



AI PLATFORM INTRODUCTION - II

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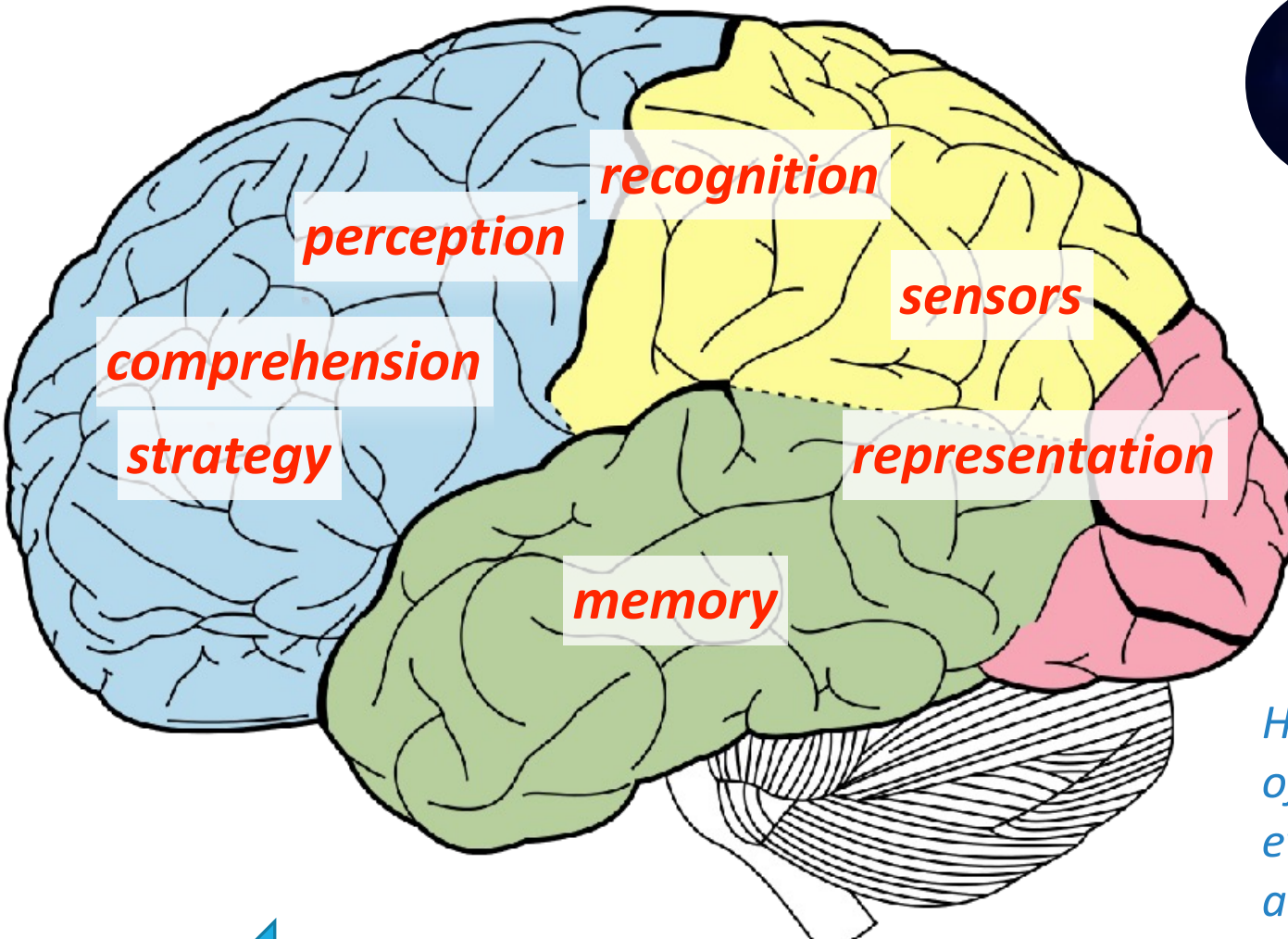


Ardi AI Platform

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

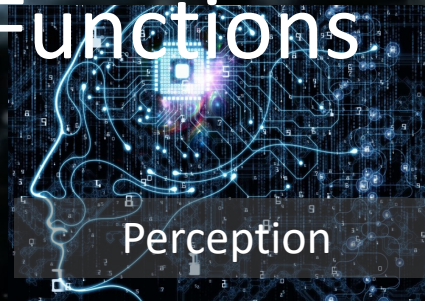


Memory

- Causality Modeling
- Behavior Prediction

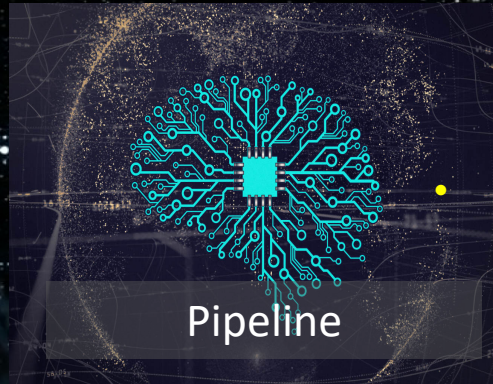


Reasoning



Perception

- Graph Analytics
- Feature Engineering



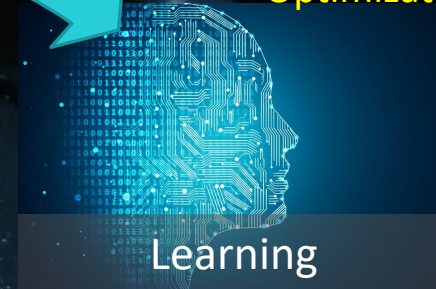
Pipeline

- Production Workflow



Expression

- Visualization
- ML Explanations



Learning

- Machine Learning
- Deep Learning
- Autonomous Model Optimization



Understanding

- Natural Language Processing
- Deep Video Understanding



Strategy

- Action Strategy Simulation



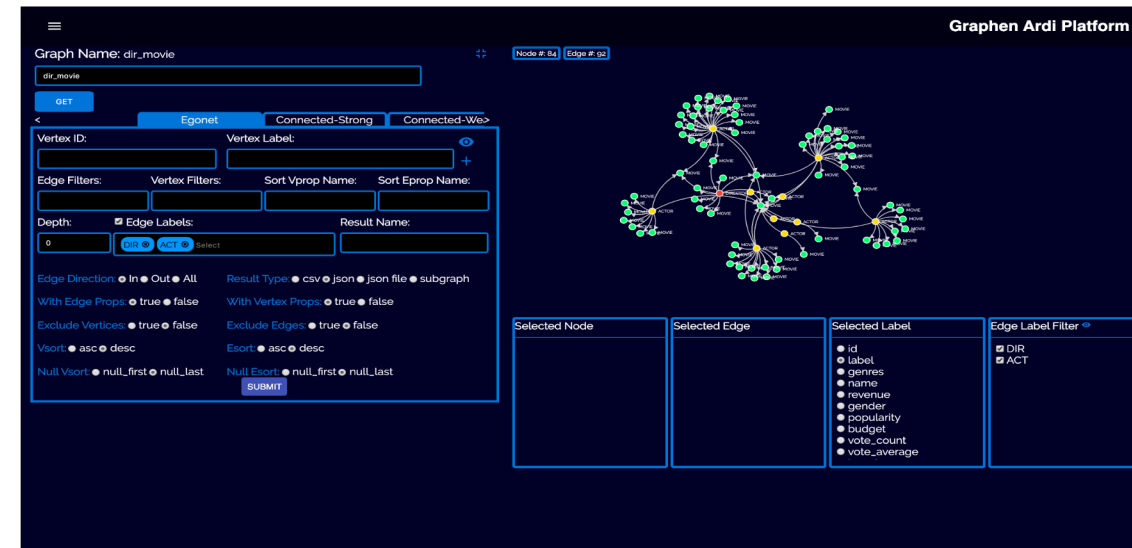
Ardi AI Platform



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



The screenshot displays the Graphen Ardi Platform interface for a graph analysis tool. The main window shows a graph visualization with nodes and edges. The interface includes a control panel on the left with the following fields and options:

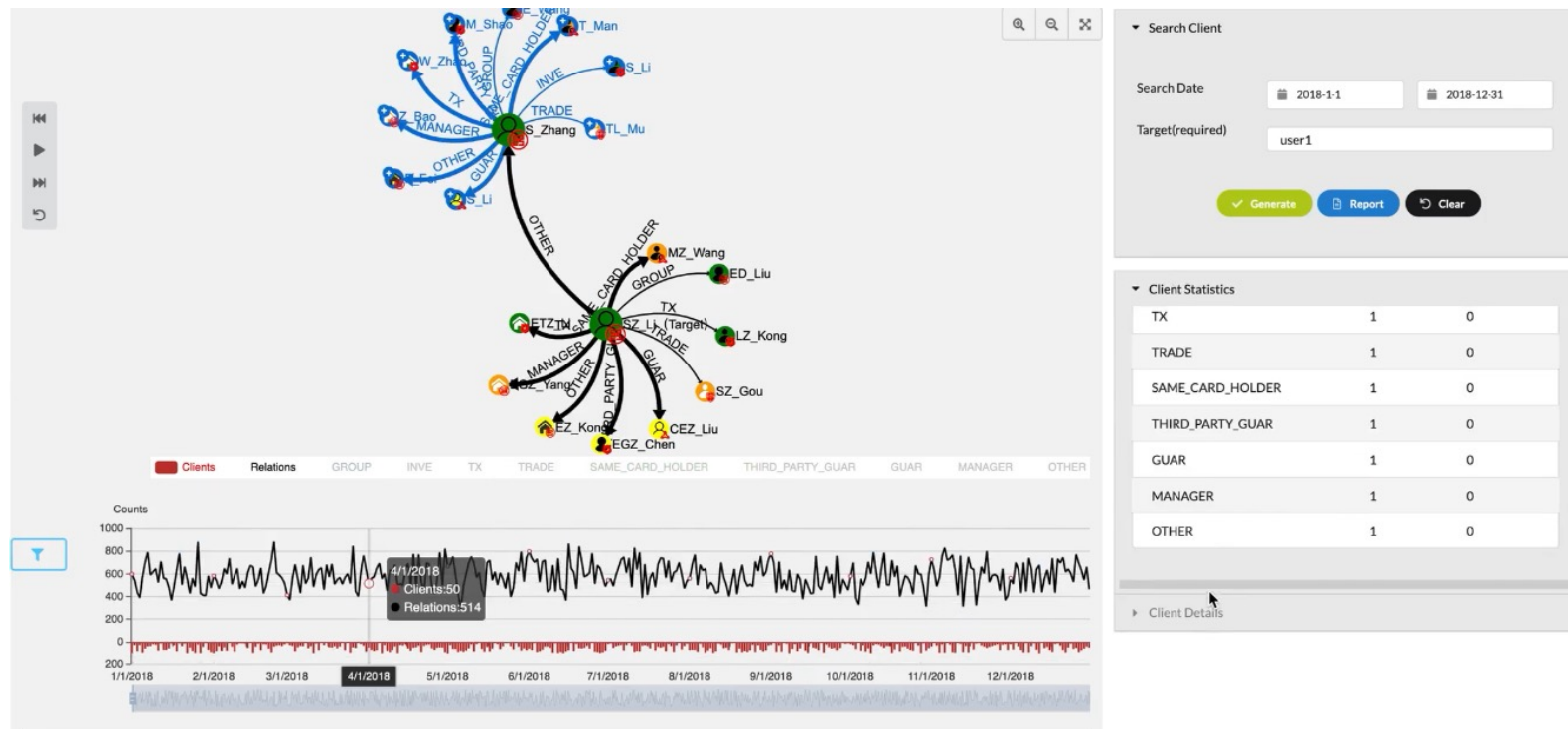
- Graph Name: dir_movie
- GET button
- Navigation: < Egonet Connected-Strong Connected-We >
- Vertex ID: [input field]
- Vertex Label: [input field]
- Edge Filters: [input field]
- Vertex Filters: [input field]
- Sort Vprop Name: [input field]
- Sort Eprop Name: [input field]
- Depth: [input field]
- Edge Labels: DIR ACT
- Result Name: [input field]
- Edge Direction: In Out All
- Result Type: csv json json file subgraph
- With Edge Props: true false
- With Vertex Props: true false
- Exclude Vertices: true false
- Exclude Edges: true false
- Vsort: asc desc
- Esort: asc desc
- Null Vsort: null_first null_last
- Null Esort: null_first null_last
- SUBMIT button

At the bottom, there are four panels for data selection:

- Selected Node
- Selected Edge
- Selected Label: id label genres name revenue gender popularity budget vote_count vote_average
- Edge Label Filter: DIR ACT

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%**.

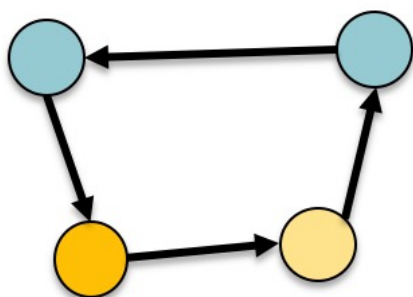


Relationship Generation for NPL

	Basic Elements	Implicit Relations
Investors & Shareholders	Investment <ul style="list-style-type: none"> • Majority Shareholder • Top Non-controlling Shareholder Executives <ul style="list-style-type: none"> • Corporate Representatives/Other Executives Other <ul style="list-style-type: none"> • Relatives/Spouse/Non-Spouse 	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • Inferred Relationship by Credit Card • Same Address/Phone number

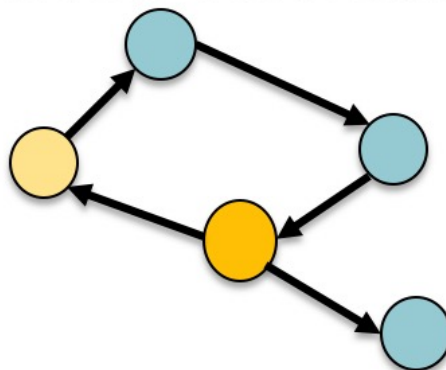
Critical Pattern Detection

Circular Flow of Funds



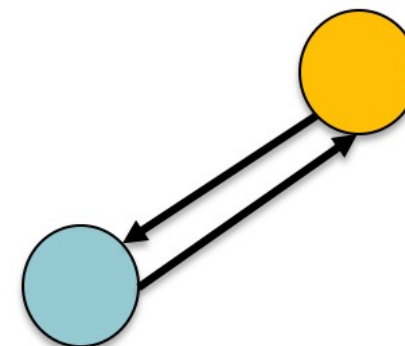
The presence of a defaulting entity in the circular flow will increase the entity's risk

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

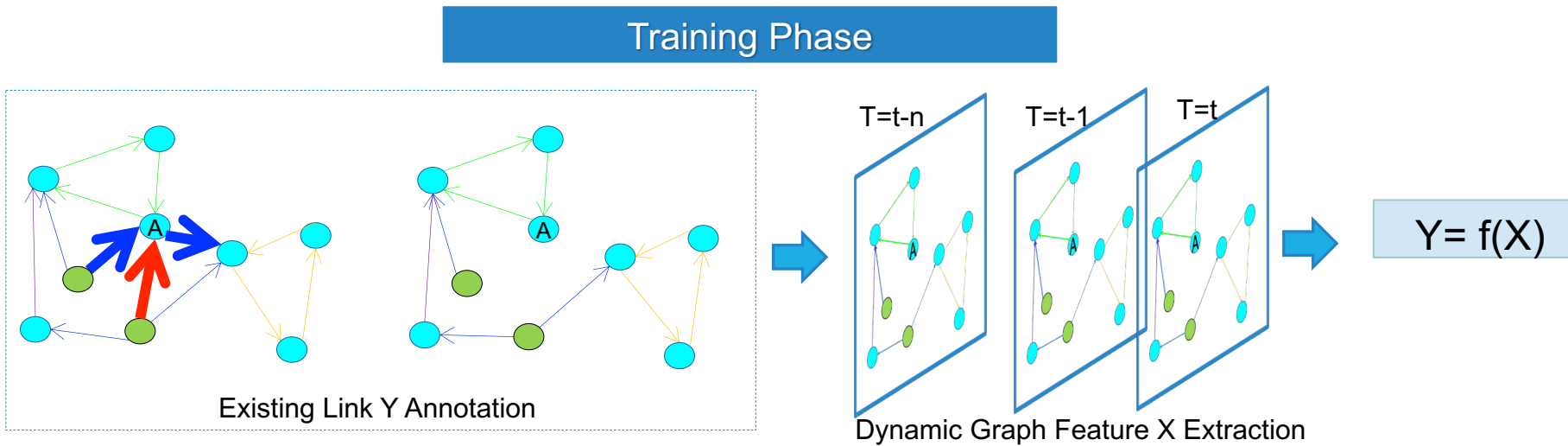


Mutual guarantees relationships are inherently suspicious

Critical Link Prediction

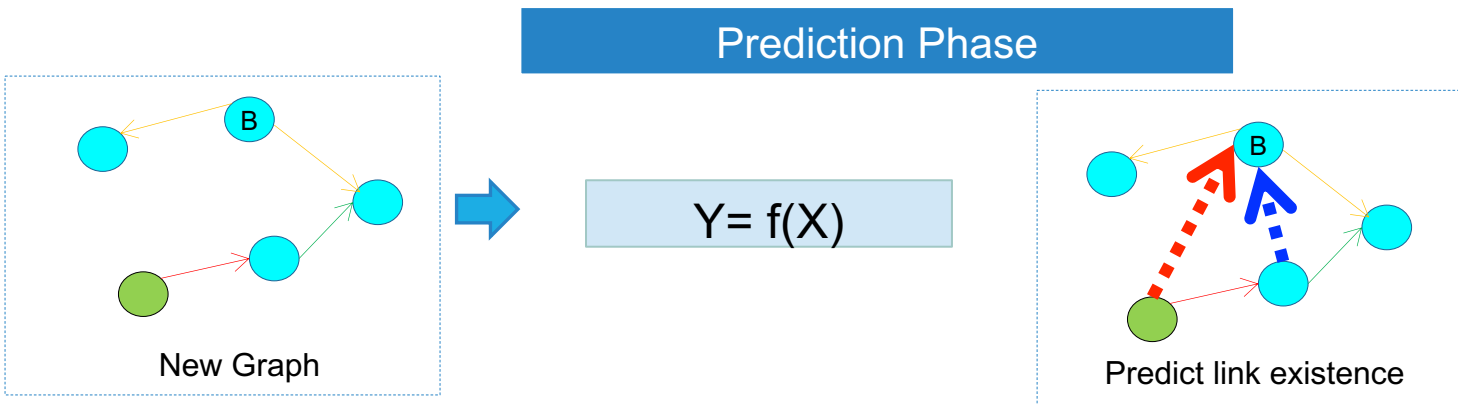
- Target: Given information on money transaction, trade and guarantee behavior pattern, Graphen's Link Prediction tool predicts the existence of potential connections between a pair of customers (or customer and corporation) among which at least one is loaned. We focus on the following relations.
 - 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



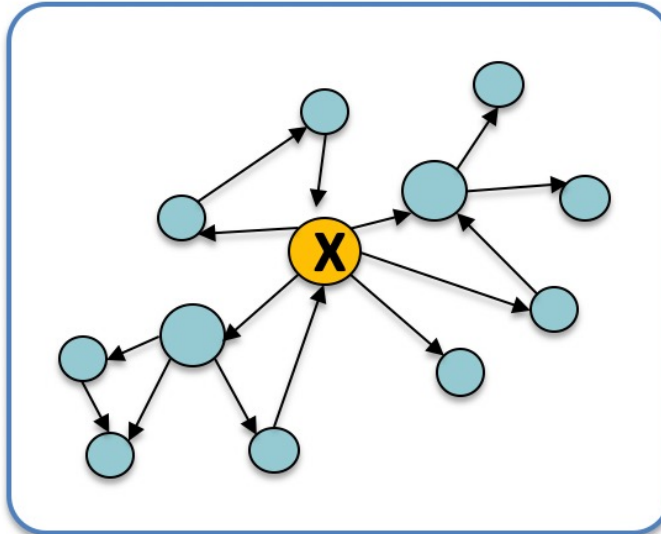
Detect potential **missing links** by predicting the probability of link existence between two nodes using supervised machine learning methods.

