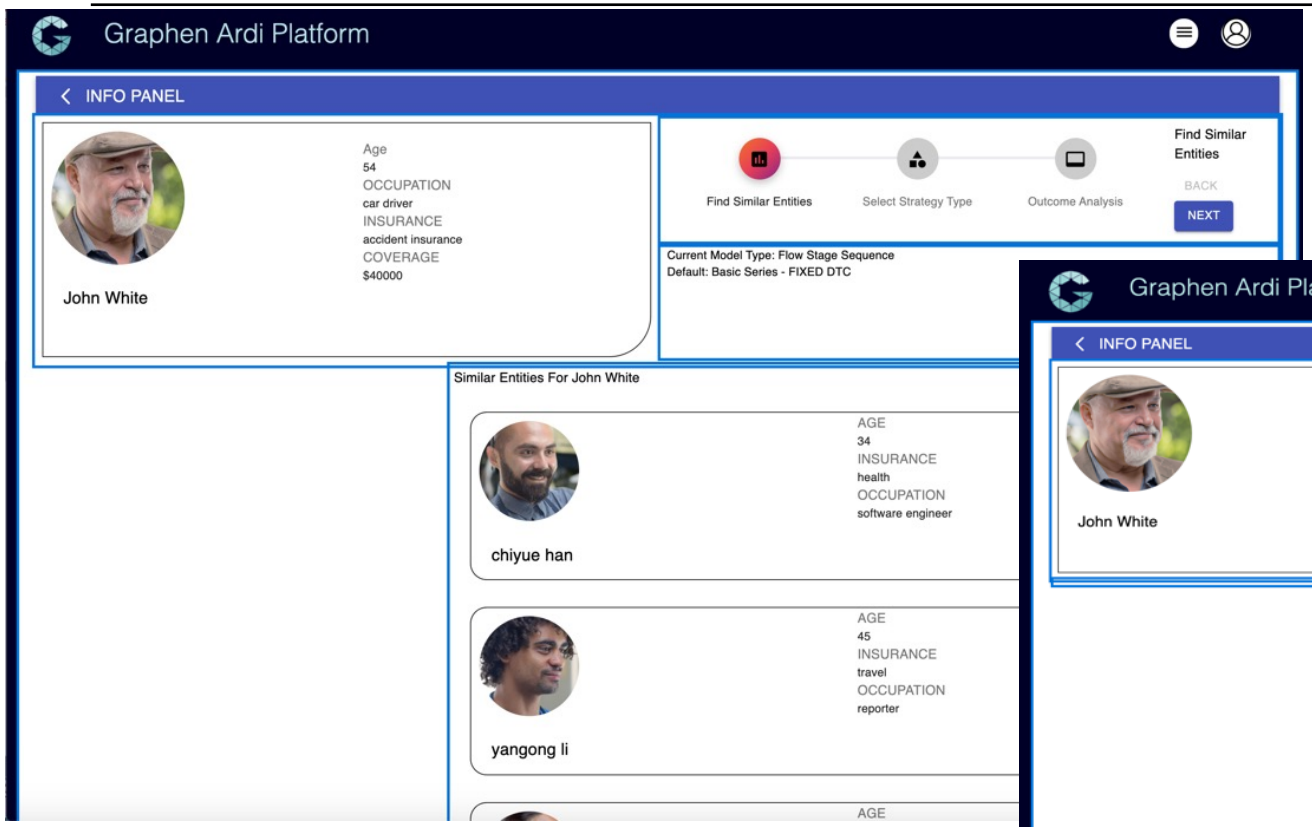


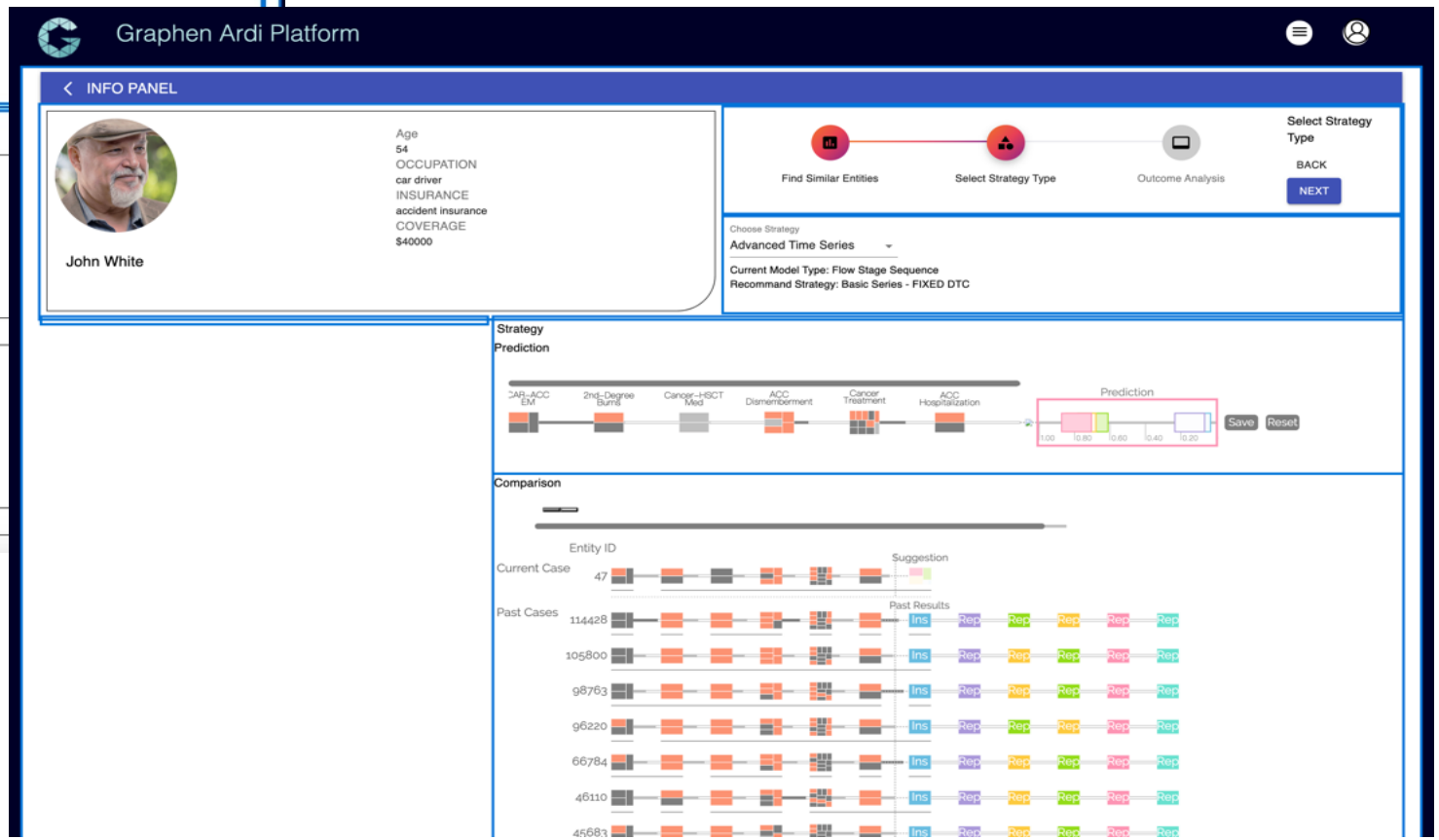
Radial Tidy Tree Static:



Worldmap with Tracing Bar Dynamic:

