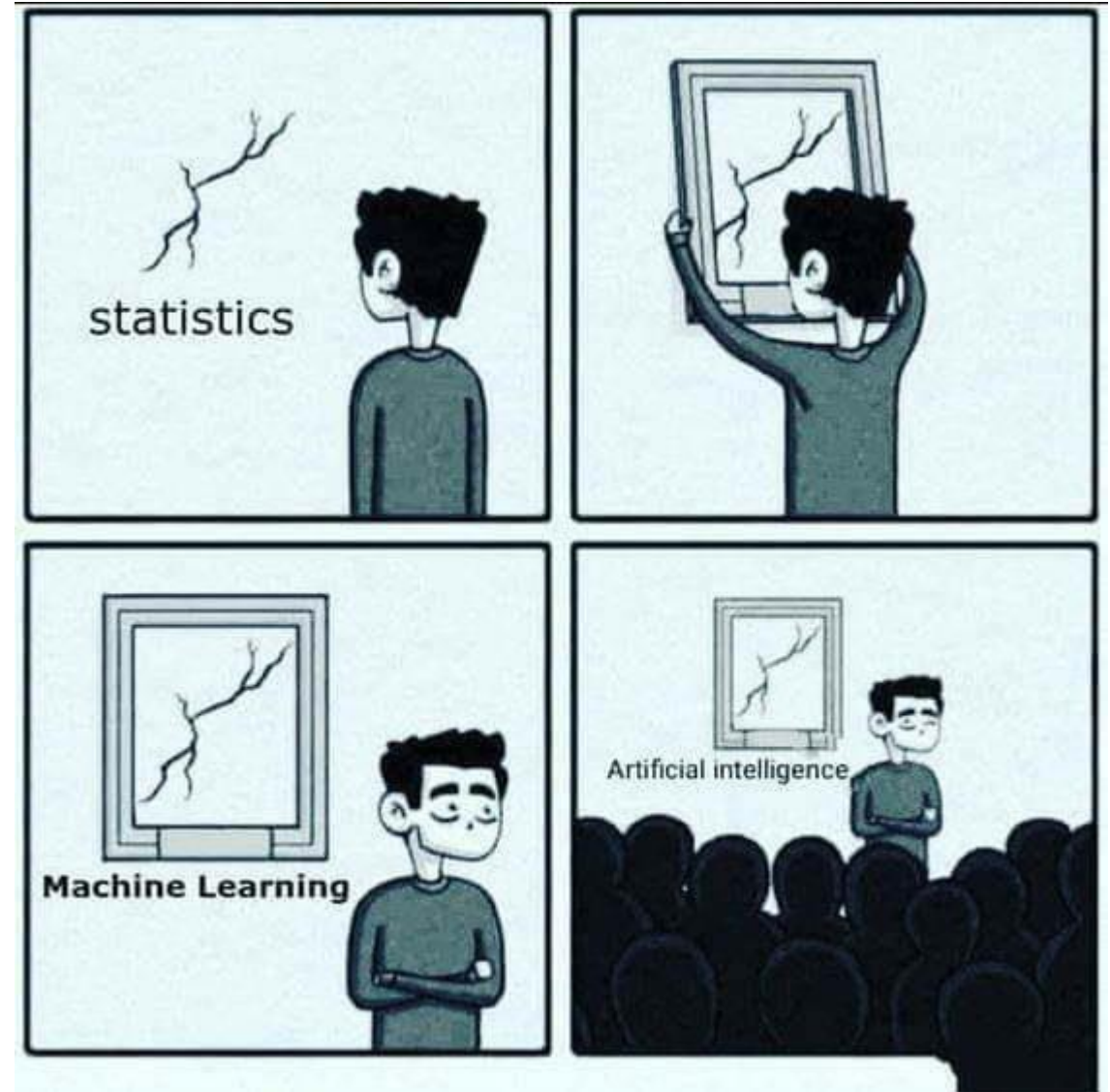


Operational Intelligence

AI AND MACHINE LEARNING IN IT OPERATIONS

A solid blue horizontal bar spanning the width of the slide at the bottom.