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

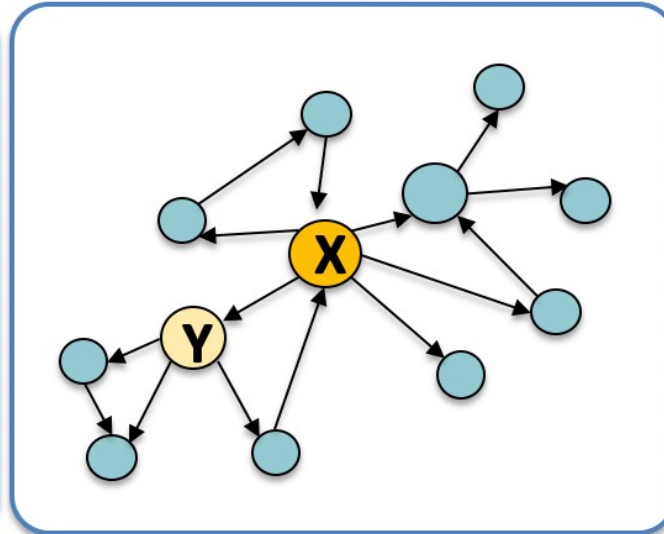


- Prediction Phase
 - Calculate the link existence given the new graph and the relationship learnt in the training phase.

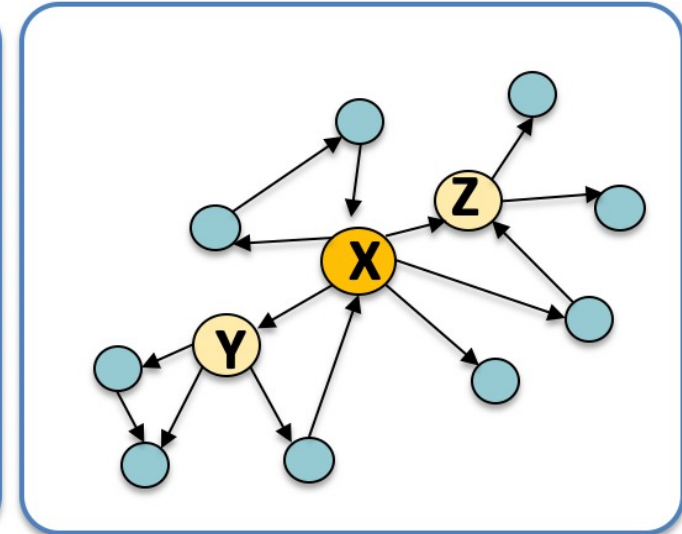
Risk Propagation



In time T1, a given entity X breaks contract

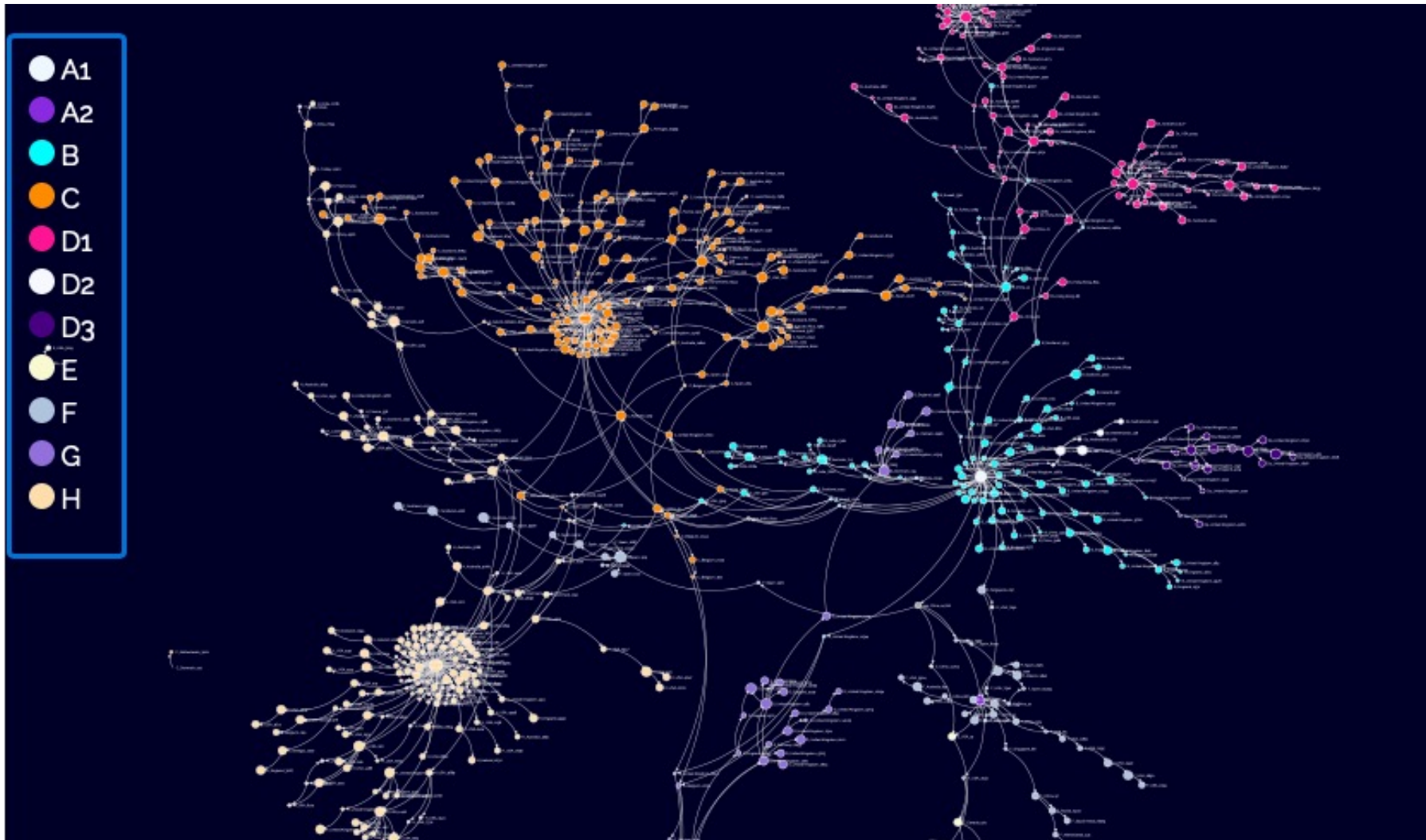


The solution predicts Y expected defaults in time T2



The solutions predicts Z expected defaults in time T3

Graph Spectral Clustering



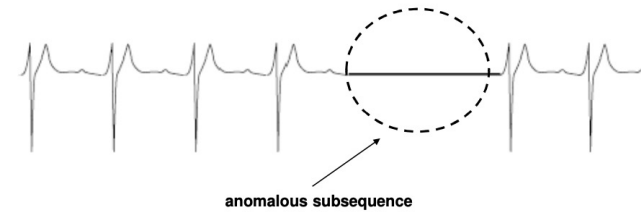
- Multi-Resolution on Graph Topologies:
 - Finding key communities
 - Finding key bridges
 - Finding hubs
 - Finding visual analytics results that keep the original structure.
- Example: COVID-19 Worldwide Genome Evolution Graph

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

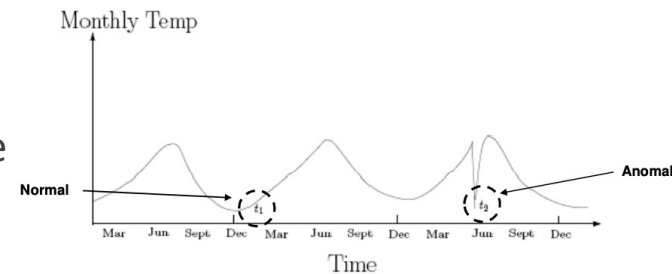
Technologies

- 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.

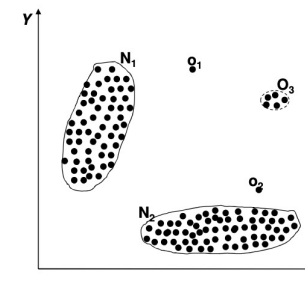
Types of Anomalies



Collective Anomalies

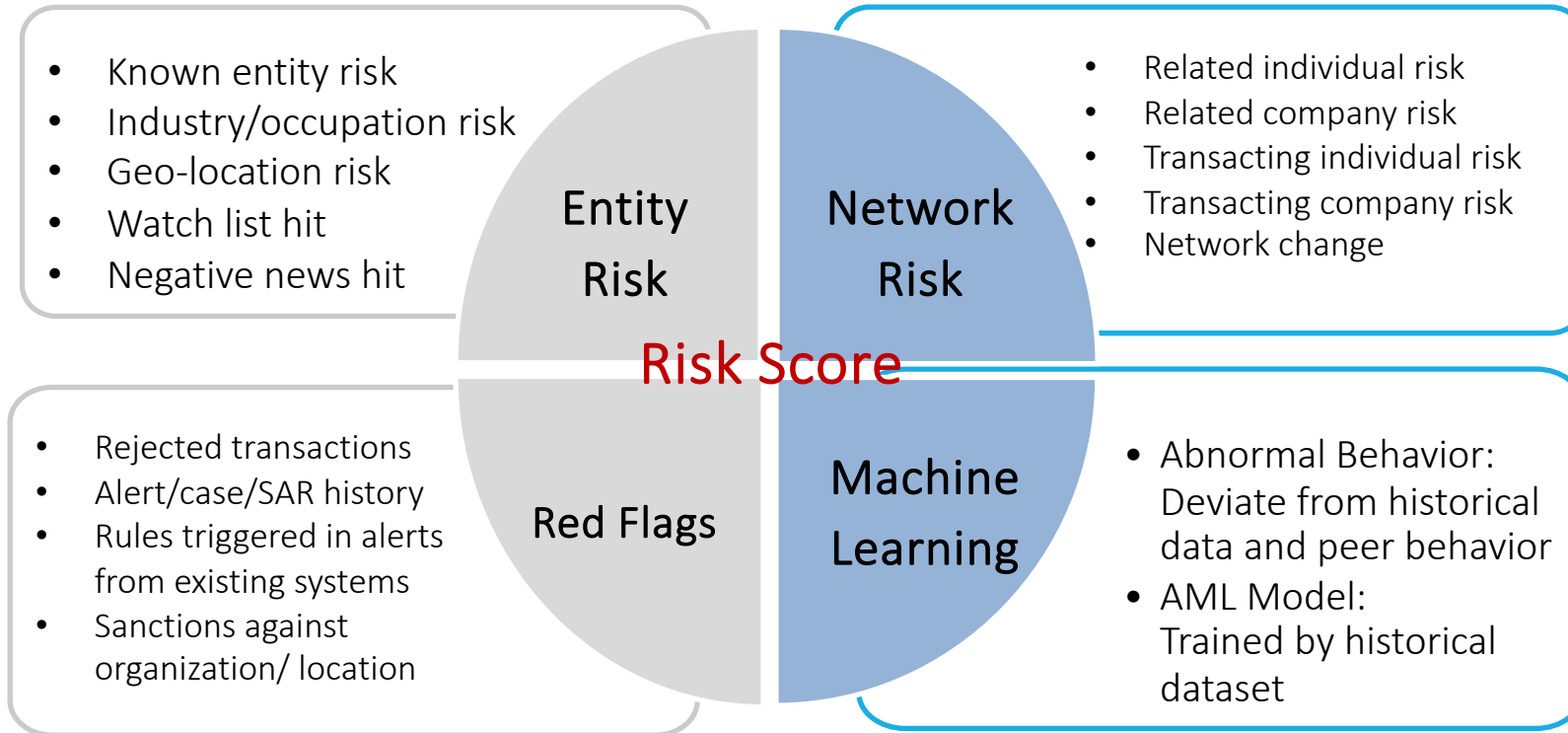


Contextual Anomalies



Point Anomalies

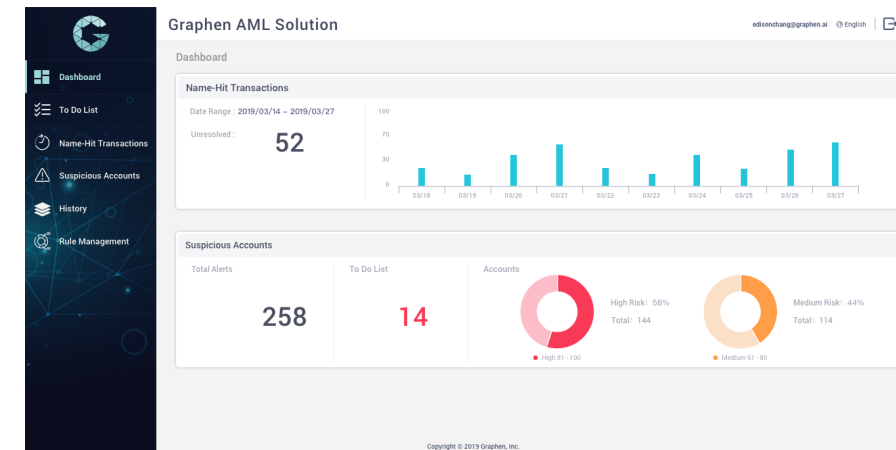
Example: Anti-Money Laundering



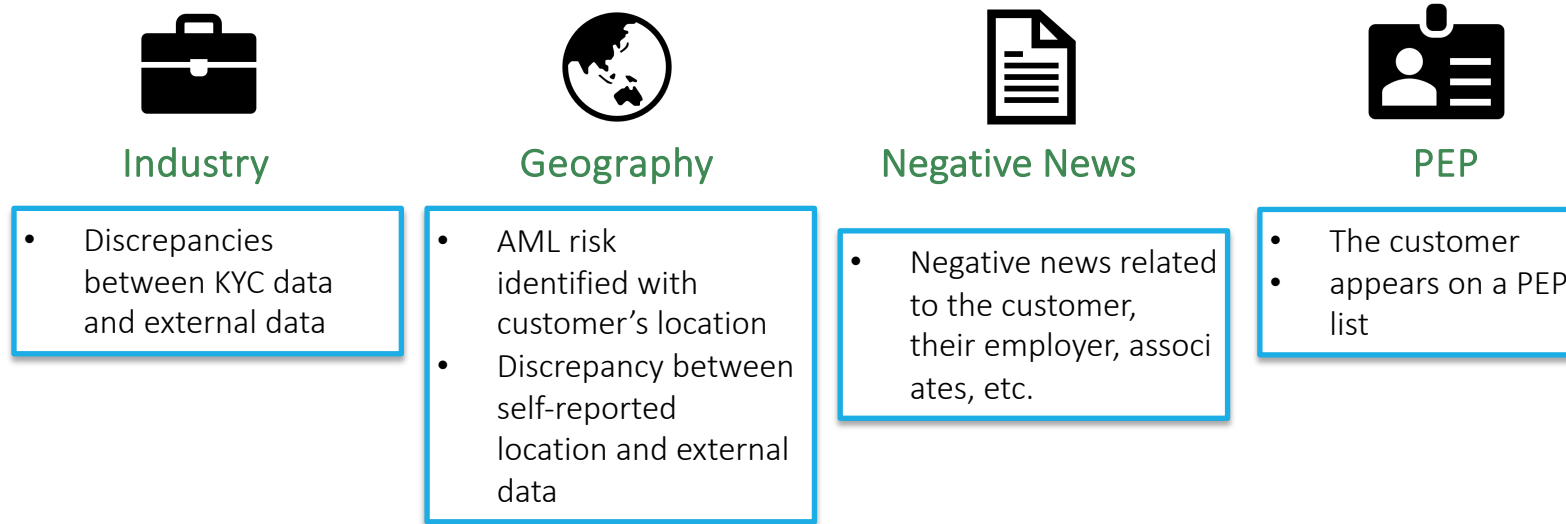
Deployment Examples:

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

1. Decreasing False Positive
2. Finding Unknown Unknowns



Example: Entity Risk

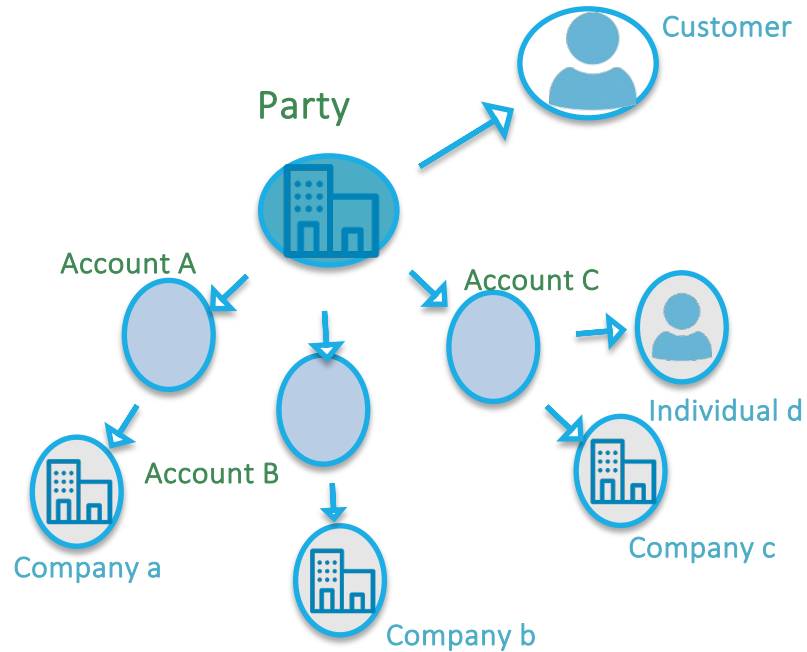


Information Source

<ul style="list-style-type: none"> • Onboarding/KYC data • CDD、 EDD data • Client location • Bank Branch location 	<ul style="list-style-type: none"> • Open Internet / social media • Online news sources • Third-party vendors
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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

– 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

```
else:
    modifier_ob = bpy.context.selected_objects[0]
    #mirror_ob
    mirror_ob = bpy.context.active_object
    mirror_ob.select = False # pop modifier_ob from sel stack
    print("popped")

    #modifier_ob
    modifier_ob = bpy.context.selected_objects[+]
    print("Modifier object:" +str(modifier_ob.name))

#modifier_ob.select=1

print("mirror_ob",mirror_ob)
print("modifier_ob",modifier_ob)

# put mirror modifier on modifier_ob

mirror_mod = modifier_ob.modifiers.new("mirror_mirror", "MIRROR")

# set mirror object to mirror_ob
mirror_mod.mirror_object = mirror_ob

if _operation == "MIRROR_X":
    mirror_mod.use_x = True
    mirror_mod.use_y = False
    mirror_mod.use_z = False
else:
    mirror_mod.use_x = False
    mirror_mod.use_y = True
    mirror_mod.use_z = False
```

Ardi Machine Reasoning

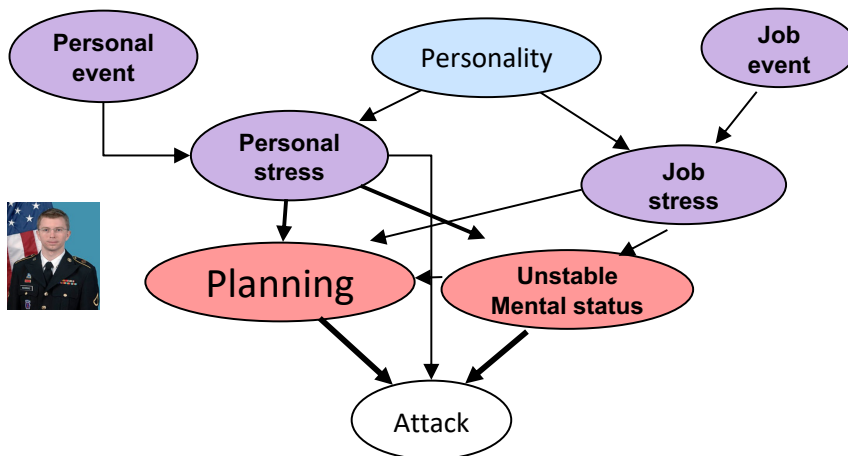


One of the main challenges in building an efficient system is the ability to learn and to reason under uncertainty, and one of the most successful approaches for dealing with this challenge is based on the framework of Bayesian Networks.