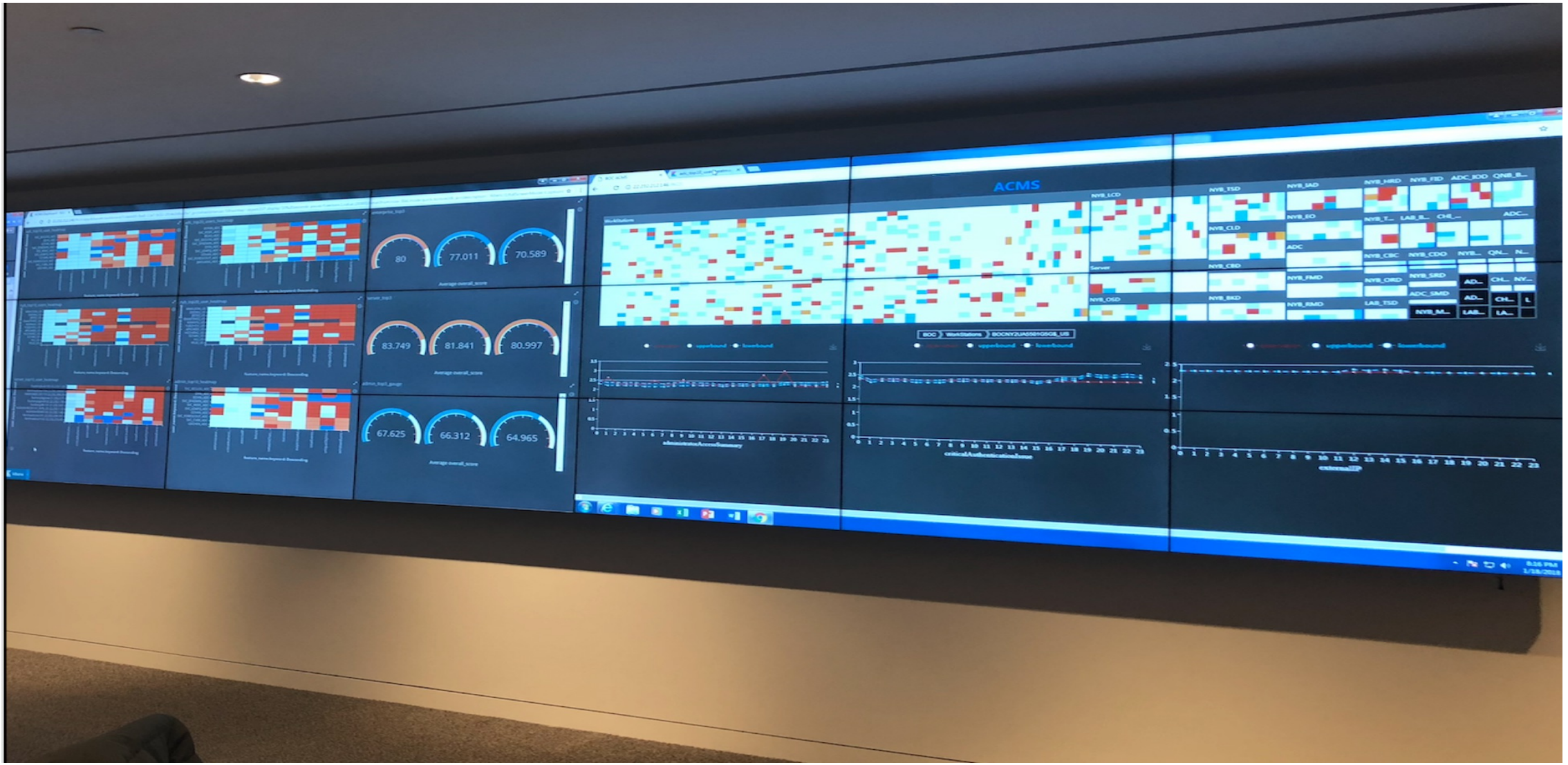
Ardi Explanation – Health Monitoring

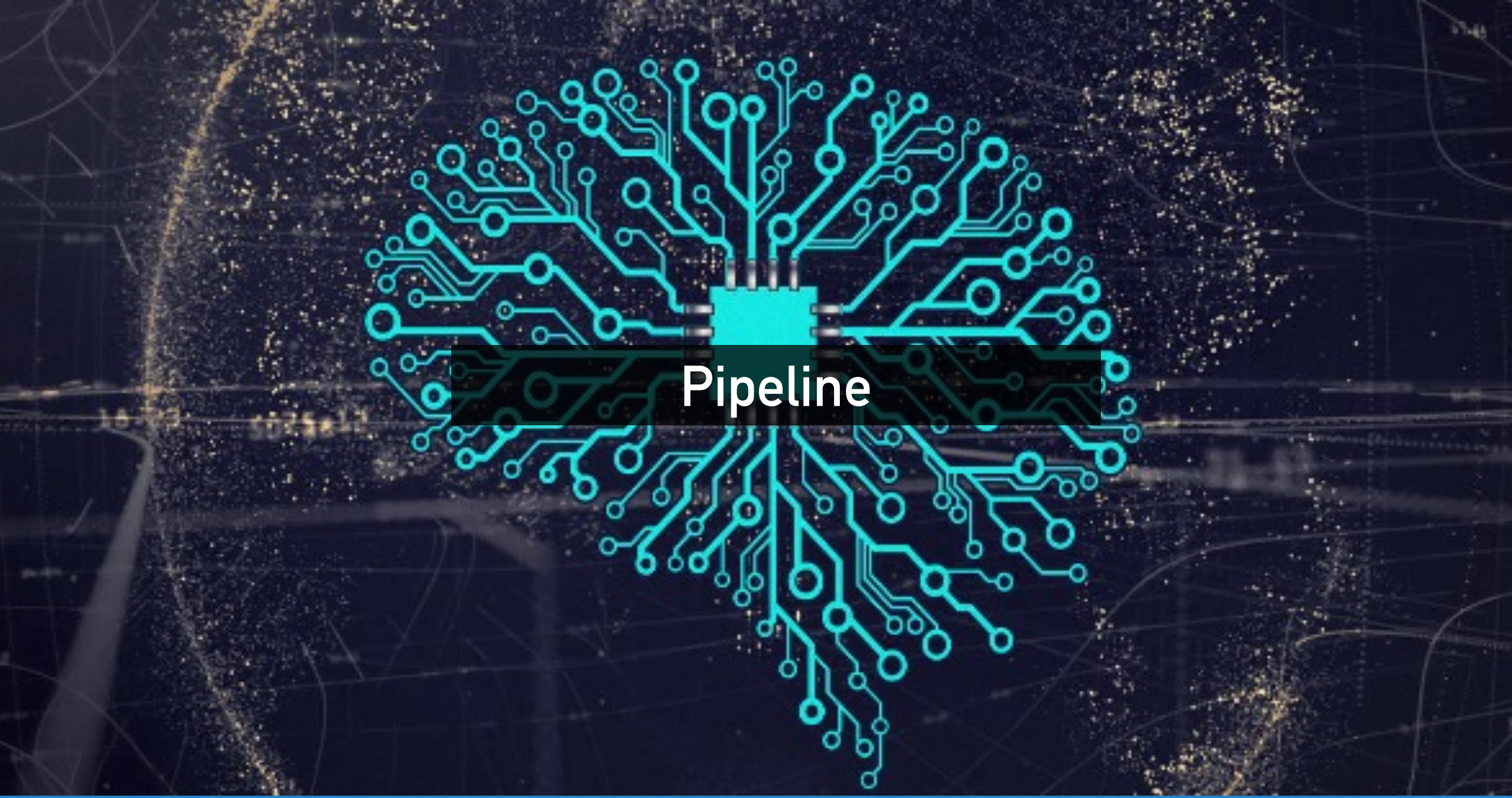




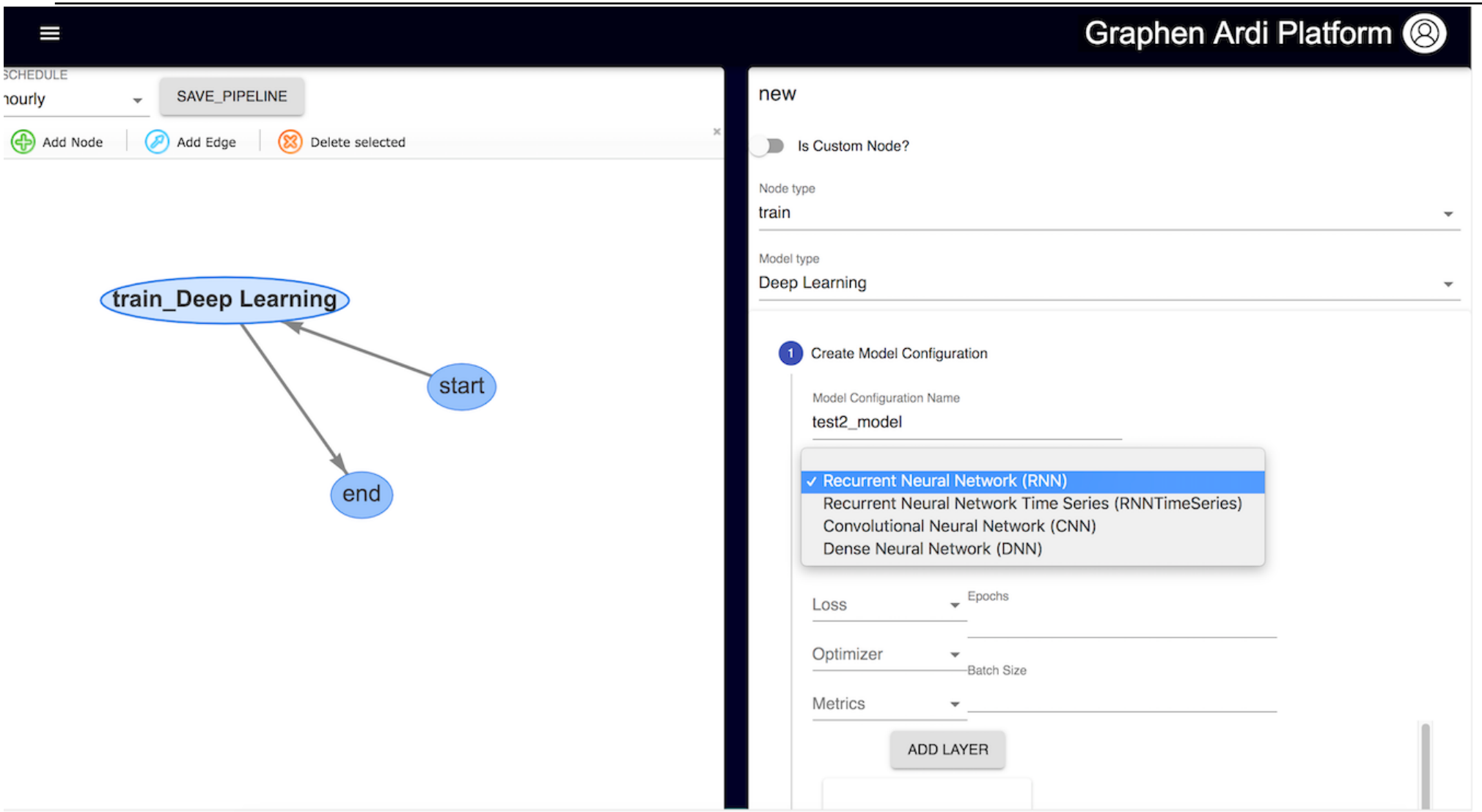
Example: Core-Banking Monitoring Center

GRAPHEN
An Artificial Intelligence Company