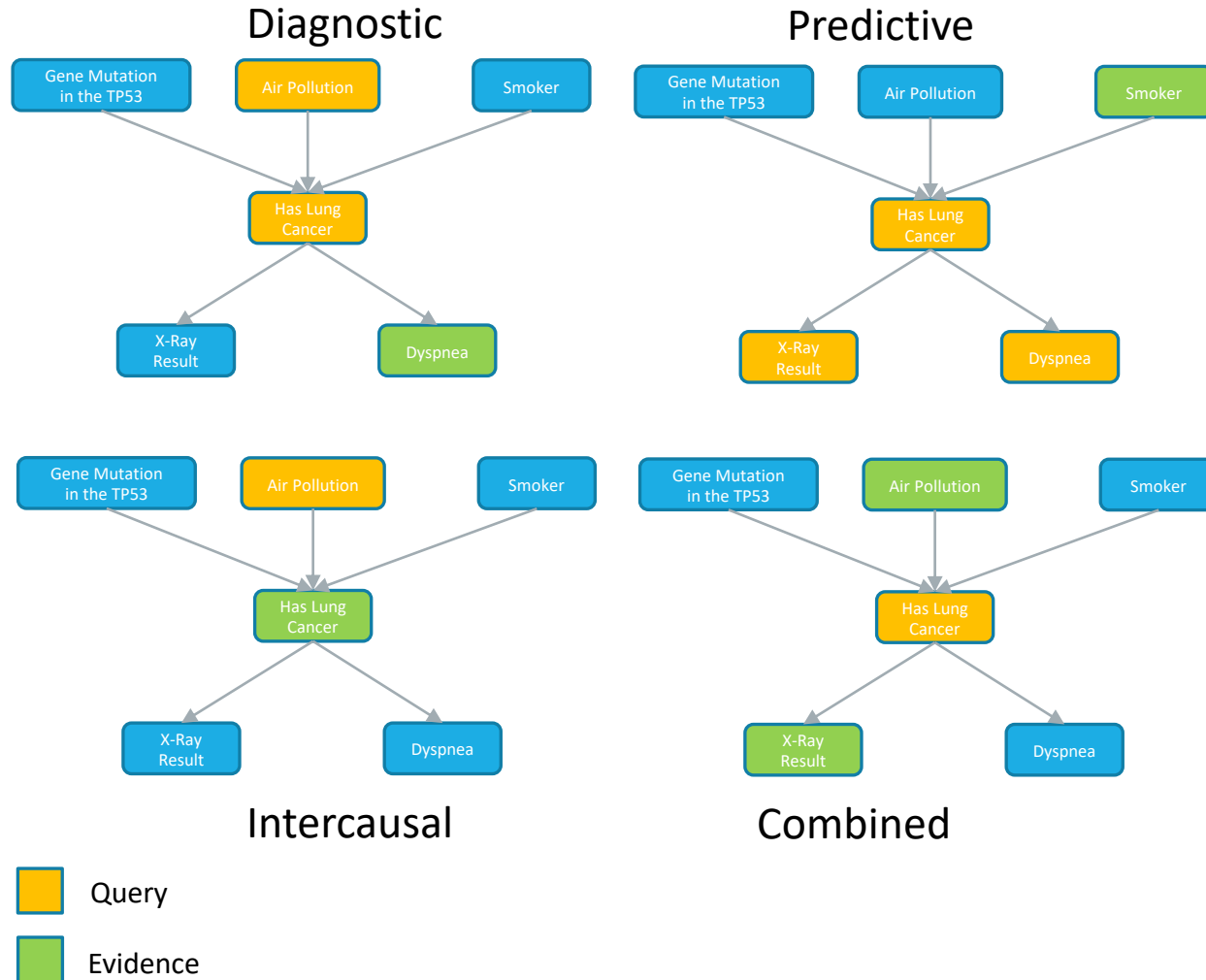
Bayesian Networks offer an expressive visual and quantitative tool for

- Learning and representing reasoning procedures
- Understanding causality among variables

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



Types of Reasoning



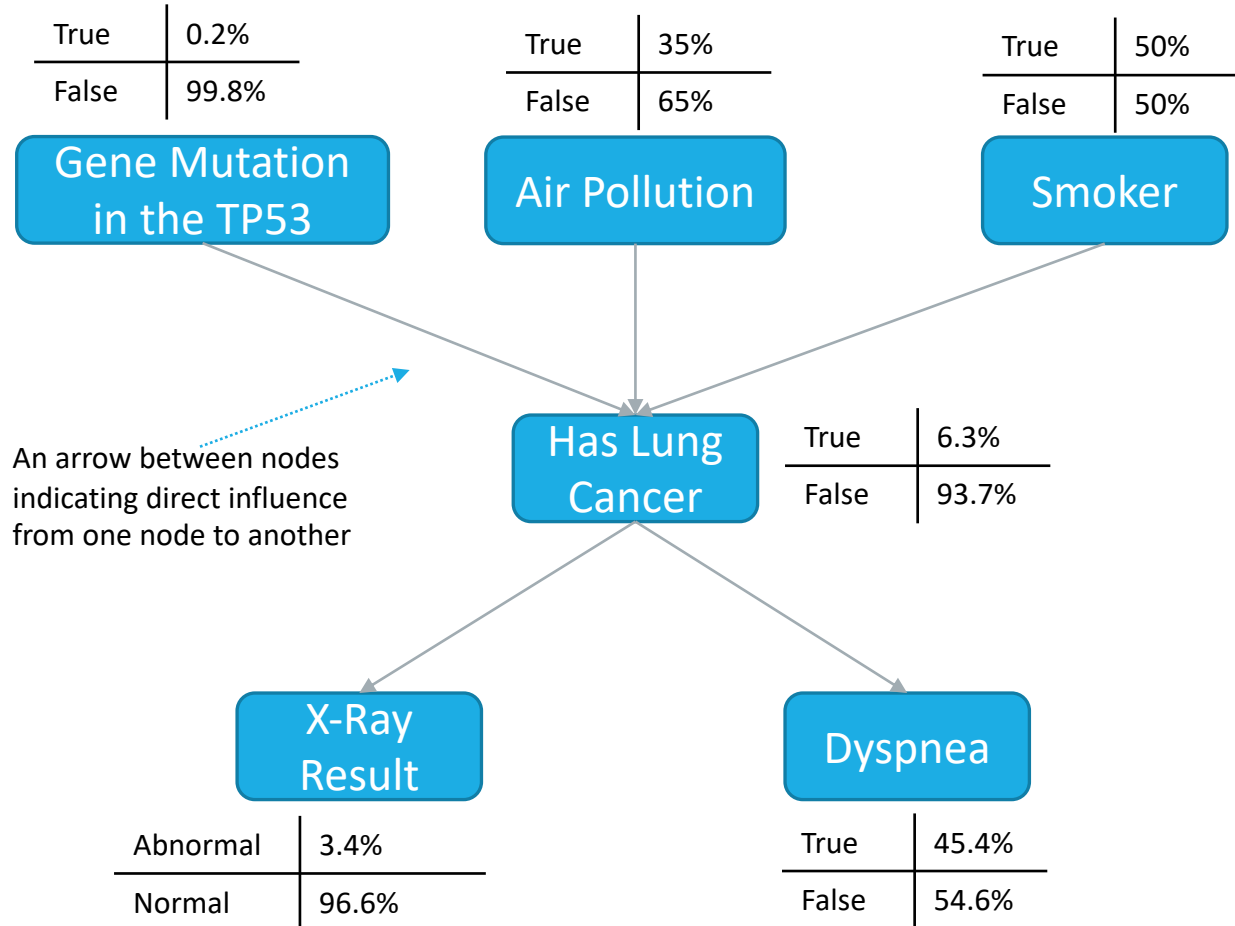
- **Diagnostic:** Given evidence about an effect, how does this change the belief in this causes?
- **Predictive:** Given evidence, what are the predicted outcome?
- **Intercausal:** Given evidence about a cause and about its effect, how does it change the beliefs in other causes?
- **Combined:** Given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

Why using Bayesian Networks for Reasoning?

- 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

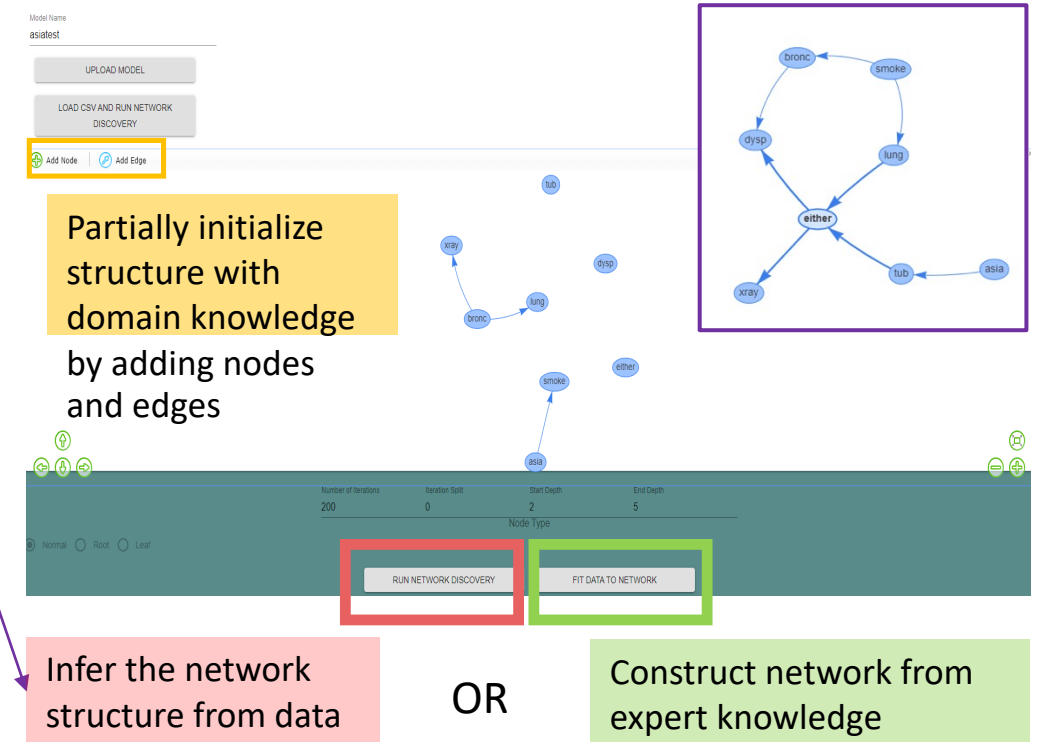
Each node is a random variable



- 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



Graphen Ardi Bayesian Network GUI

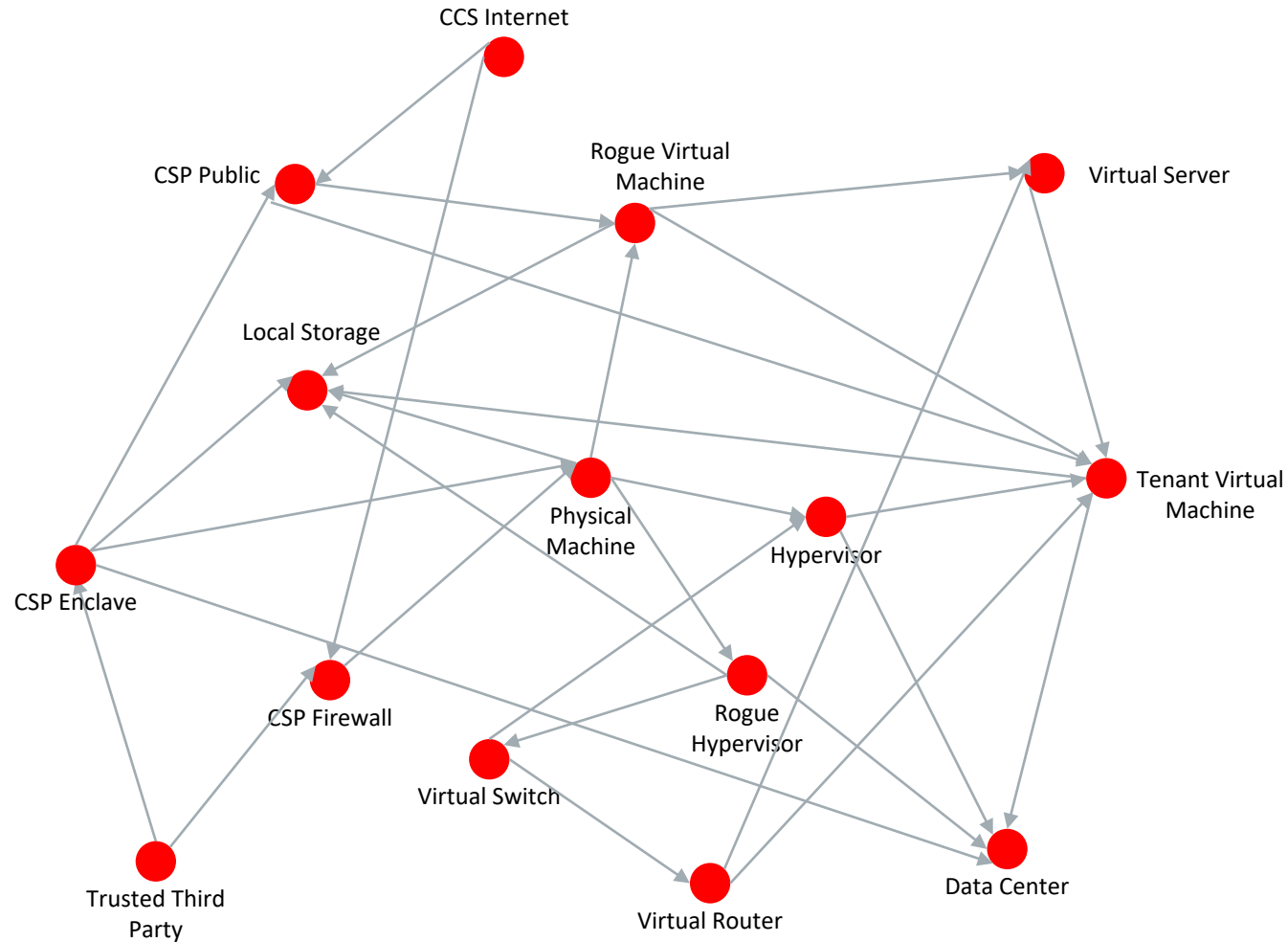
Example: Bayesian Inference in Cyber Security

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

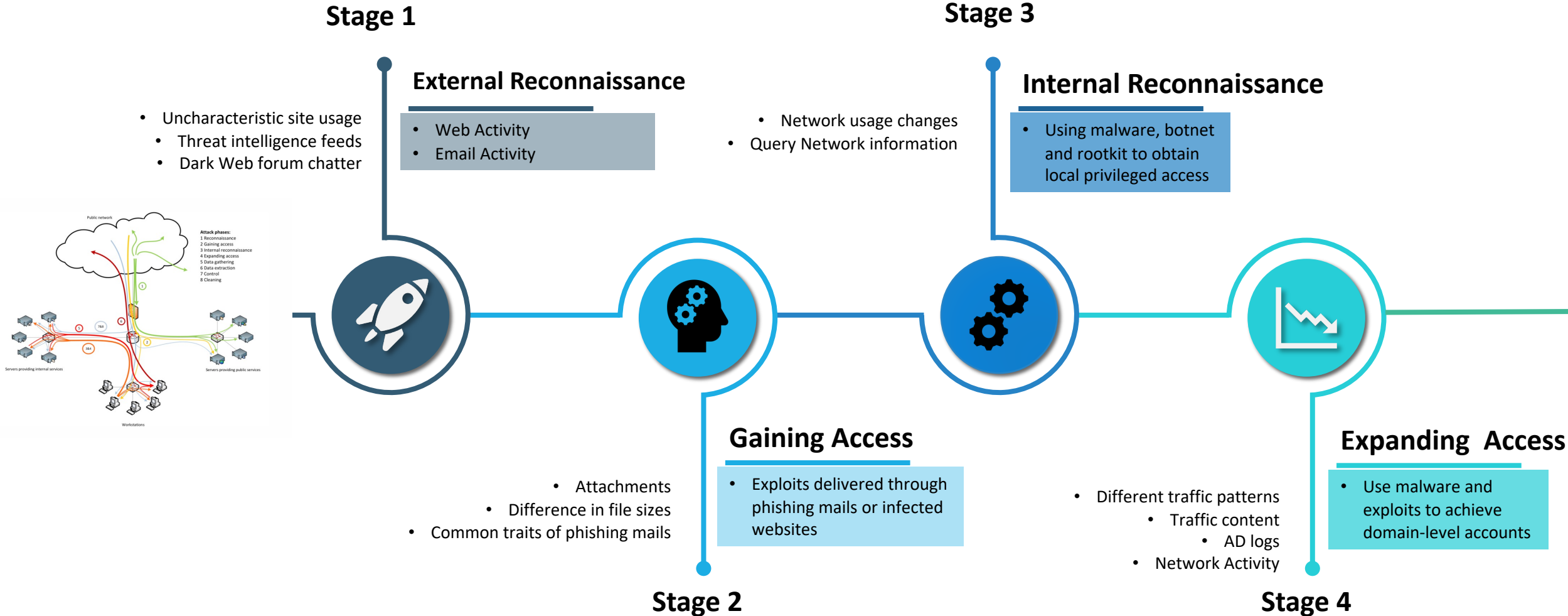


Construct attack graph from domain knowledge

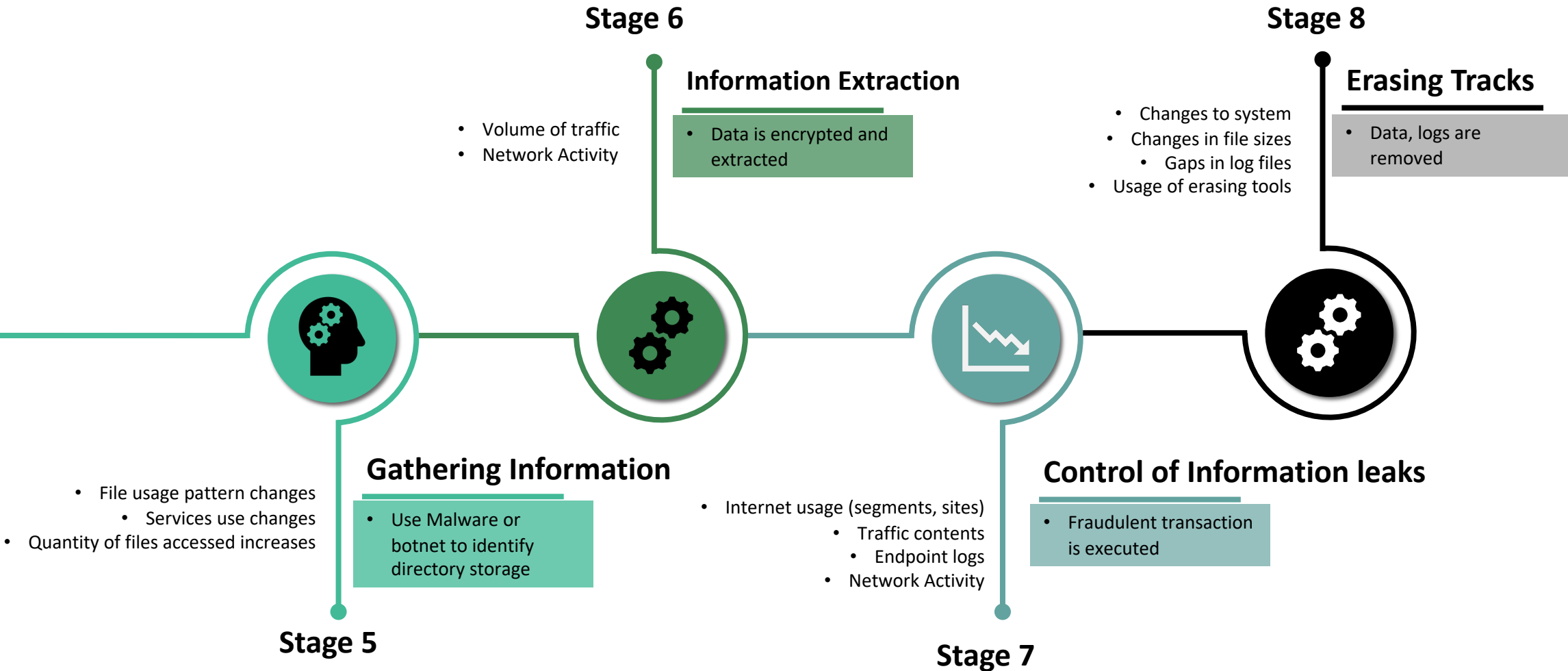
Conditional Probability Assignments

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

Detection Long-Term Anomalies and Threats



Detection Long-Term Anomalies and Threats

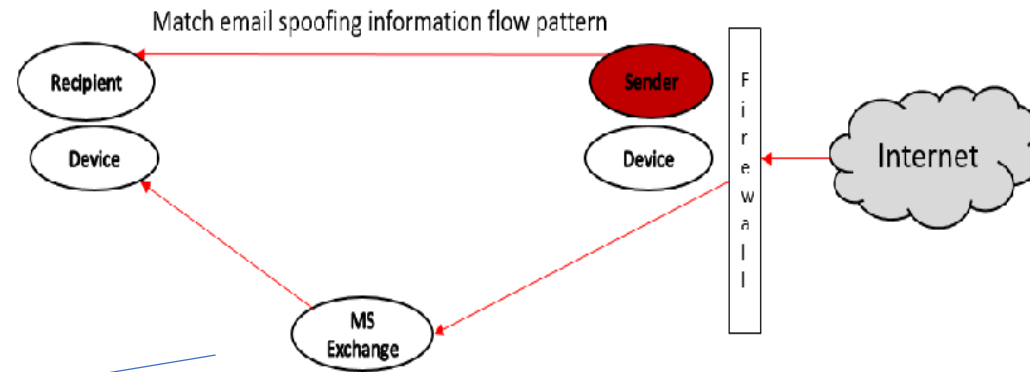


Machine Reasoning to Aggregate Risk

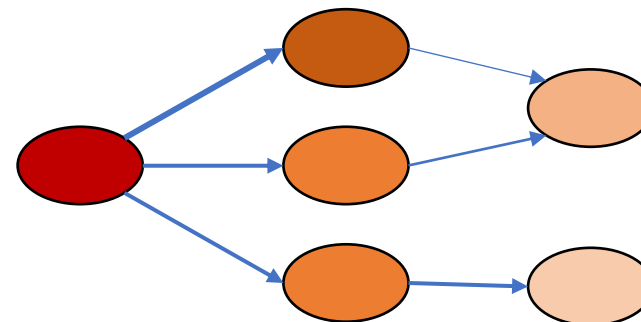
Behavior-based anomaly identified

- **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



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

Graphen Automobile – AI Car Doctors

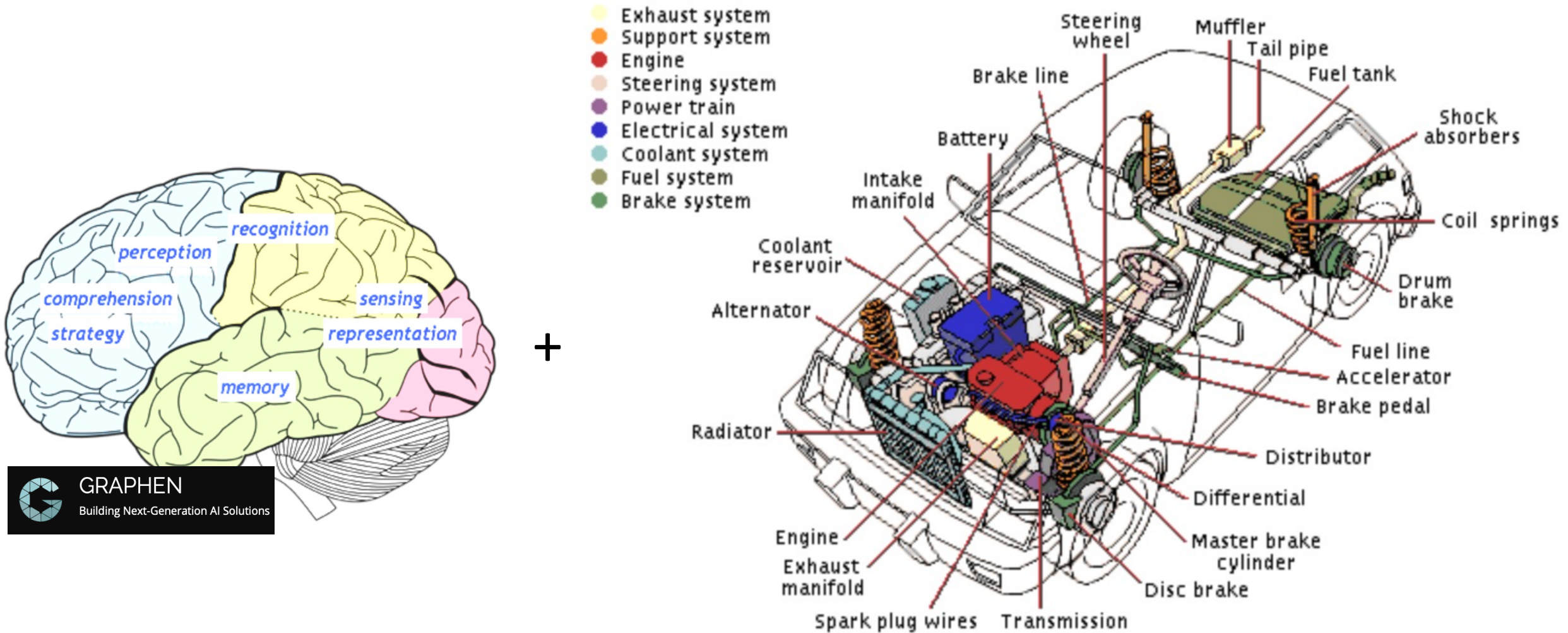
Graphen Automobile – working with the North America market dominating leader to develop Car Doctor AI technology for the world

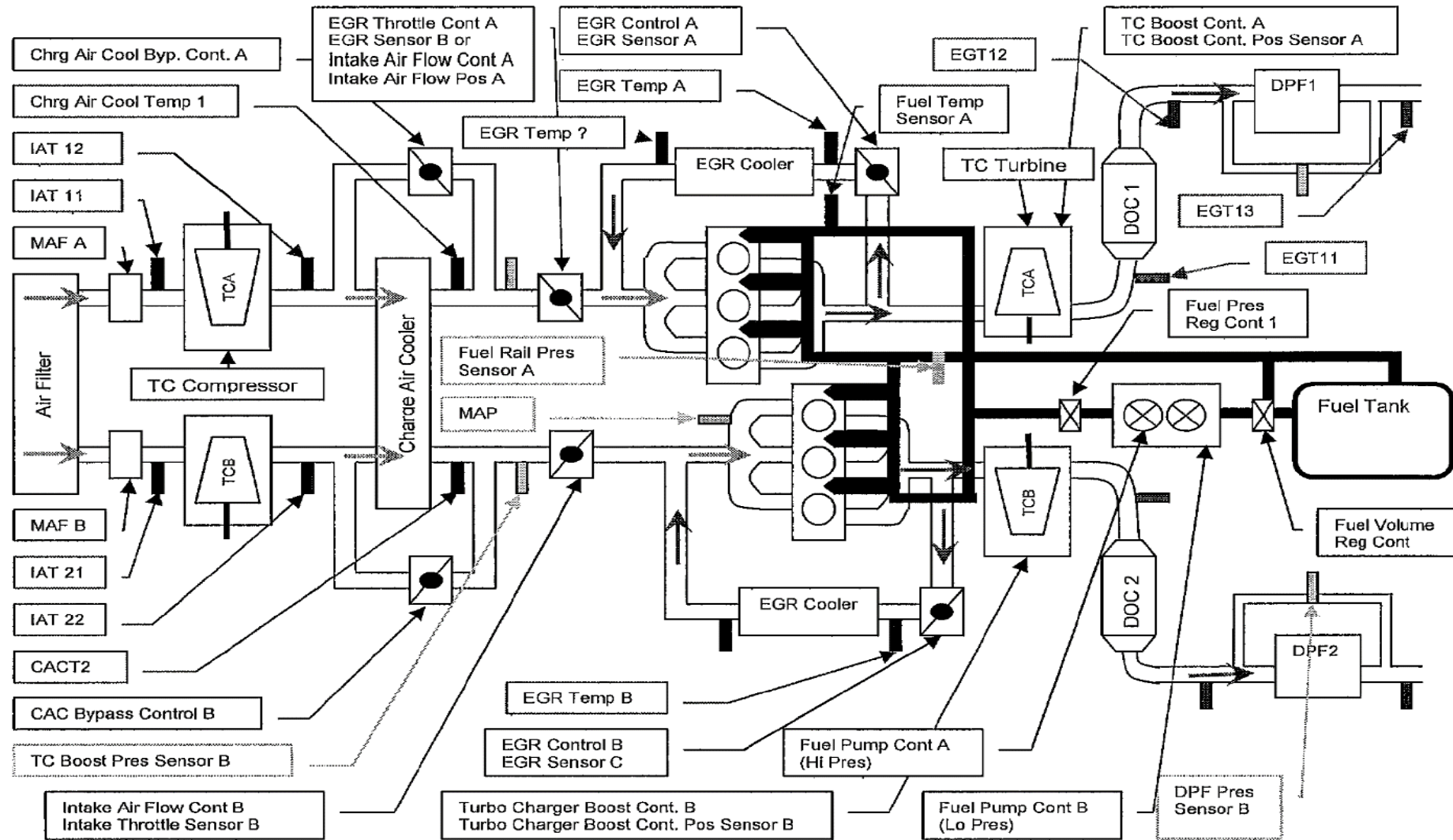
- Graphen AI was able to achieve almost 99% accuracy of car diagnosis and fix suggestions.
- Graphen AI was able to achieve 91% accuracy of car diagnosis and fix suggestions with just 1% of training data..



FixName1	Total present invalidation data	Total correctly predicted 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





Ardi Applications – Graphen Energy

Graphen Energy – AI Reasoning & Strategy to realize Smart Grids

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

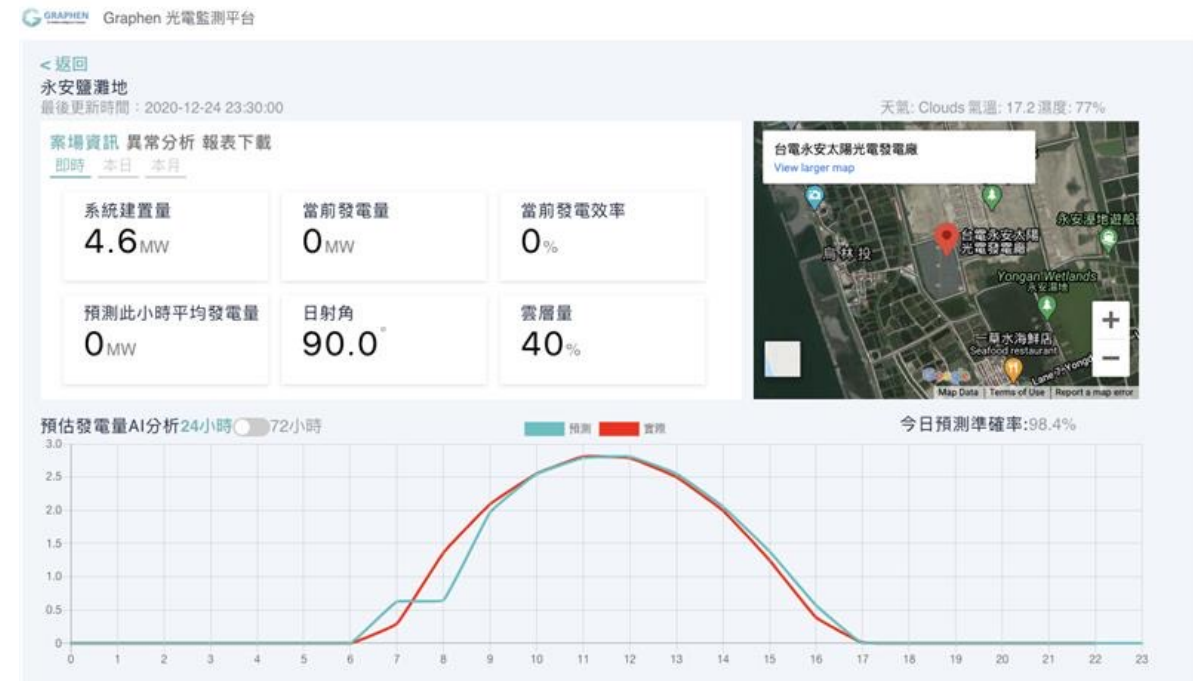


GRAPHEN Graphen photoelectric monitoring platform

Case analysis
Exception overview
Report record
Intelligent dispatch

Exception overview

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

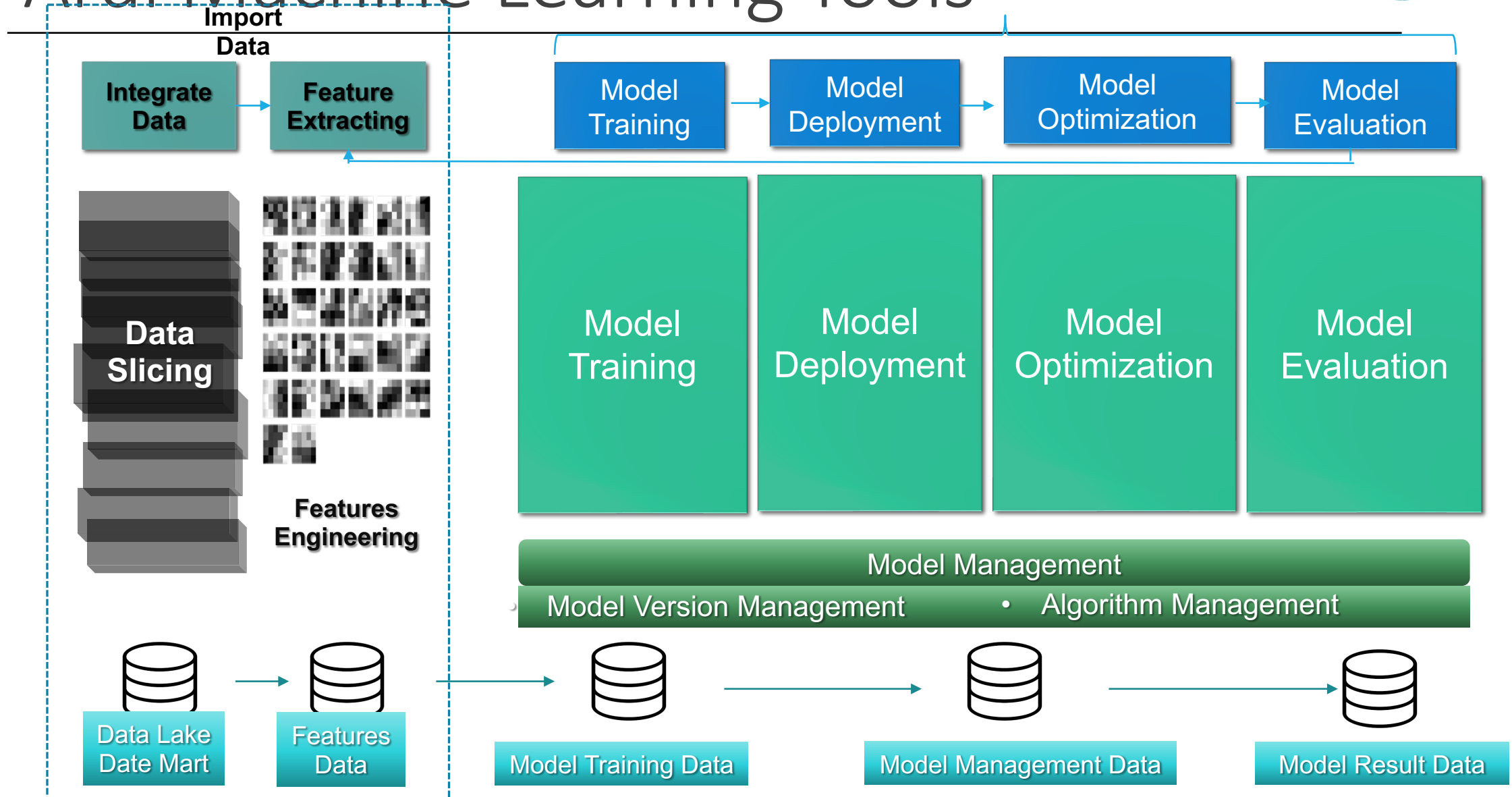


Graphen Energy's live system monitors all solar power stations in Taiwan and predicts power generations. Its accuracy is around 98.5%, far better than the customer's requirement of 90%.