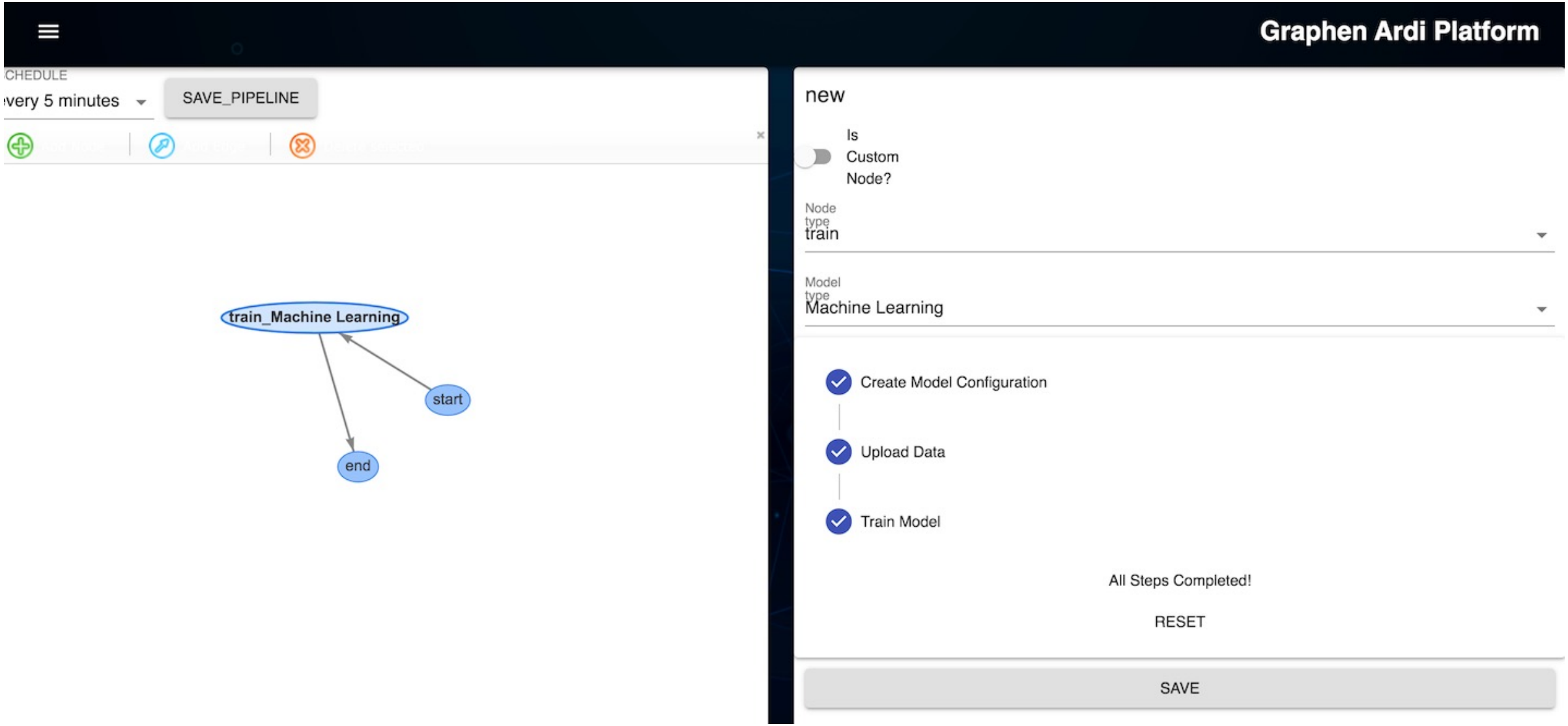

Pipeline

Ardi Pipeline Tools

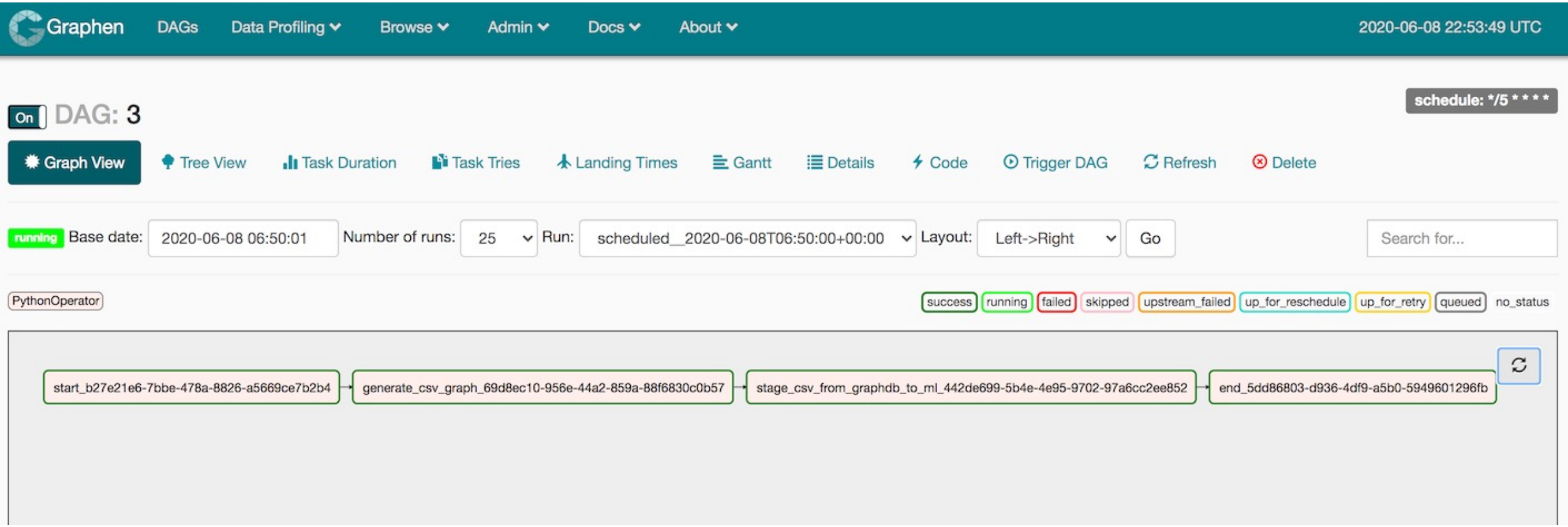


- Scheduling tasks
- Cascading task steps
- Publish for production applications
- Monitoring status of steps

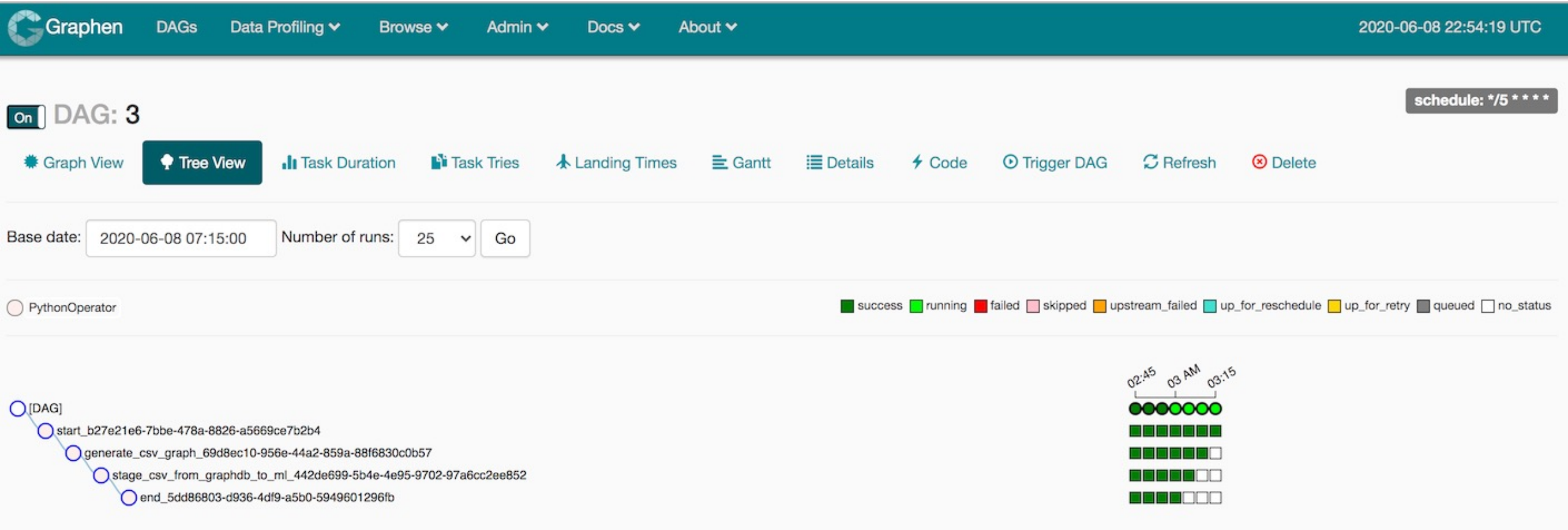
Ardi Pipeline Tools



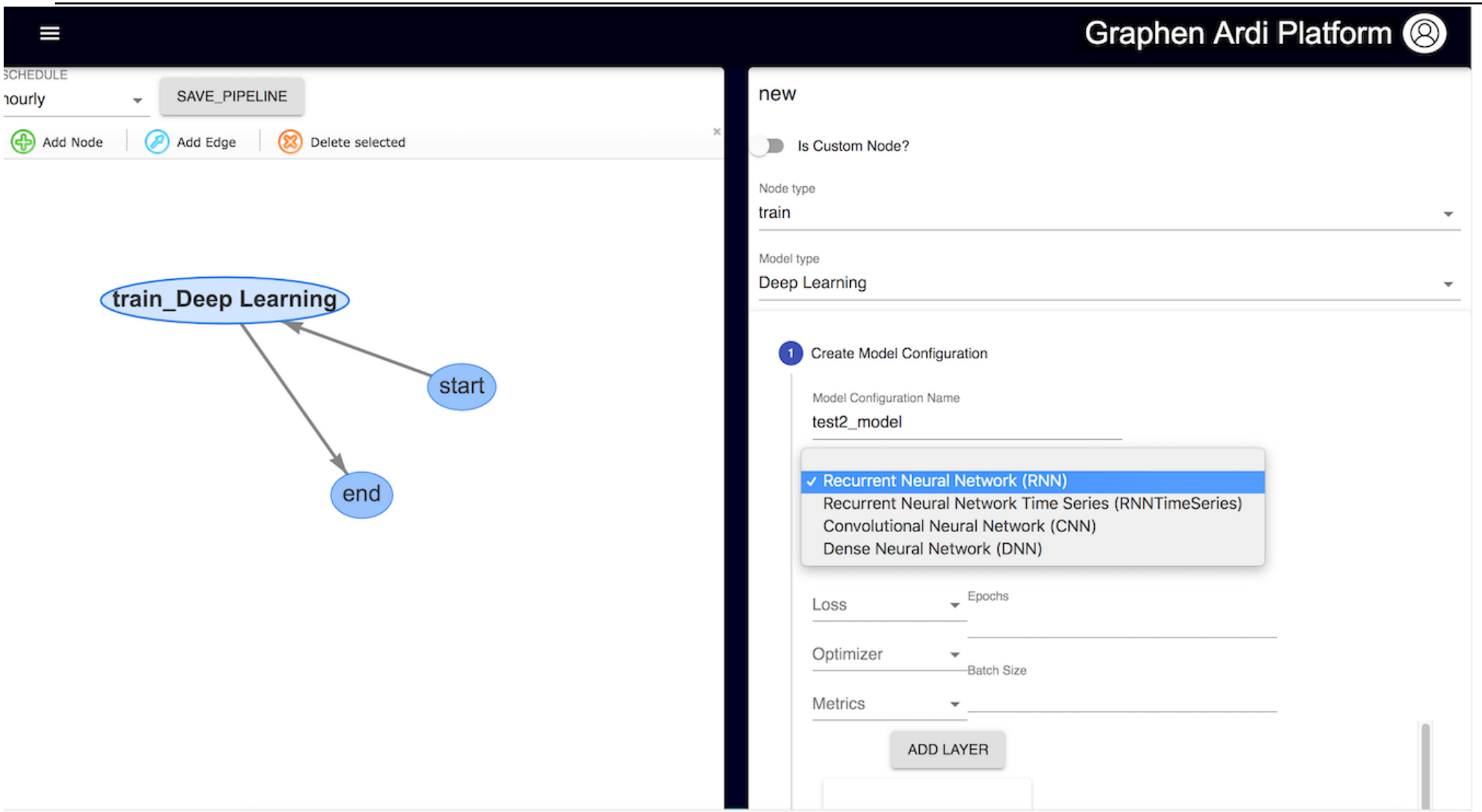
Ardi Pipeline Tools



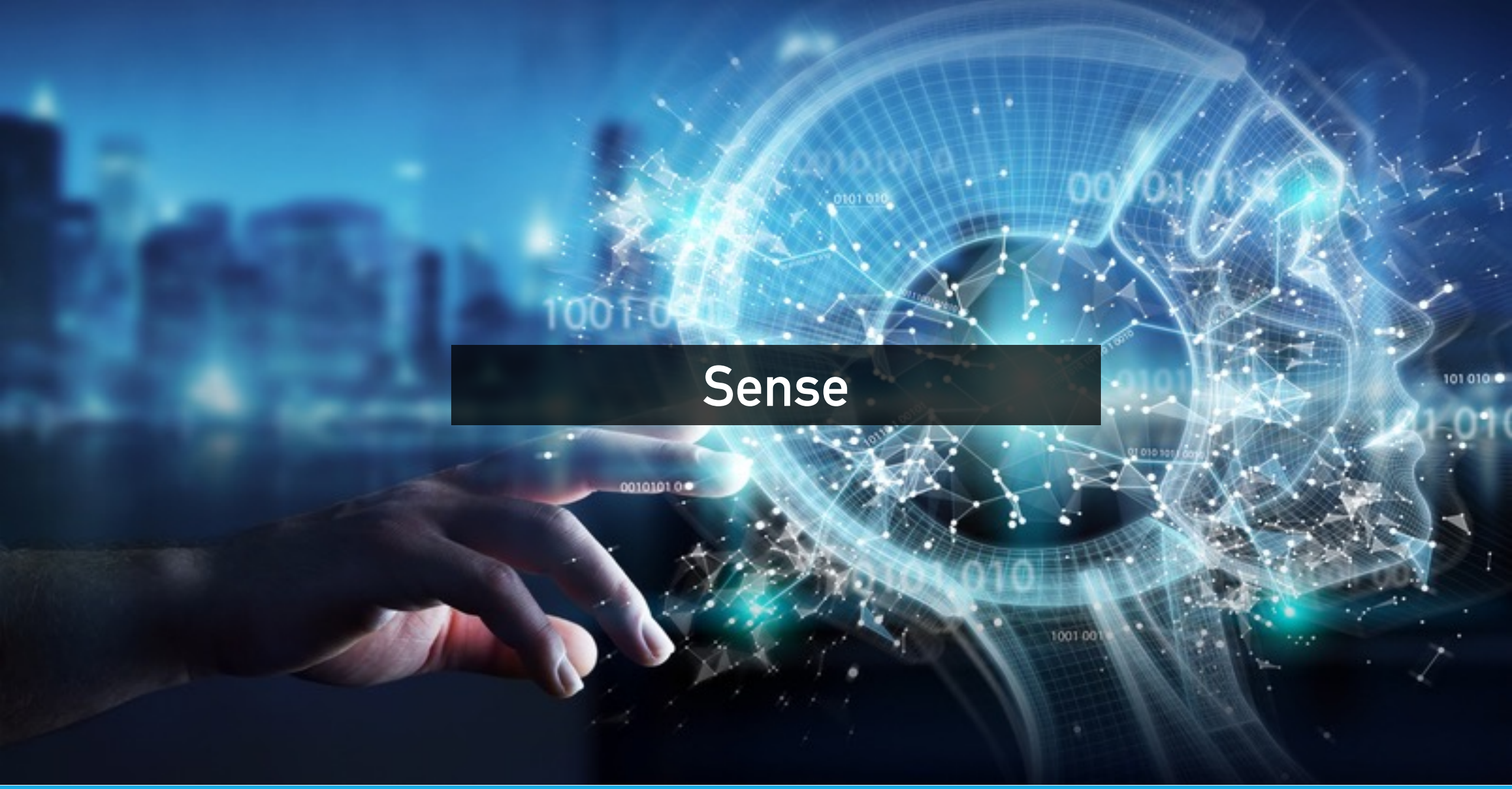
Ardi Pipeline Tools



Ardi Pipeline Tools

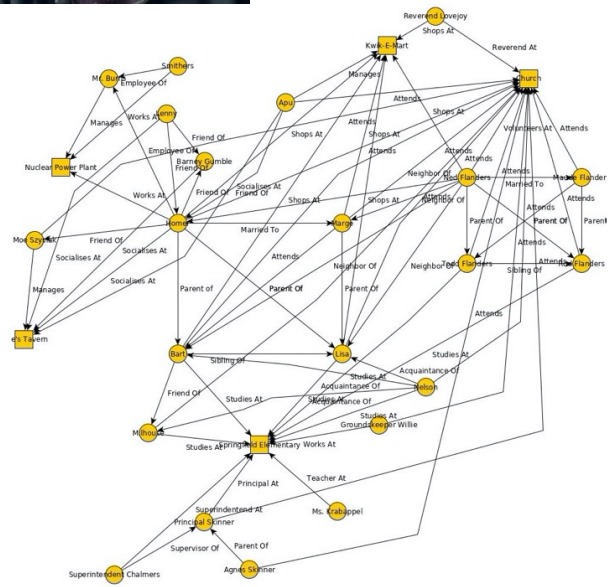


- Scheduling tasks
- Cascading task steps
- Publish for production applications
- Monitoring status of steps


Sense

Ardi Sense

Deep Video Understanding + Natural Language Understanding



Graphen's Ardi Sense achieves Deep Video Understanding in the ACM Multimedia 2020-2022 Grand Challenge (2nd place in 2020, 1st place in 2021 and 2022):