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

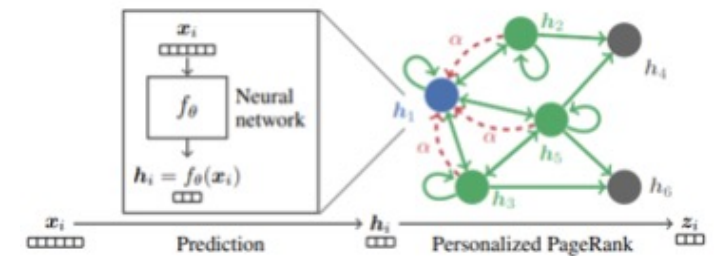
- K-means
- Birch

Deep Learning

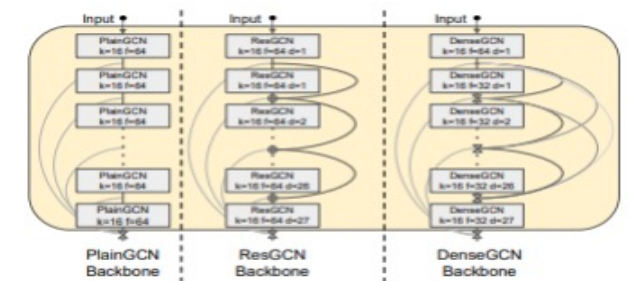
- Insert/delete layers
- Recurrent Neural Network (RNN)
- Deep neural network (DNN)
- Convolutional neural network (CNN)
- Graph neural network



Principal neighborhood aggregation



Approximate personalized propagation



Deep GCN architecture

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

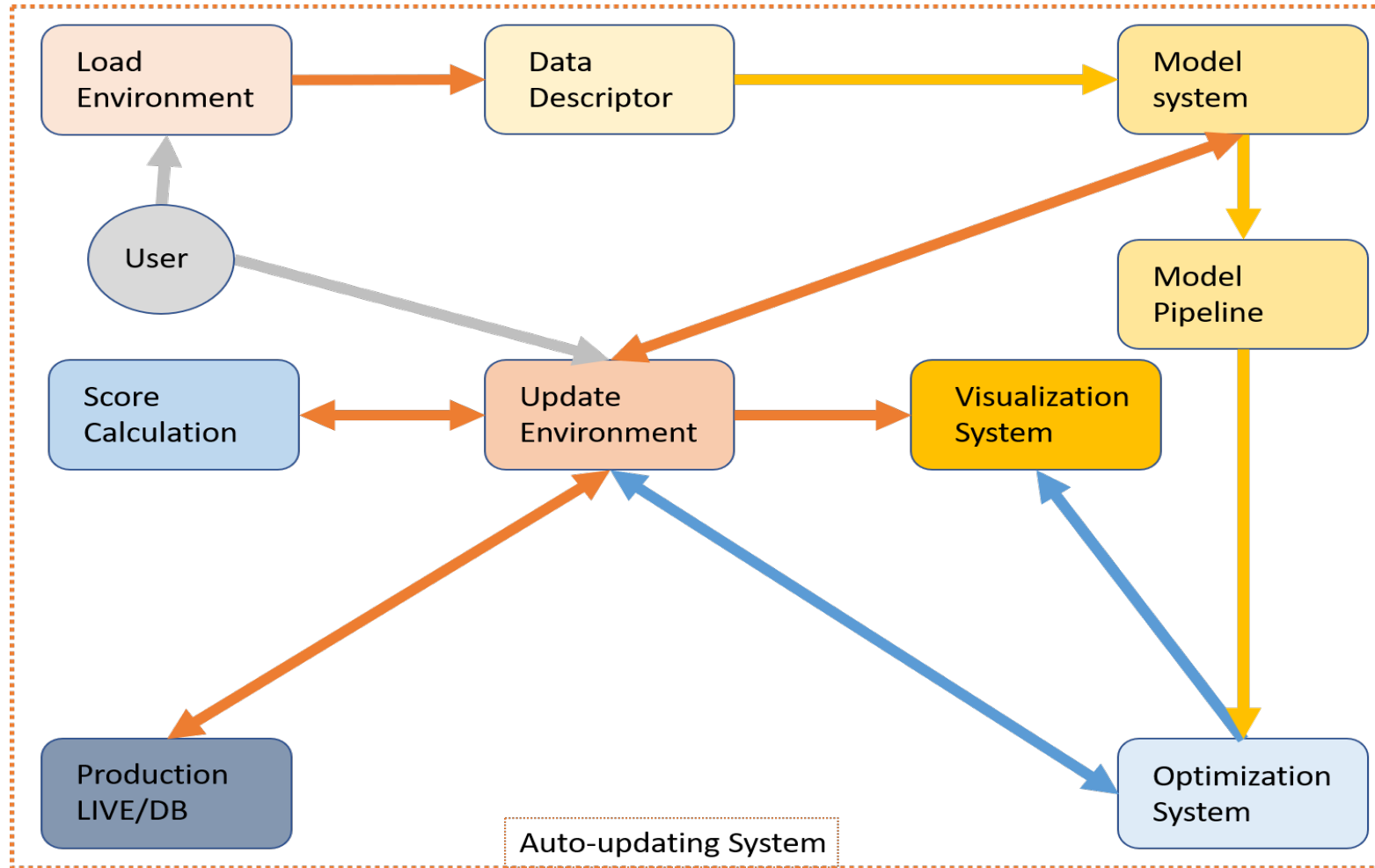
Model Deployment– Support user to set the frequency of model execution , model deployment and execution .

Model Optimization – Support users to optimize model flexibly

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

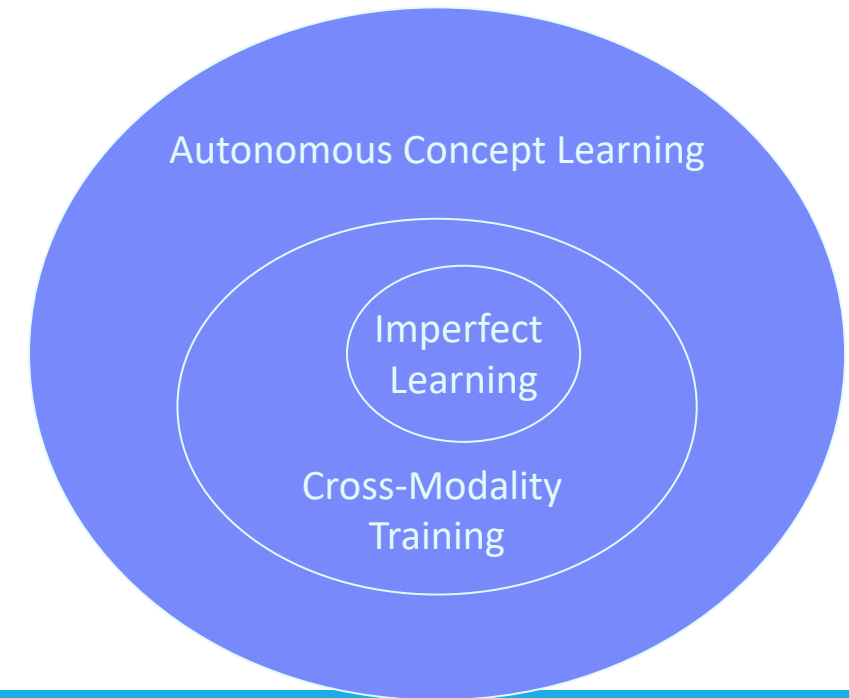
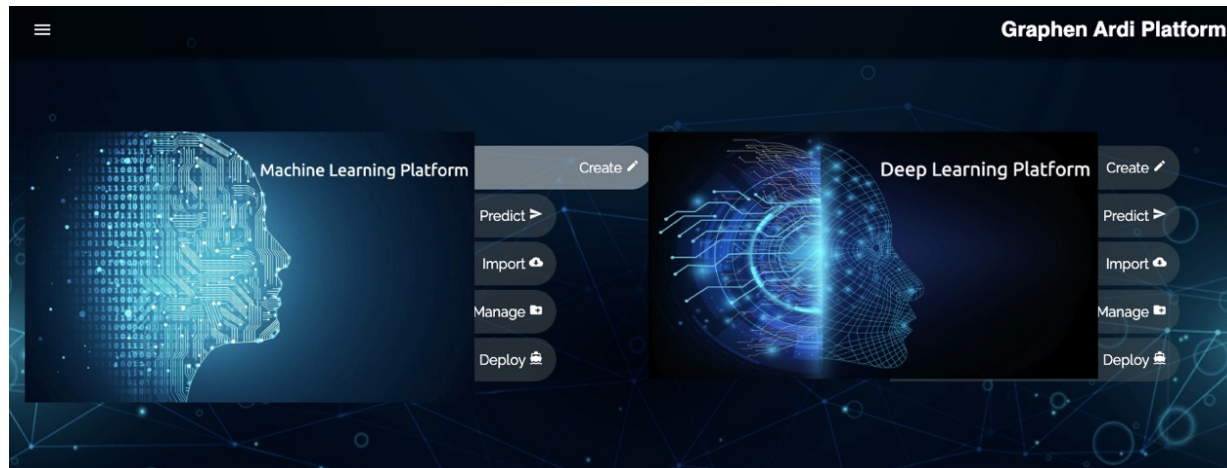
Model Management– Integrated supports of importing various features data, choosing model type, saving model, setting access right and deployment. Support importation of models trained on outer platforms. Support automatically generate version of models.

Ardi Automatic ML Optimization



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**

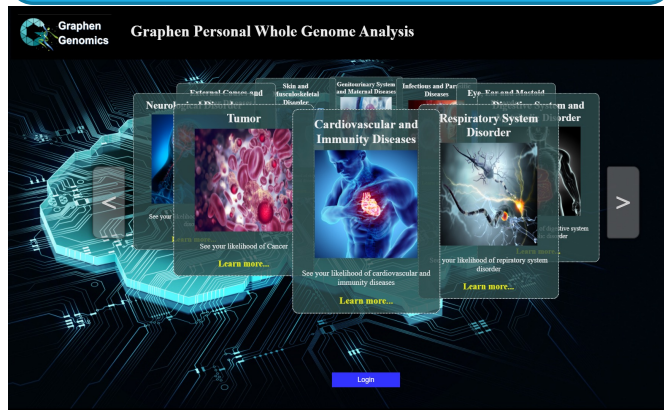


Ardi Applications – AI Medical

Graphen Medical – AI Meets the Central Dogma of Biology

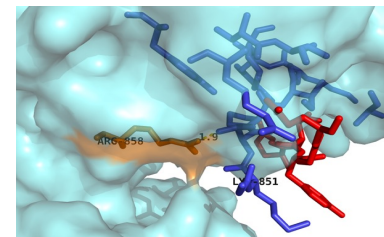
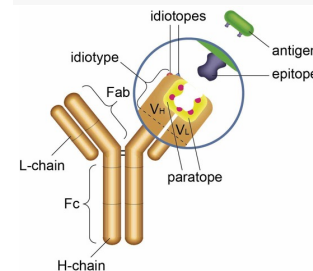
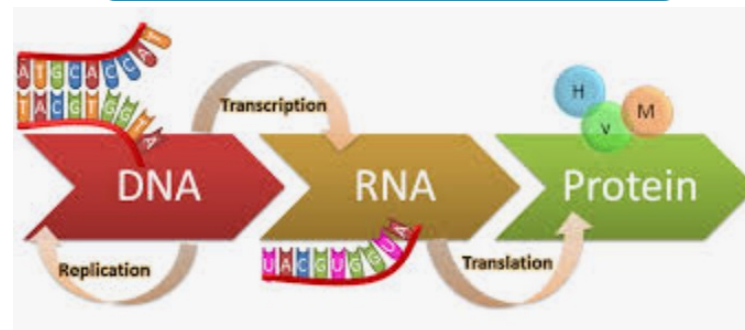
Personalized Whole Genome Disease Analysis

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

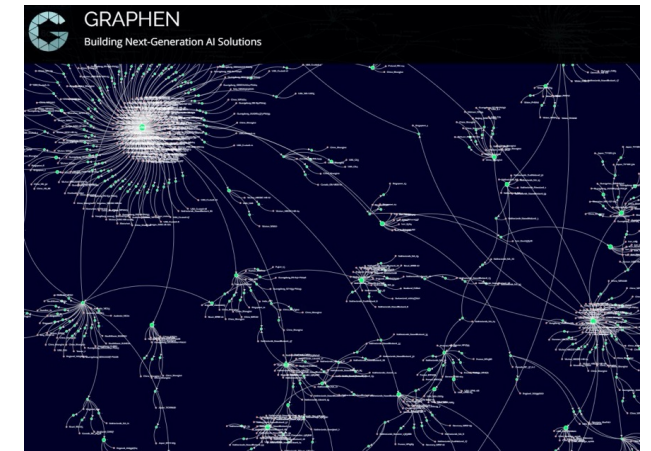
AI Tools for Drug Development



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

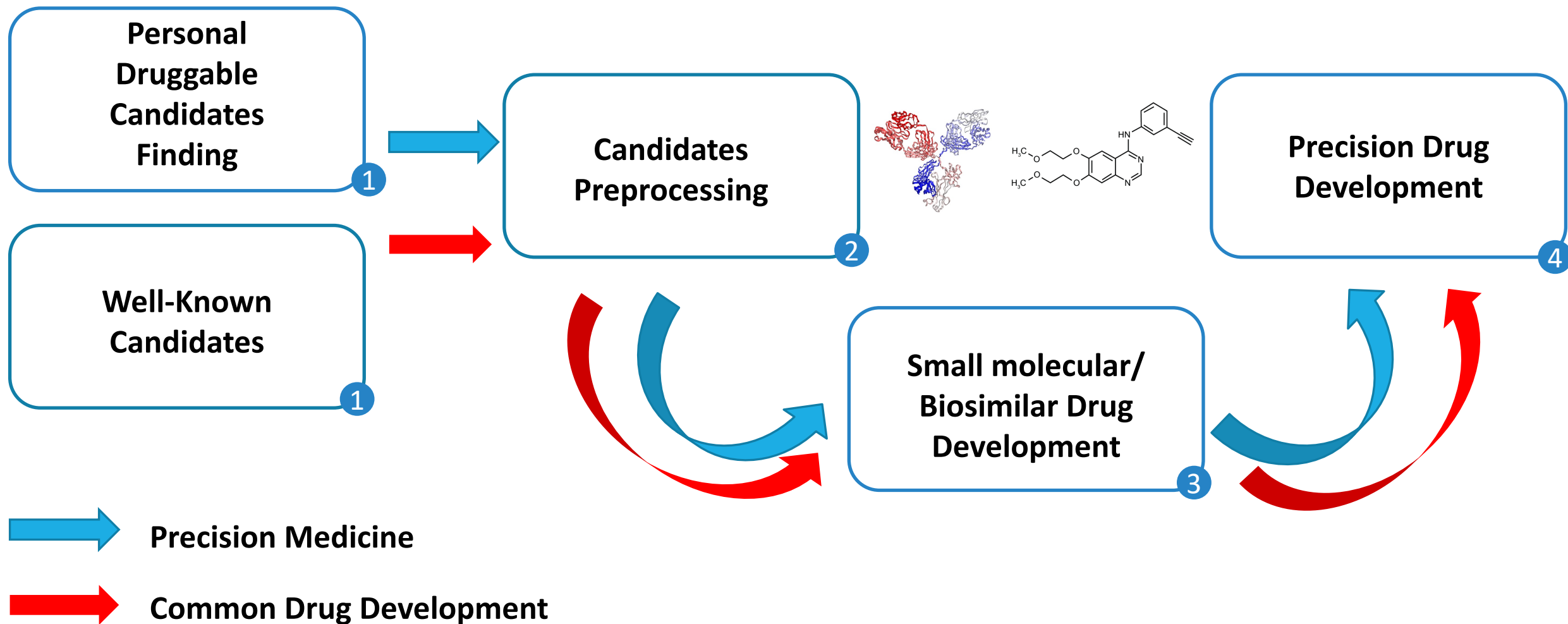
Virus Mutation Surveillance

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.