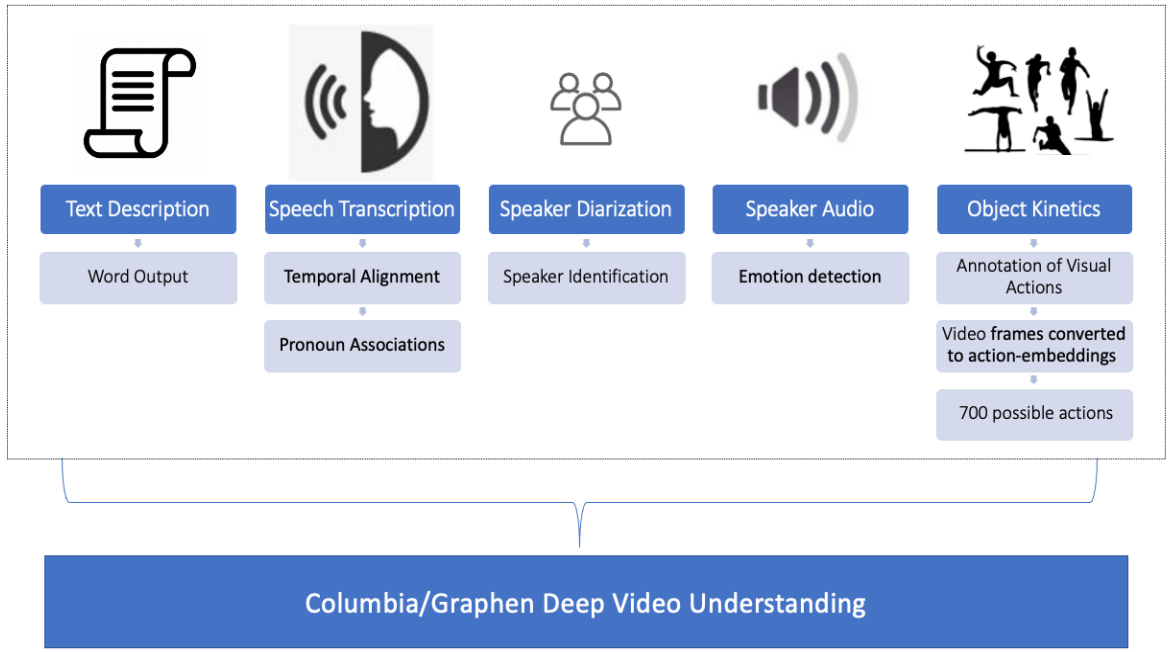
- Visual Recognition
- Speech Recognition
- Knowledge Graph
- Face Recognition
- Emotion Recognition
- Speaker Identification
- Relationship Inference
- Event and Action Understanding

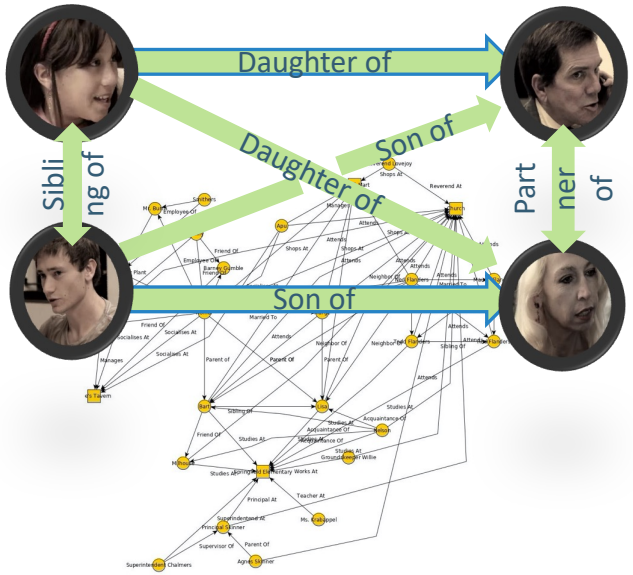
Ardi Sense's Natural Language Understanding:

- Understand unstructured text within context
- Reading Medical Articles -> summarization & Q&A
- Reading Financial Information and Market Info

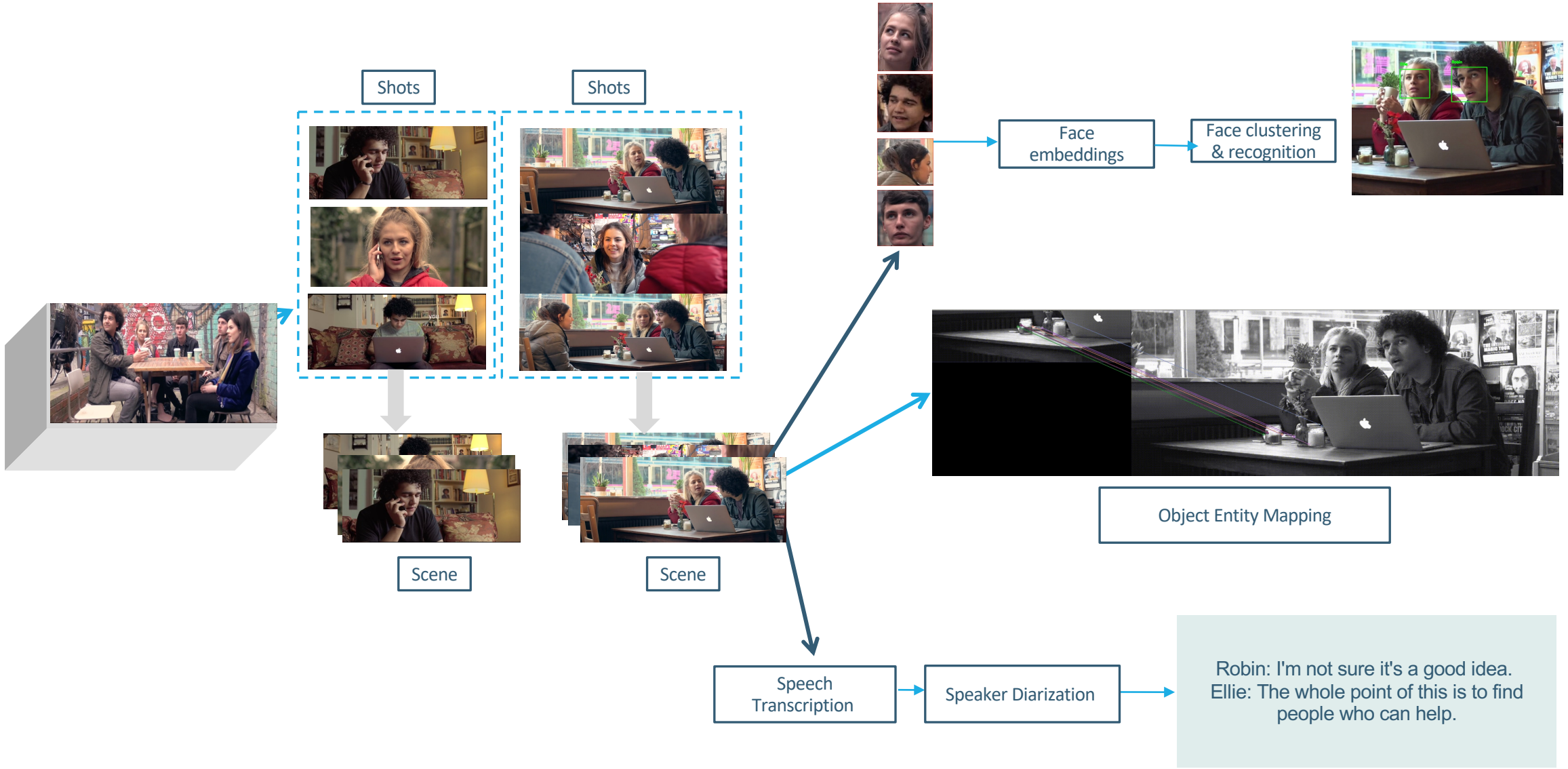
Graphen Ardi Sense

- Visual Recognition
- Speech Recognition
- Knowledge Graph
- Face Recognition
- Emotion Recognition
- Speaker Identification
- Relationship Inference
- Event and Action Understanding