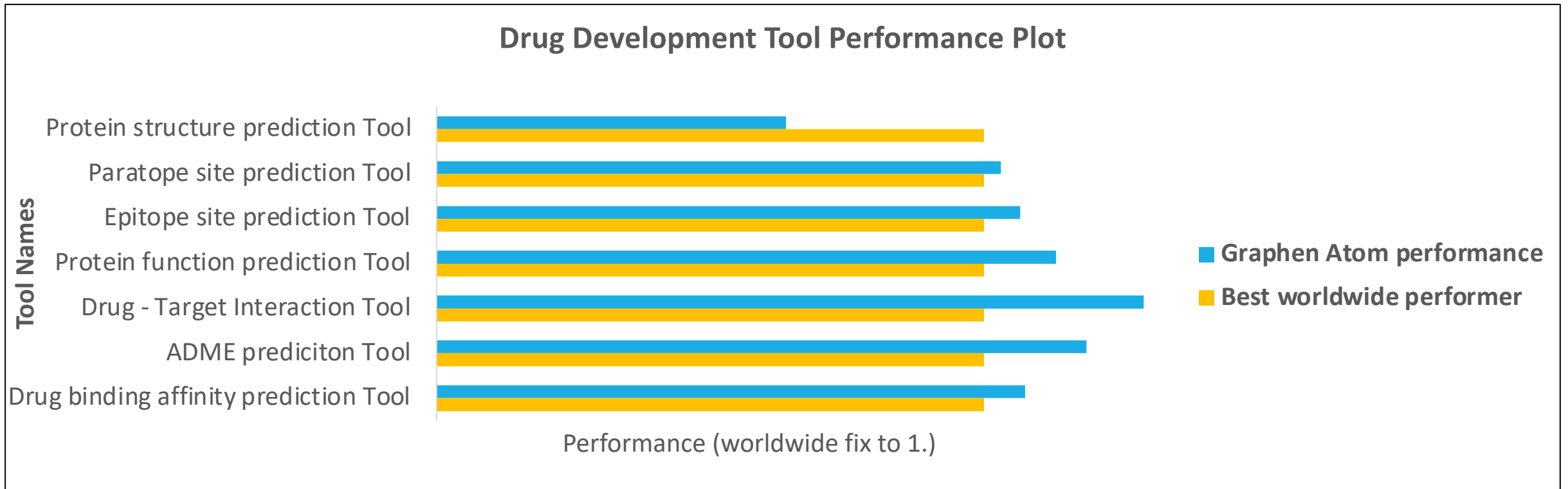
Graphen AI Tools for Drug Development



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

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.

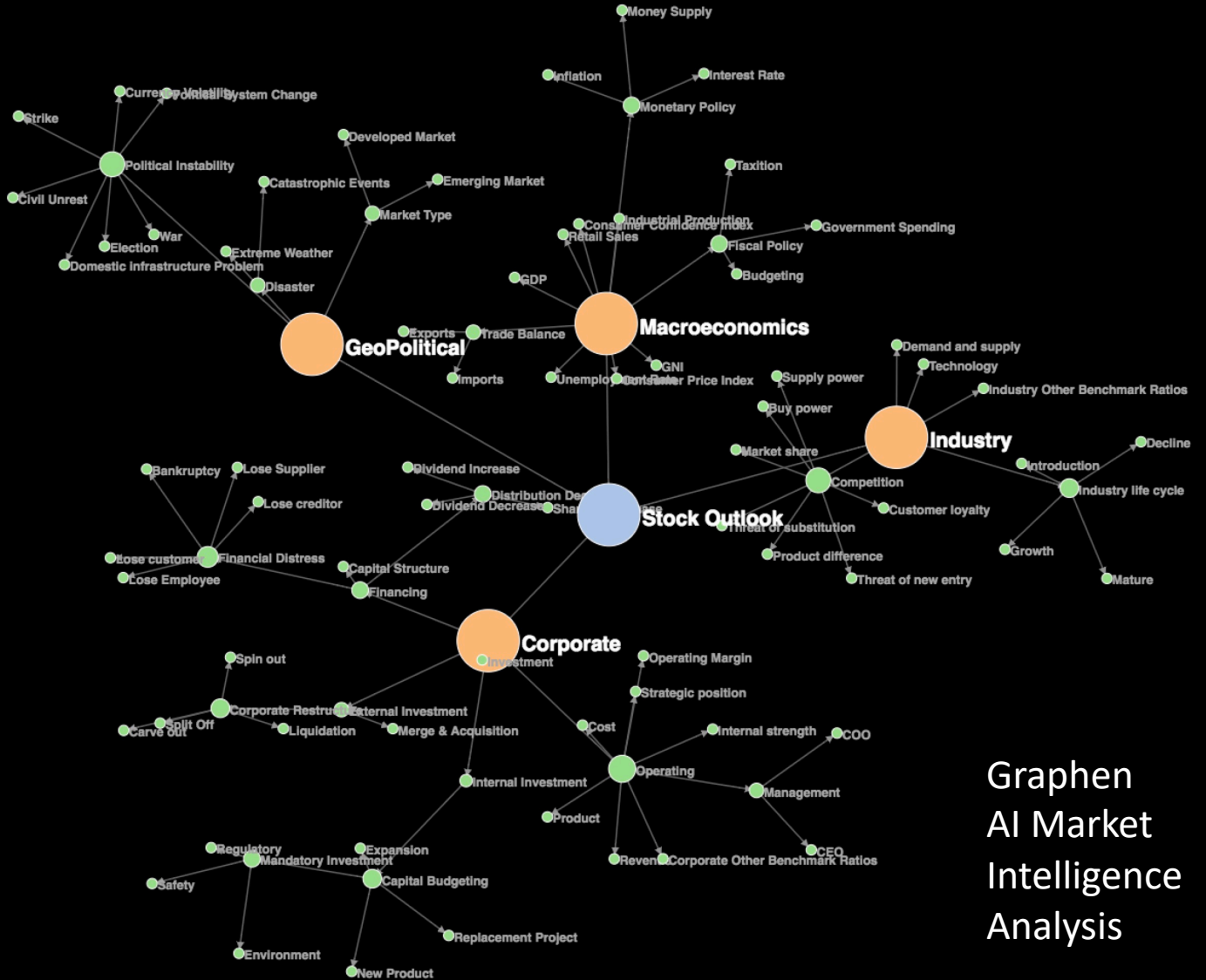
Underwriting criteria:

Pricing	Per CRE price
Min. DSCR	1.25X 1.x based on appraiser's price
Stress test: current + 2%, 25-yr	1.0X Cash flow, i.e. increasing operating expenses
Operating expenses	Based on the historical performance of operating expenses
Tenant estoppels	Per loan policy
Auto payment debit	Yes – per CRE

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

Anita Graphen Artificial Intelligence Traders Home Demo Technologies Login

Anita avatars are earning: **\$1,501.65**

ANITA-324658
PER \$1,000 EARN: **\$82.24**

ANITA-253758
PER \$1,000 EARN: **\$27.04**

ANITA-247917
PER \$1,000 EARN: **\$291.07**

ANITA-428339
PER \$1,000 EARN: **\$55.16**

ANITA-164762
PER \$1,000 EARN: **\$33.69**

ANITA-450214
PER \$1,000 EARN: **\$161.56**

ANITA-247502
PER \$1,000 EARN: **\$51.40**

ANITA-267139
PER \$1,000 EARN: **\$456.80**

- Avatars with different trading strategy
- Simulate personalities

Anita Graphen Artificial Intelligence Traders Home ForeignExchange Stocks Bonds



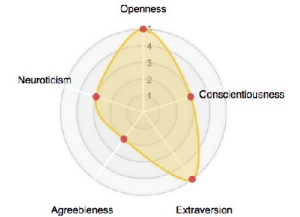
Anita 267139

-- an Adventurous AI Trader

Specialized at: EUR-USD

Knowledgeable of: Oil, Gold and Twitter

Strategy Learning Frequency at: 2.0 hours



Original: **\$1,000.00**, Current: **\$1,404.50**, Performance: **Gain \$404.50**



Activities

Time	Action	Cash	Unit	Balance
2017-10-12 13:45:05	Sell 50,000	\$1,404.50	0	\$1,404.50
2017-10-12 12:57:25	Buy 100,000	\$-57,792.00	50,000	\$1,386.50
2017-10-12 11:19:10	Sell 100,000	\$60,577.00	-50,000	\$1,372.00
2017-10-12 11:11:55	Buy 100,000	\$-57,822.00	50,000	\$1,366.00
2017-10-12 09:08:05	Sell 100,000	\$60,566.00	-50,000	\$1,310.00
2017-10-12 08:34:40	Buy 100,000	\$-57,935.00	50,000	\$1,287.50



Explanation



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



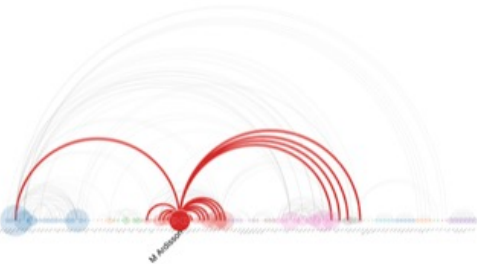
Generates a linear model based on result of above points



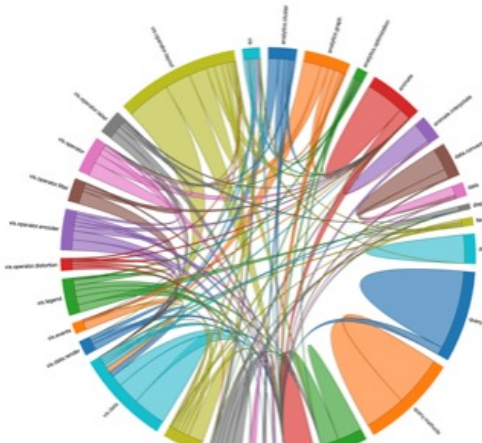
Calculates the weightage of each input feature

Graphen Visualization Tools

Arc Diagram Hover:



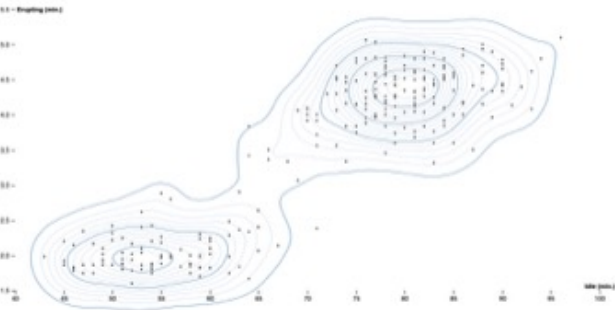
Chord Dependency Static:



Tree Map Static:



Density Contours Static:

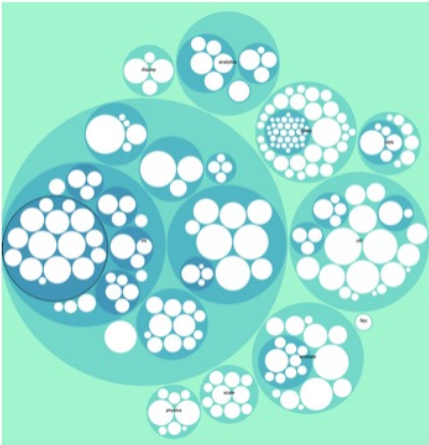


- 30+ different types of graphics

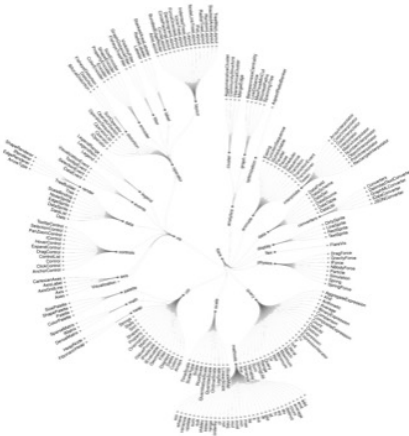
Sunburst Zoomable:



Circle Packing Zoomable:



Radial Tidy Tree Static:




Worldmap with Tracing Bar Dynamic:



Ardi Explanation – Health Monitoring

Graphen Ardi Platform

INFO PANEL


John White




Age: 54
OCCUPATION: car driver
INSURANCE: accident insurance
COVERAGE: \$40000

Find Similar Entities → Select Strategy Type → Outcome Analysis

Find Similar Entities [BACK] [NEXT]


Current Model Type: Flow Stage Sequence
Default: Basic Series - FIXED DTC

Similar Entities For John White

 chiyue han	AGE: 34 INSURANCE: health OCCUPATION: software engineer
 yangong li	AGE: 45 INSURANCE: travel OCCUPATION: reporter
 [Name obscured]	AGE: [Value obscured]

Graphen Ardi Platform

INFO PANEL


John White

Age: 54
OCCUPATION: car driver
INSURANCE: accident insurance
COVERAGE: \$40000


Find Similar Entities → Select Strategy Type → Outcome Analysis

Select Strategy Type [BACK] [NEXT]

Choose Strategy: **Advanced Time Series**

Current Model Type: Flow Stage Sequence
Recommend Strategy: Basic Series - FIXED DTC

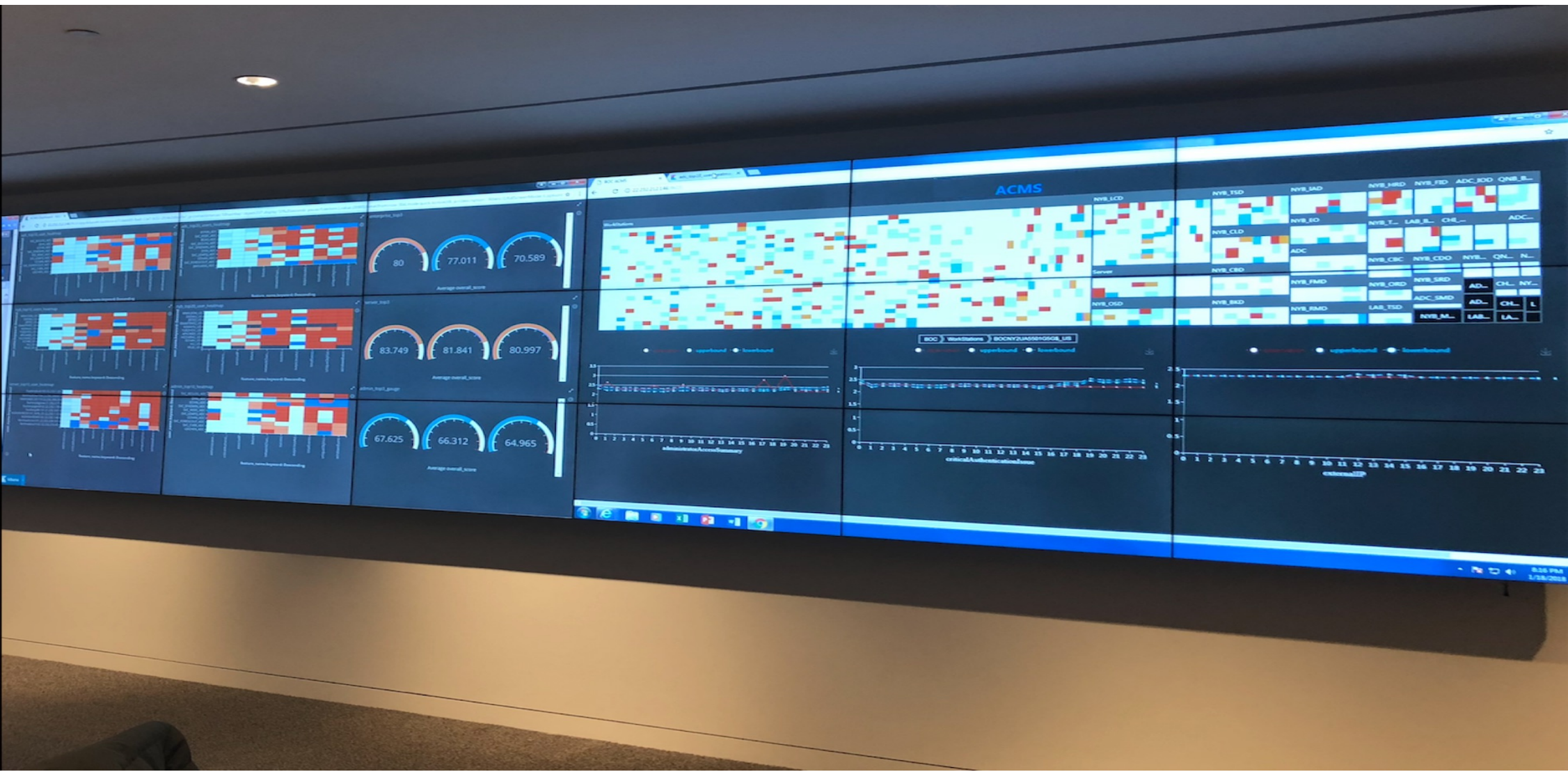
Strategy Prediction

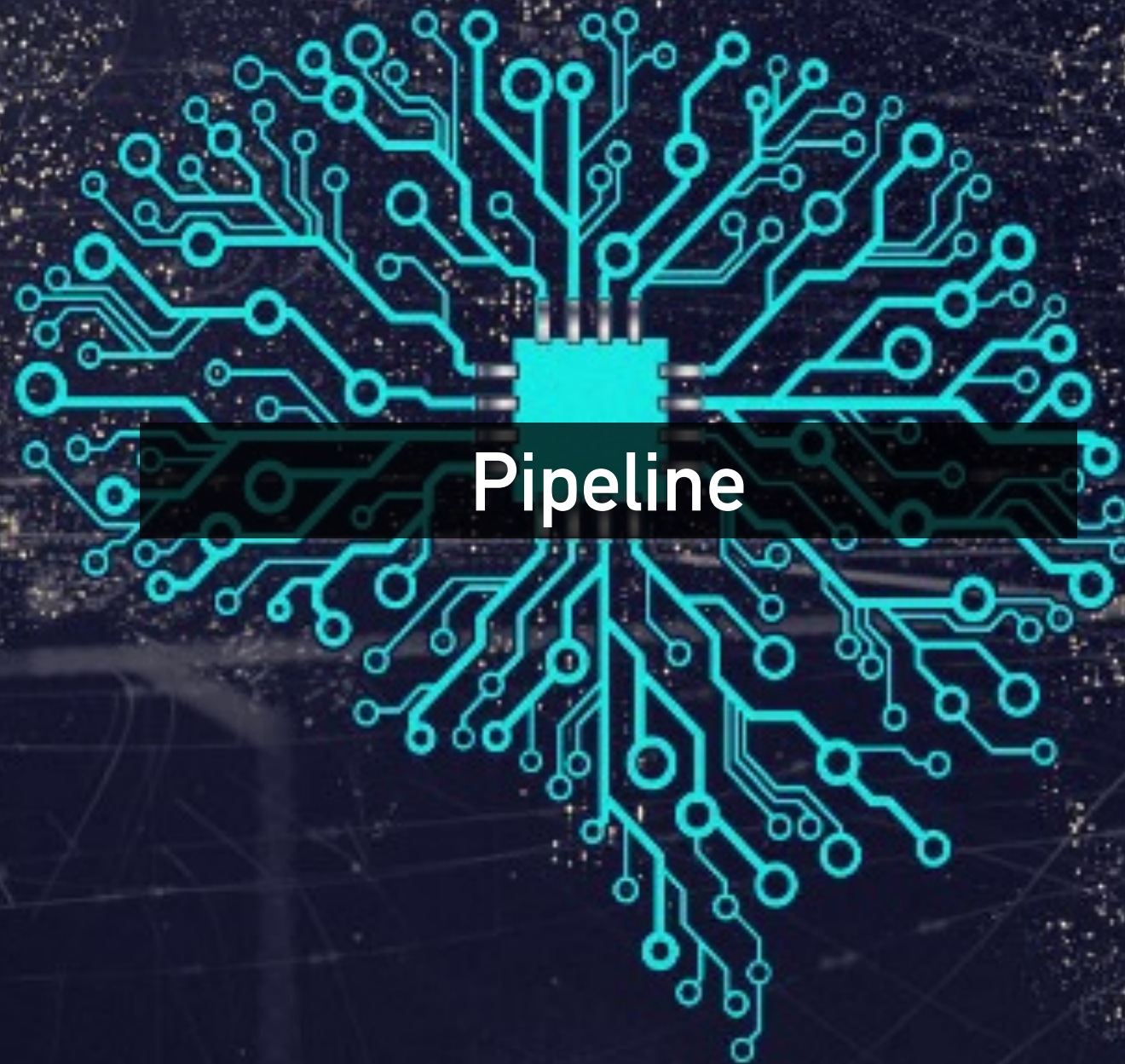


Comparison

Entity ID	Suggestion
Current Case: 47	[Suggestion icons]
Past Cases: 114428	Ins, Rep, Rep, Rep, Rep
Past Cases: 105800	Ins, Rep, Rep, Rep, Rep
Past Cases: 98763	Ins, Rep, Rep, Rep, Rep
Past Cases: 96220	Ins, Rep, Rep, Rep, Rep
Past Cases: 66784	Ins, Rep, Rep, Rep, Rep
Past Cases: 46110	Ins, Rep, Rep, Rep, Rep
Past Cases: 45681	Ins, Rep, Rep, Rep, Rep

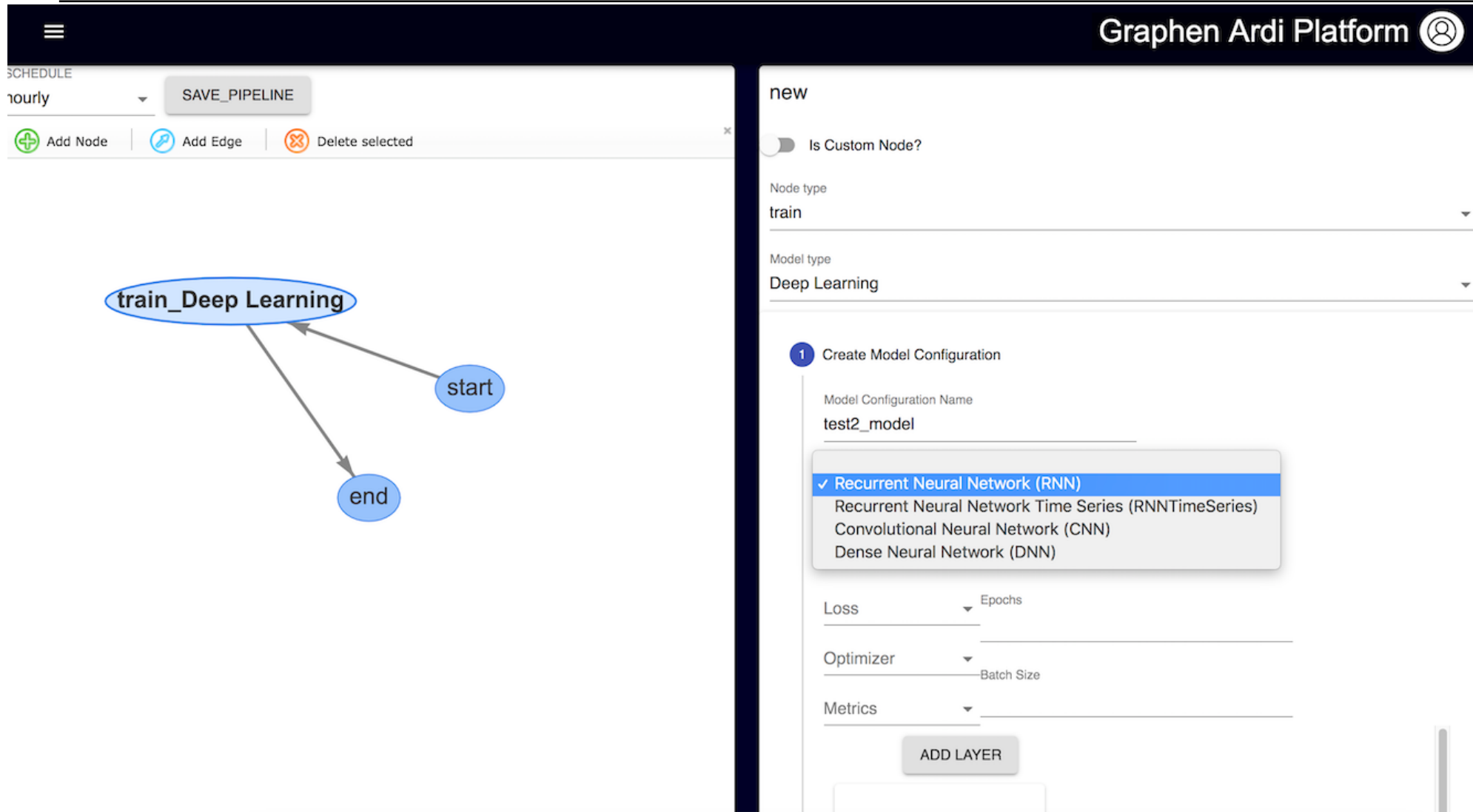
Example: Core-Banking Monitoring Center





Pipeline

Ardi Pipeline Tools



The screenshot displays the Graphen Ardi Platform interface. On the left, a pipeline editor shows a flow from a 'start' node to a 'train_Deep Learning' node, which then leads to an 'end' node. The 'train_Deep Learning' node is highlighted with a blue oval. Above the editor, there are controls for scheduling (set to 'hourly'), a 'SAVE_PIPELINE' button, and actions for 'Add Node', 'Add Edge', and 'Delete selected'. On the right, a configuration panel for a 'new' node is shown. It includes a toggle for 'Is Custom Node?', dropdowns for 'Node type' (set to 'train') and 'Model type' (set to 'Deep Learning'), and a section for '1 Create Model Configuration'. This section has a text input for 'Model Configuration Name' (set to 'test2_model') and a dropdown menu with options: 'Recurrent Neural Network (RNN)' (selected), 'Recurrent Neural Network Time Series (RNNTimeSeries)', 'Convolutional Neural Network (CNN)', and 'Dense Neural Network (DNN)'. Below this are fields for 'Loss', 'Optimizer', and 'Metrics', each with a dropdown and a corresponding input field. A vertical scrollbar is visible on the right side of the configuration panel.

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

Ardi Pipeline Tools

Graphen Ardi Platform

CCHEDULE
every 5 minutes SAVE_PIPELINE

+ 🔗 ✖

```
graph TD; start((start)) --> train_ML([train_Machine Learning]); train_ML --> end((end));
```

new

Is Custom Node?

Node type
train

Model type
Machine Learning

- Create Model Configuration
- Upload Data
- Train Model

All Steps Completed!

RESET

SAVE

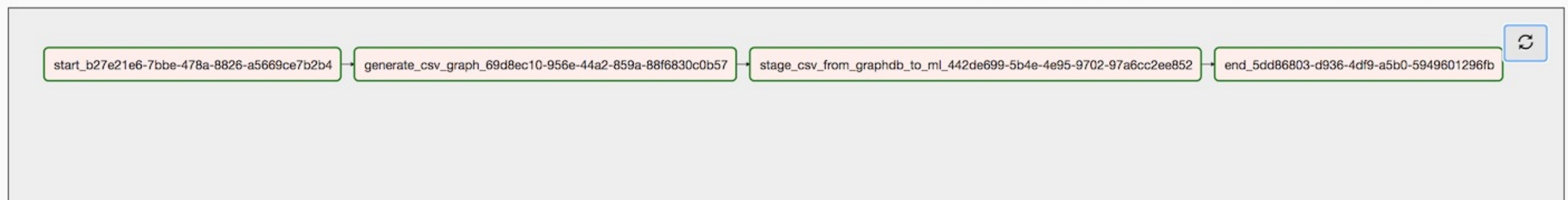
Ardi Pipeline Tools

On DAG: 3 schedule: */5 ****

Graph View Tree View Task Duration Task Tries Landing Times Gantt Details Code Trigger DAG Refresh Delete

running Base date: 2020-06-08 06:50:01 Number of runs: 25 Run: scheduled__2020-06-08T06:50:00+00:00 Layout: Left->Right Go Search for...

PythonOperator success running failed skipped upstream_failed up_for_reschedule up_for_retry queued no_status



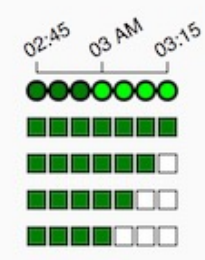
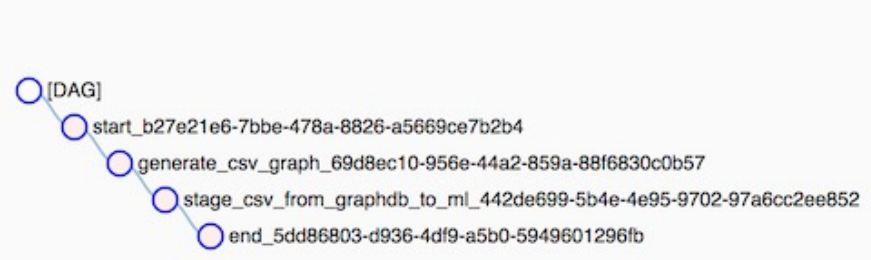
Ardi Pipeline Tools

On DAG: 3 schedule: */5 * * * *

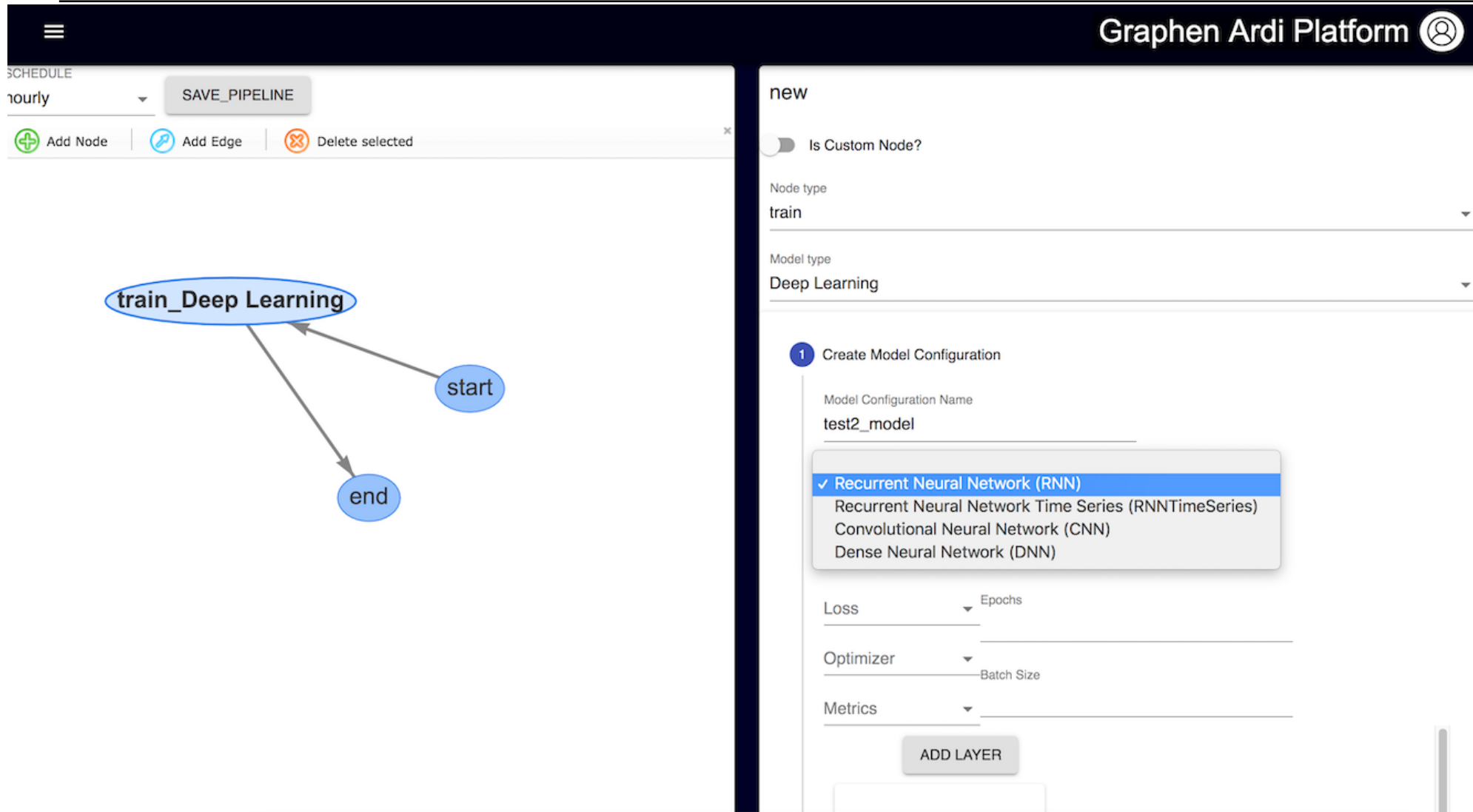
- Graph View
- Tree View**
- Task Duration
- Task Tries
- Landing Times
- Gantt
- Details
- Code
- Trigger DAG
- Refresh
- Delete

Base date: Number of runs:

PythonOperator ■ success ■ running ■ failed ■ skipped ■ upstream_failed ■ up_for_reschedule ■ up_for_retry ■ queued □ no_status



Ardi Pipeline Tools



The screenshot displays the Graphen Ardi Platform interface. On the left, a pipeline editor shows a flow from a 'start' node to a 'train_Deep Learning' node, which then leads to an 'end' node. The 'train_Deep Learning' node is highlighted with a blue oval. Above the editor, there are controls for scheduling (set to 'hourly') and a 'SAVE_PIPELINE' button. Below the editor, there are buttons for 'Add Node', 'Add Edge', and 'Delete selected'. On the right, a configuration panel for a 'new' node is shown. It includes a toggle for 'Is Custom Node?', dropdowns for 'Node type' (set to 'train') and 'Model type' (set to 'Deep Learning'), and a section for '1 Create Model Configuration'. This section has a text input for 'Model Configuration Name' (set to 'test2_model') and a dropdown menu with options: 'Recurrent Neural Network (RNN)' (selected), 'Recurrent Neural Network Time Series (RNNTimeSeries)', 'Convolutional Neural Network (CNN)', and 'Dense Neural Network (DNN)'. Below the dropdown are fields for 'Loss', 'Optimizer', and 'Metrics', each with a dropdown and a text input. There are also labels for 'Epochs' and 'Batch Size' next to the 'Loss' and 'Optimizer' fields respectively. An 'ADD LAYER' button is at the bottom of the configuration panel.

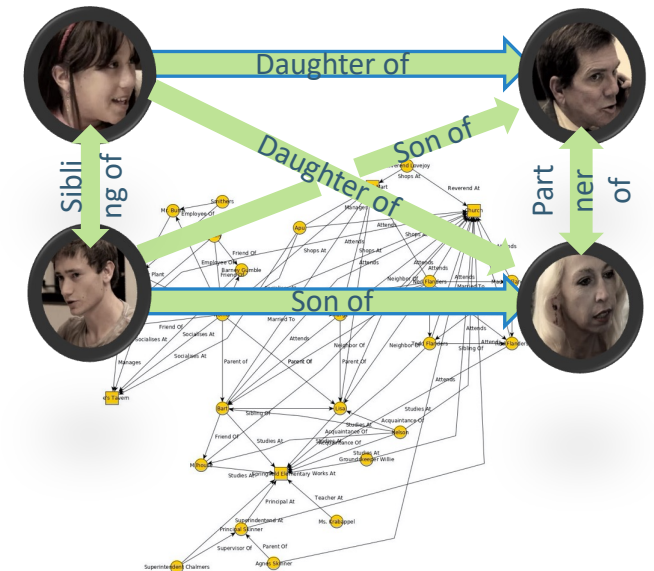
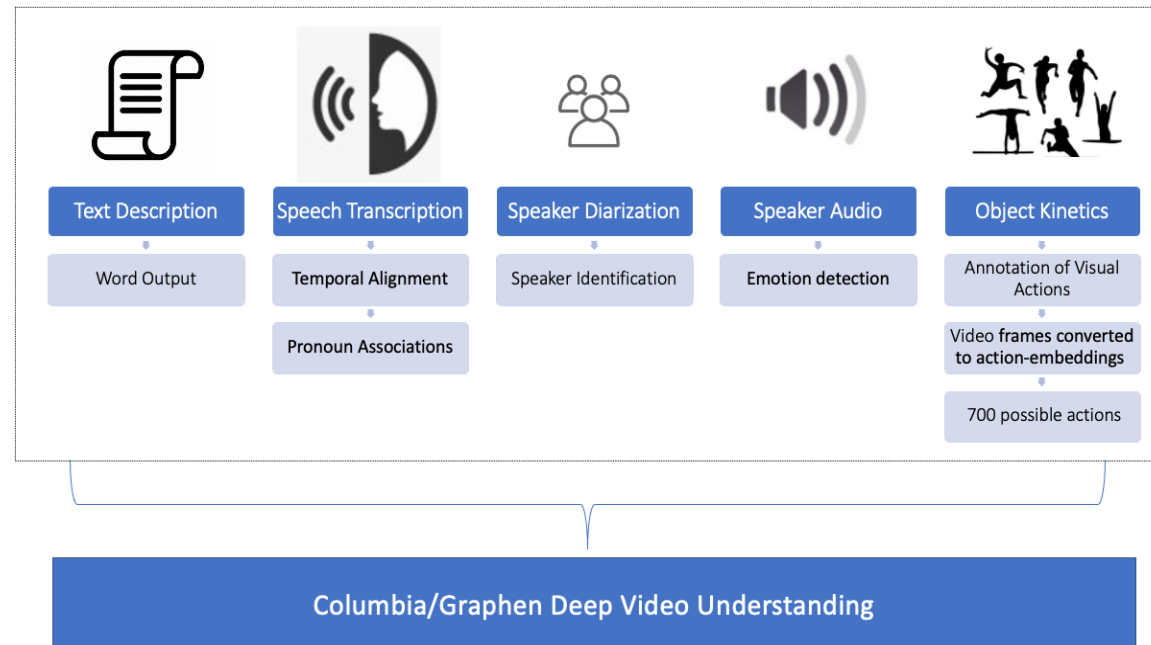
- Scheduling tasks
- Cascading task steps
- Publish for production applications
- Monitoring status of steps