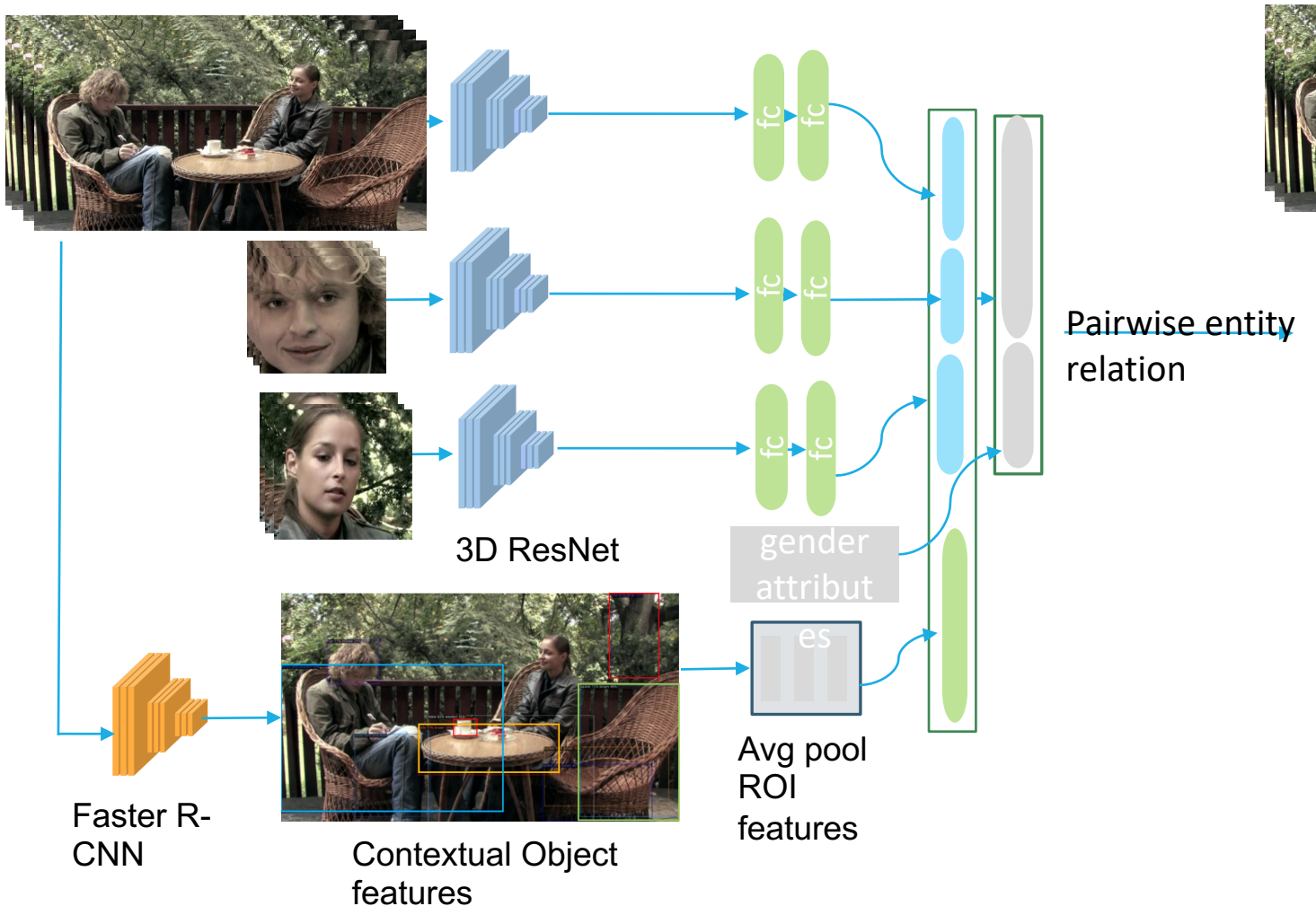


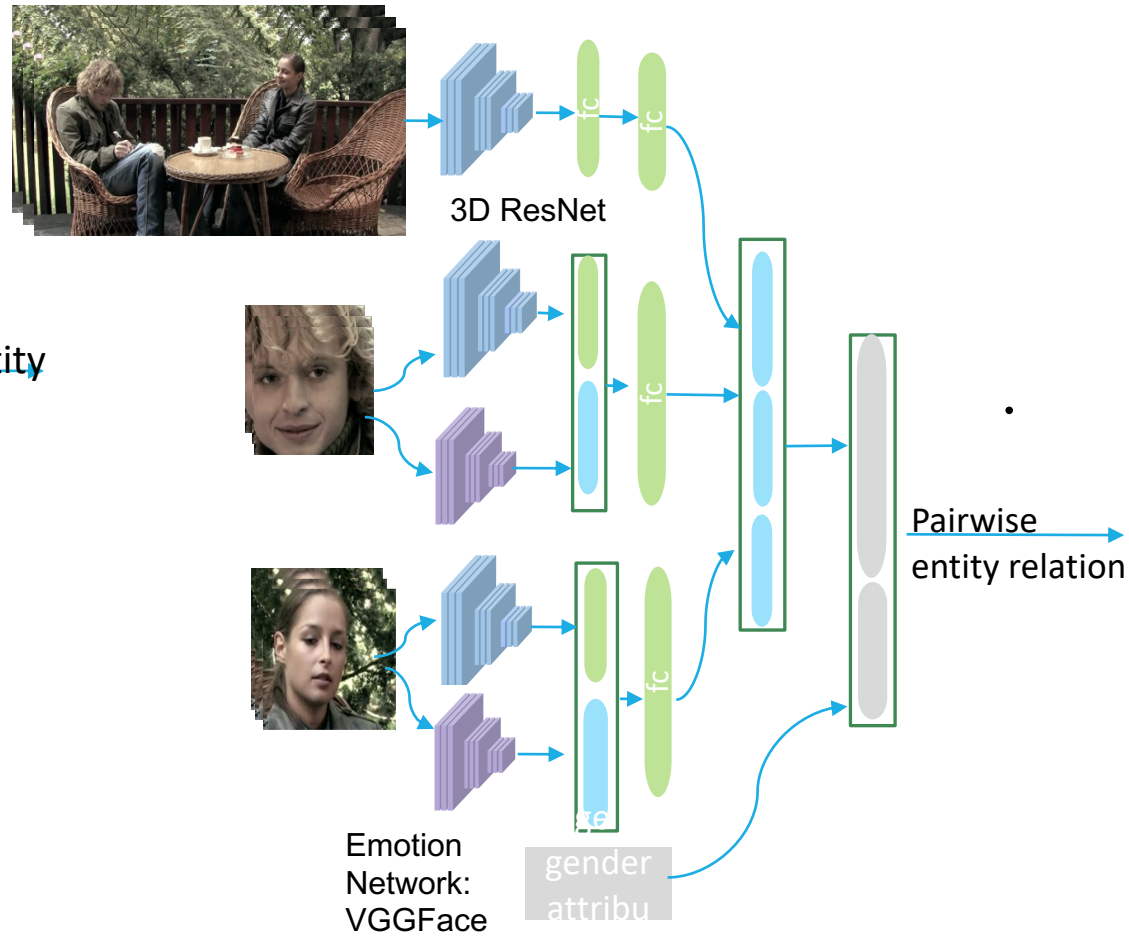


Graphen Ardi Sense – Entity Identification and Relationship & Event Understanding