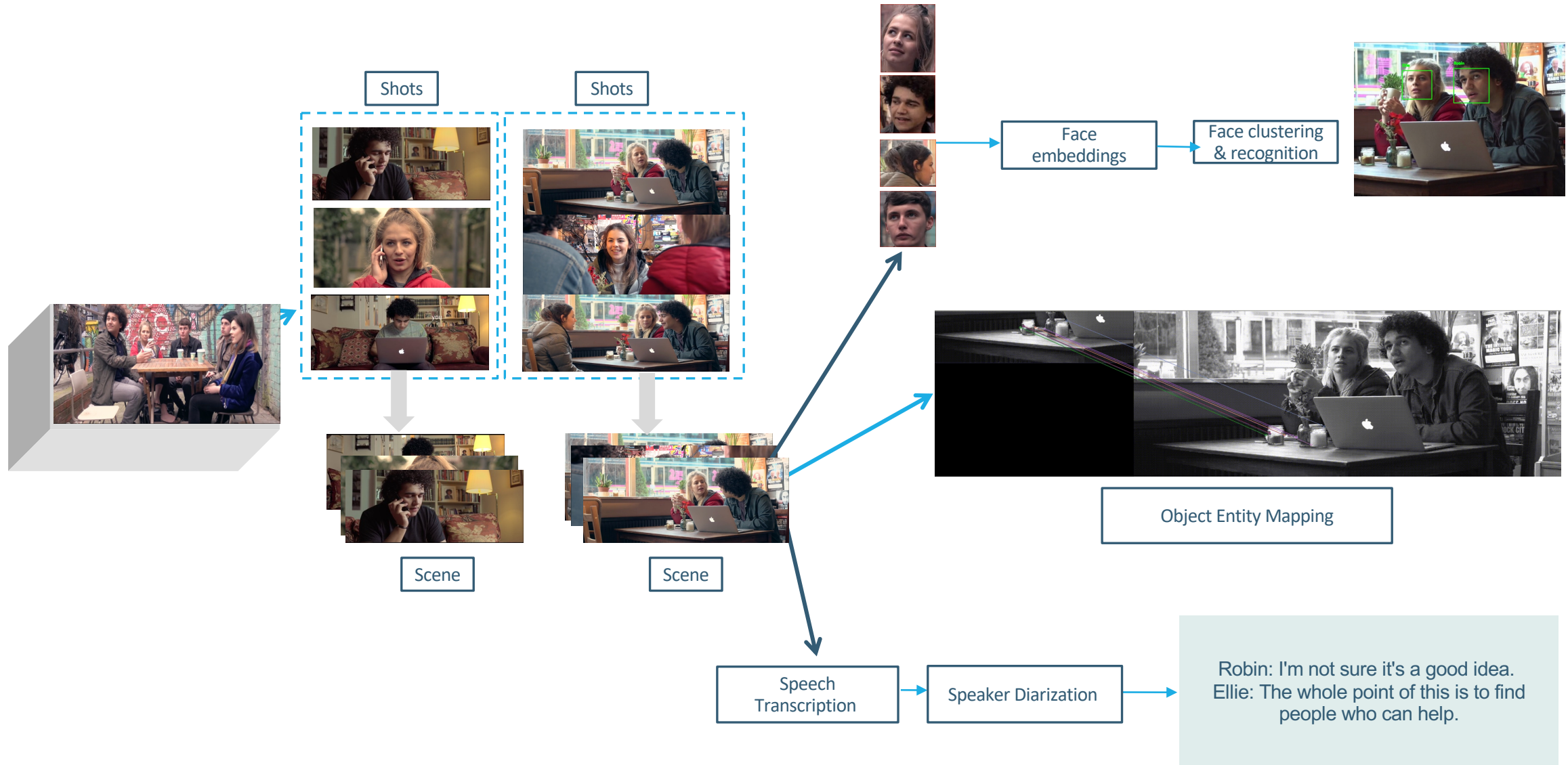
Sense

Graphen Ardi Sense

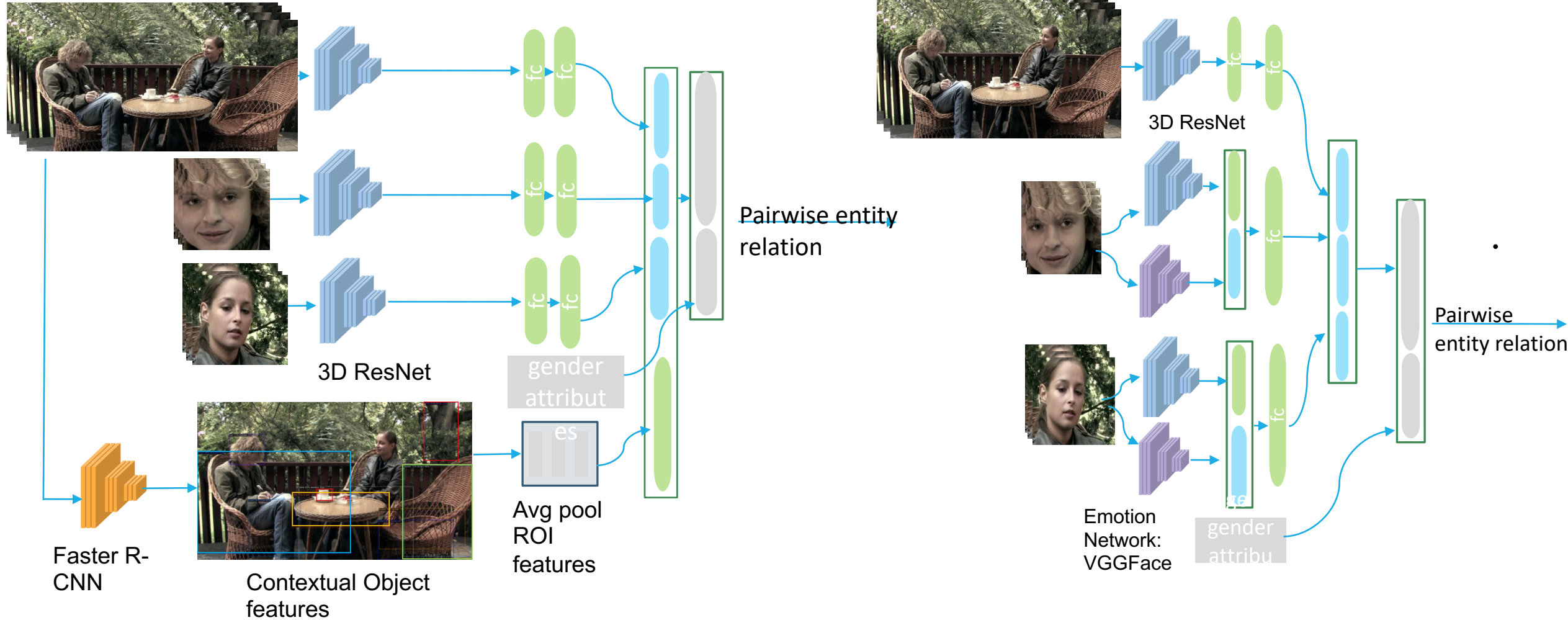
- Visual Recognition
- Speech Recognition
- Knowledge Graph
- Face Recognition
- Emotion Recognition
- Speaker Identification
- Relationship Inference
- Event and Action Understanding



Graphen Ardi Sense – Entity Identification and Relationship & Event Understanding



Graphen Ardi Sense – People Kinetics, Contextual Objects and Emotions



Example: Negative News

ARTIFICIAL INTELLIGENCE SOLUTIONS
Case id: TSD20190430000005 Question B25

<div style="background-color: #2c3e50; color: white; padding: 5px; margin-bottom: 5px;"> Microsoft </div> <ul style="list-style-type: none"> <li style="margin-bottom: 5px;">1.00 Microsoft Corporation 199 <li style="margin-bottom: 5px;">0.95 Fast Search & Transfer ASA 1 <li style="margin-bottom: 5px;">0.95 Microsoft Digital Crimes Unit 0 <li style="margin-bottom: 5px;">0.95 Microsoft Lottery 0 <li style="margin-bottom: 5px;">0.95 Microsoft National Lottery 0 <li style="margin-bottom: 5px;">0.95 Microsoft Tech Support 0 <li style="margin-bottom: 5px;">0.93 privacy@microsoft.com 0 	<div style="background-color: #2c3e50; color: white; padding: 5px; margin-bottom: 5px;"> Cargill Inc </div> <ul style="list-style-type: none"> <li style="margin-bottom: 5px;">1.00 Cargill, Inc. 32 <li style="margin-bottom: 5px;">0.79 CFSE / Cargill Financial Services Europe / FXCFSE 0 <li style="margin-bottom: 5px;">0.79 Cargill Bank of Connecticut 0 <li style="margin-bottom: 5px;">0.79 The Cargill Lumber Co. 0 <li style="margin-bottom: 5px;">0.73 Cargill Wright and Associates 0 <li style="margin-bottom: 5px;">0.71 Cargill RSA (Pty) Ltd 0 <li style="margin-bottom: 5px;">0.71 Cargill Securities LP 0 <li style="margin-bottom: 5px;">0.71 Cargill Uruguay Sociedad Anonima 0 <li style="margin-bottom: 5px;">0.71 Cargill de México SA De CV 1 	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Title:U.S. Court Denies Appeal in Child Labor Case</p> <p style="margin: 5px 0 0 20px;">Major Category:Social/Labour; Social/Labour Minor Category:Human Rights Issues; Discrimination/Workforce Rights Issues Government Action:Yes</p> <hr/> <p style="font-size: 0.8em; margin: 0;">Content Summary:Stocks of for-profit colleges, some left for dead five months ago, have climbed rapidly since November as investors cheer President Donald Trump's talk of easing regulations, the WSJ reports. Last week, for-profit schools got an inkling he might deliver on the promise when the Education Department announced it would delay enforcing rules drafted under the Obama administration. Those rules, known as "gainful employment," threatened to shut down hundreds of for-profit campuses in the next two years due to high debt levels among former students. A lawsuit alleging Nestle, Cargill and Archer Daniels Midland "aided and abetted" child slavery in Cote d'Ivoire can proceed after an intervention by an appeals court in the US.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Title:Biotech Seed Giant Sued Over Lost China Sales</p> <p style="margin: 5px 0 0 20px;">Major Category:Environment/Production Minor Category:Product/Service Issues Government Action:Yes</p> <hr/> <p style="font-size: 0.8em; margin: 0;">Content Summary:Cargill Inc. filed suit Friday against Syngenta Seeds Inc. over a genetically engineered variety of corn that led China to largely shut down imports of U.S. grain. China has been rejecting U.S. corn shipments since November 2013 after discovering the Syngenta corn. In a statement responding to the lawsuit, Syngenta said that it had been "fully transparent" in commercializing the seed. The lawsuits seeks to recover the damages to Cargill's business plus interest.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Title:Fire closes operations at Cargill's Dodge City beef packing plant; cause under investigation</p> <p style="margin: 5px 0 0 20px;">Major Category:Environment/Production Minor Category:Production/Supply Chain Issues Government Action:Yes</p> <hr/> <p style="font-size: 0.8em; margin: 0;">Content Summary:No injuries were reported in the fire Monday night, but 1,000 employees were evacuated and firefighters took several hours to put out all the hotspots. More than 2,700 people work at the southwest Kansas plant. DODGE CITY, Kan. The cause of the fire is being investigated.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Title:FAKTA: Disse selskaber er i skattely i Luxembourg</p> <p style="margin: 5px 0 0 20px;">Major Category:Regulatory Minor Category:Fraud Issues Government Action:Yes</p> <hr/> <p style="font-size: 0.8em; margin: 0;">Content Summary:The documents, disclosed by the Washington-based International Consortium of Investigative Journalists on Thursday, provide fresh detail on how hundreds of the world's biggest companies, including PepsiCo Inc., FedEx Corp. Luxembourg's finance minister, Pierre Gramegna, said at a news conference on Thursday that the problem of tax avoidance by international companies couldn't be solved by his country alone. As Luxembourg's prime minister, Mr. Juncker was a strong defender of his country's tax system, arguing that the country was fully compliant with international standards. France and Germany both support an initiative by the Organization for Economic Cooperation and Development aimed at devising a new international framework for corporate taxation.</p> </div> <div style="border: 1px solid #ccc; padding: 5px;"> <p style="text-align: center; margin: 0;">Title:Sweet Rewards For Consumers As Cargill Inc. Settles Lawsuit Over Marketing Of Truvia Natural Sweetener Products</p> <p style="margin: 5px 0 0 20px;">Major Category:Environment/Production</p> </div>	<div style="background-color: #007bff; color: white; padding: 5px; margin-bottom: 5px; border-radius: 5px;"> Detailed News </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">THE WALL STREET JOURNAL (EUROPE EDITION)</p> </div> <p style="margin: 0;">Content Title: U.S. Court Denies Appeal in Child Labor Case</p> <p style="margin: 0;">Risk Score: 0.25</p> <p style="margin: 0;">Content Language: en</p> <p style="margin: 0;">Content Pub Date: 2016-01-12T00:00:00Z</p> <p style="margin: 0;">Content Word Count: 407</p> <p style="margin: 0;">Direct Url: http://global.factiva.com/redir/default.aspx?P=sa&AN=WSJE000020160112ec1c0000&cat=a&ep=ASE</p> <p style="margin: 0;">Content Body: WASHINGTON -- The Supreme Court on Monday declined to consider an appeal by three major companies seeking the dismissal of a lawsuit alleging they aided and abetted child slave labor on cocoa plantations in Africa. The justices, without comment, turned away an appeal from Nestle SA's U.S. subsidiary, Archer Daniels Midland Co. and Cargill Inc., which deny the allegations and say a federal appeals court erred in a 2014 ruling that revived the case. Representatives for the three companies expressed disappointment that the Supreme Court didn't take up the case, but said they vigorously would defend themselves in further lower-court proceedings. Nestle, the lead company on the petition to the Supreme Court, said child labor goes against what the company stands for. "Nestle is committed to following and respecting all international laws and is dedicated to the goal of eradicating child labor from our cocoa supply chain," the company said. Three Malians, who filed a class-action lawsuit under pseudonyms, alleged they were forced as children to work on cocoa fields in the Ivory Coast for long hours and no pay. They filed their lawsuit in California, alleging the companies were aware of child slave labor on Ivory Coast cocoa plantations and facilitated human-rights abuses through business relationships with Ivorian farmers who are critical to the chocolate industry. A federal trial judge dismissed the lawsuit in 2010 on several grounds, including that the laborers hadn't identified any company conduct with a direct effect on specific wrongful actions by the farmers. In reviving the lawsuit in 2014, a divided panel of the Ninth U.S. Circuit Court of Appeals in San Francisco said the allegations raised the inference that the companies put increased revenues ahead of basic human welfare. Despite Monday's development, it isn't clear whether the case eventually will move forward. The Supreme Court, in a separate 2013 case involving Royal Dutch Shell PLC, limited the ability of human-rights lawsuits to proceed in the U.S. when the conduct took place in foreign lands, though the court didn't bar such cases entirely. The appeals court in the Nestle case said the laborers should have the opportunity to amend their lawsuit before judges decide whether their claims can go forward under the new rules announced by the Supreme Court.</p>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">JUST-FOOD</p> </div> <p style="margin: 0;">Content Title: US: Child slavery lawsuit against Nestle allowed to proceed.</p> <p style="margin: 0;">Risk Score: 0.30</p> <p style="margin: 0;">Content Language: en</p> <p style="margin: 0;">Content Pub Date: 2014-09-08T00:00:00Z</p> <p style="margin: 0;">Content Word Count: 433</p> <p style="margin: 0;">Direct Url: http://global.factiva.com/redir/default.aspx?P=sa&AN=JUFO000020140908ea980005I&cat=a&ep=ASE</p> <p style="margin: 0;">Content Body:</p>

Example: Company Due Diligence

ARTIFICIAL INTELLIGENCE SOLUTIONS

Case id: TSD20190612000001 Question B1

Case Match Result

Industry Prediction:
Forest & Paper Products, Consumer Products, Transportation & Logistics

Industry Prediction Scores:

Case Products:
Sugar Pine Logs, Wood

Products Match Scores:
Not Forest & Paper Products

Database Historical Wordcloud
International Forest Products LLC

Individual Company Match Result

JR Abbott Inc

International Forest Products LLC

International Forest Products LLC

Bloomberg

Google API

International Forest Products LLC

Description:
International Forest Products LLC produces forestry products. The Company offers containerboard, market pulp, recycled fibers, printing and writing papers, paperboard, flexible packaging and a wide variety of logs, lumber, and panel products. International Forest Products serves customers worldwide.

Sector:
Materials

Industry:
Forest & Paper Products

Sub-industry:
Forestry & Logging

Address:
1 Patriot Place, Foxboro, MA 02035, United States

Phone:
1-508-698-4600

Website:
www.ifpcorp.com

Database Historical Match Score:
0.745

Goods-Industry Match Score:
0.889

Industry Wordcloud
International Forest Products LLC

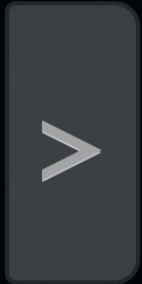
Graphen Personal Whole Genome Analysis

Neurological Disorder
Tumor
Cardiovascular and Immunity Diseases
See your likelihood of cardiovascular and immunity diseases
[Learn more...](#)

External Causes and Other Diseases
Skin and Musculoskeletal Disorder
Respiratory System Disorder
See your likelihood of respiratory system disorder
[Learn more...](#)

Genitourinary System and Maternal Disease
Infectious and Parasitic
Digestive System and Metabolic Disorder
See your likelihood of digestive system and metabolic disorder
[Learn more...](#)

Eye, Ear and Mastoid Disorder



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 likelihood 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 Database
- Relational Database



Database

- Causality Modeling
- Behavior Prediction



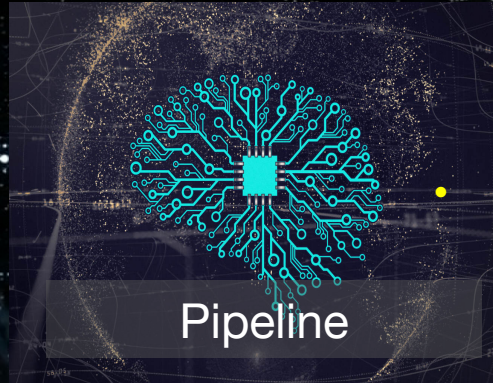
Reasoning

Ardi AI Platform



Analytics

- Graph Analytics
- Feature Engineering



Pipeline

- Production Workflow



Explanation

- Visualization
- ML Explanations



Learning

- Machine Learning
- Deep Learning
- Autonomous Model Optimization



Sense

- Natural Language Processing
- Deep Video Understanding



Strategy

- Action Strategy Simulation

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





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