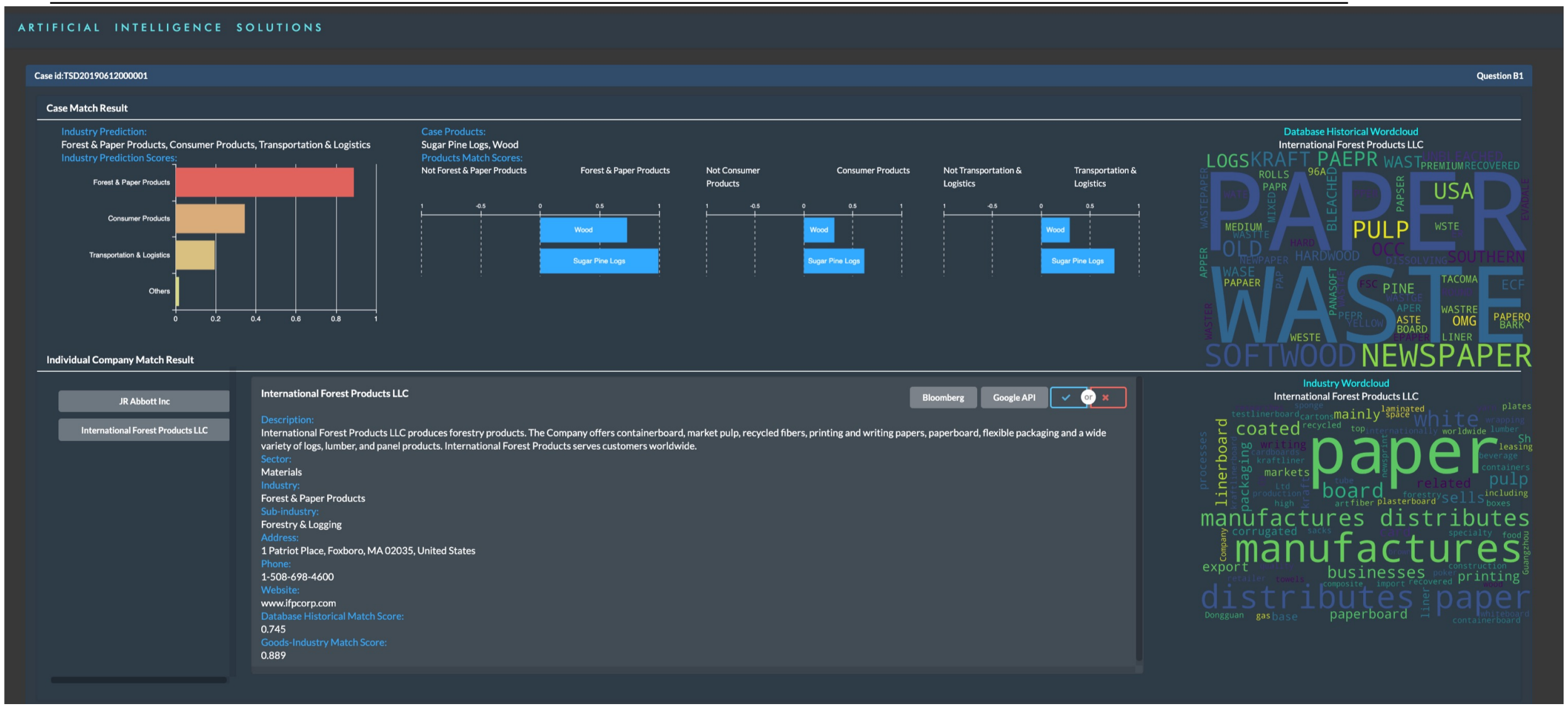
Graphen Ardi Sense – People Kinetics, Contextual Objects and Emotions





Example: Negative News

Example: Company Due Diligence



Graphen Personal Whole Genome Analysis

Skin and Musculoskeletal Disorder

Genitourinary Sys and Maternal Dise

Infectious and Parasitic

Eye, Ear and Mastoid

Cardiovascular and Immunity Diseases

See your likelihood of cardiovascular and immunity diseases

Learn more...

Respiratory System Disorder

See your likelihood of repiratory system disorder

Learn more...

Digestive System and Metabolic Disorder

See your likelihood of digestive system and metabolic disorder

Learn more...

Welcome, Ching-Yung!

Sign Out

Graphen Whole Genome Analysis

Do you want to know yourself? What does your blueprint say about you? Graphen Personal Whole Genome Analytics System analyzes your entire 6.4B genome. It provides your risk likehood of 350+ diseases in 10 major categories:

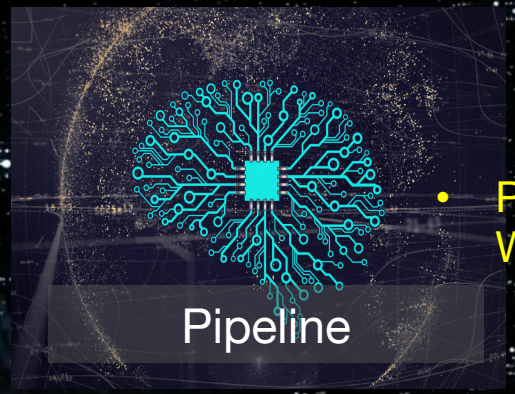
- **Tumor**
- **Cardiovascular and Immunity Diseases**
- **Respiratory System Disorder**
- **Digestive System and Metabolic Disorder**
- **Eye, Ear and Mastoid Disorder**
- **Infectious and Parasitic Diseases**
- **Genitourinary System and Maternal Diseases**
- **Skin and Musculoskeletal Disorder**
- **Neurological Disorder**
- **External Causes and Other Diseases**

Ardi Functions Recap

- Graph Analytics
- Feature Engineering

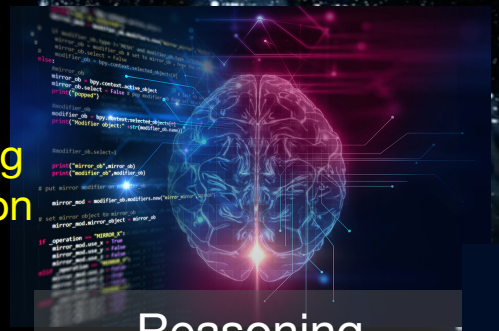
- Graph Database
- Relational Database

- Machine Learning
- Deep Learning
- Autonomous Model Optimization



- Production Workflow

- Causality Modeling
- Behavior Prediction



Visualization
ML Explanations

- Natural Language Processing
- Deep Video Understanding

- Action Strategy Simulation

Ardi AI Platform

Summary

A suite of AI powered offerings from foundational platform to industry applications

AI Foundation | Full-Brain Platform

AI Finance | Risk, Fraud, ESG & Intelligence

AI Medical | Knowledge, Drugs & Precision

AI Automobile | Car Doctor

AI Energy | Clean Energy & Smart Grid

GRAPHEN

www.graphen.ai

Advancing AI for Well-Being of the Mankind