Outline

What is machine learning?

Applying ML to IT Ops (AIOps)

Use cases

Getting started

About me

Mark Kalal

Software development / technology solutions

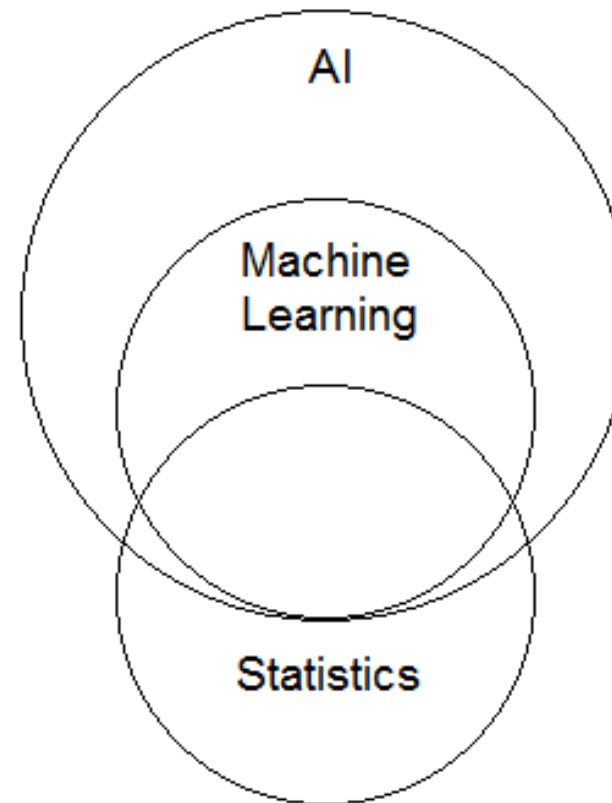
mdkalal@gmail.com

@MarkKalal

What is Machine Learning

Statistics?

Artificial Intelligence?



Learns by experience



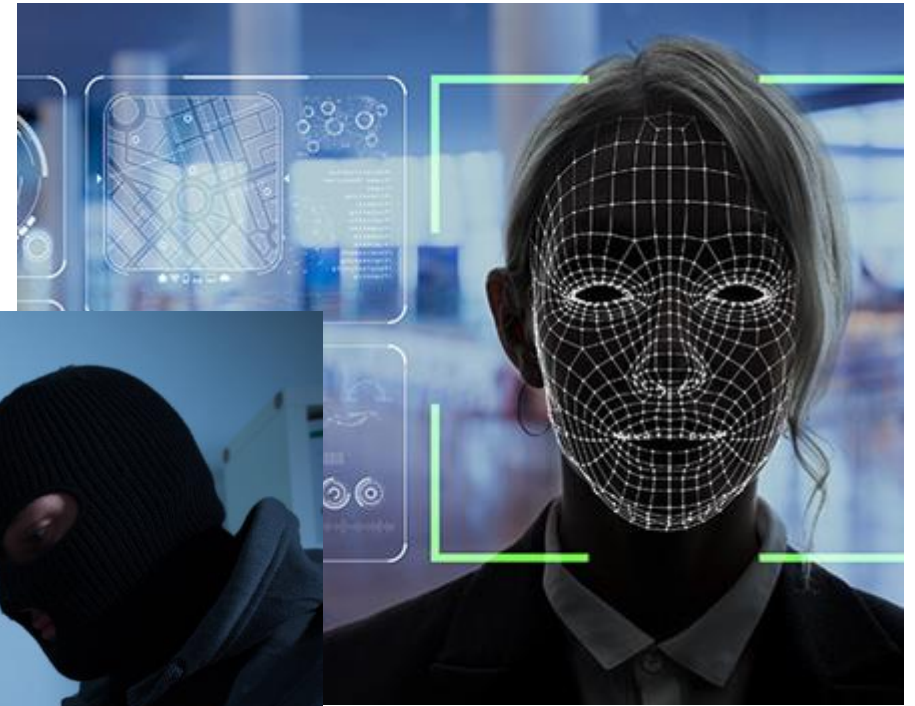
Gets specific instructions



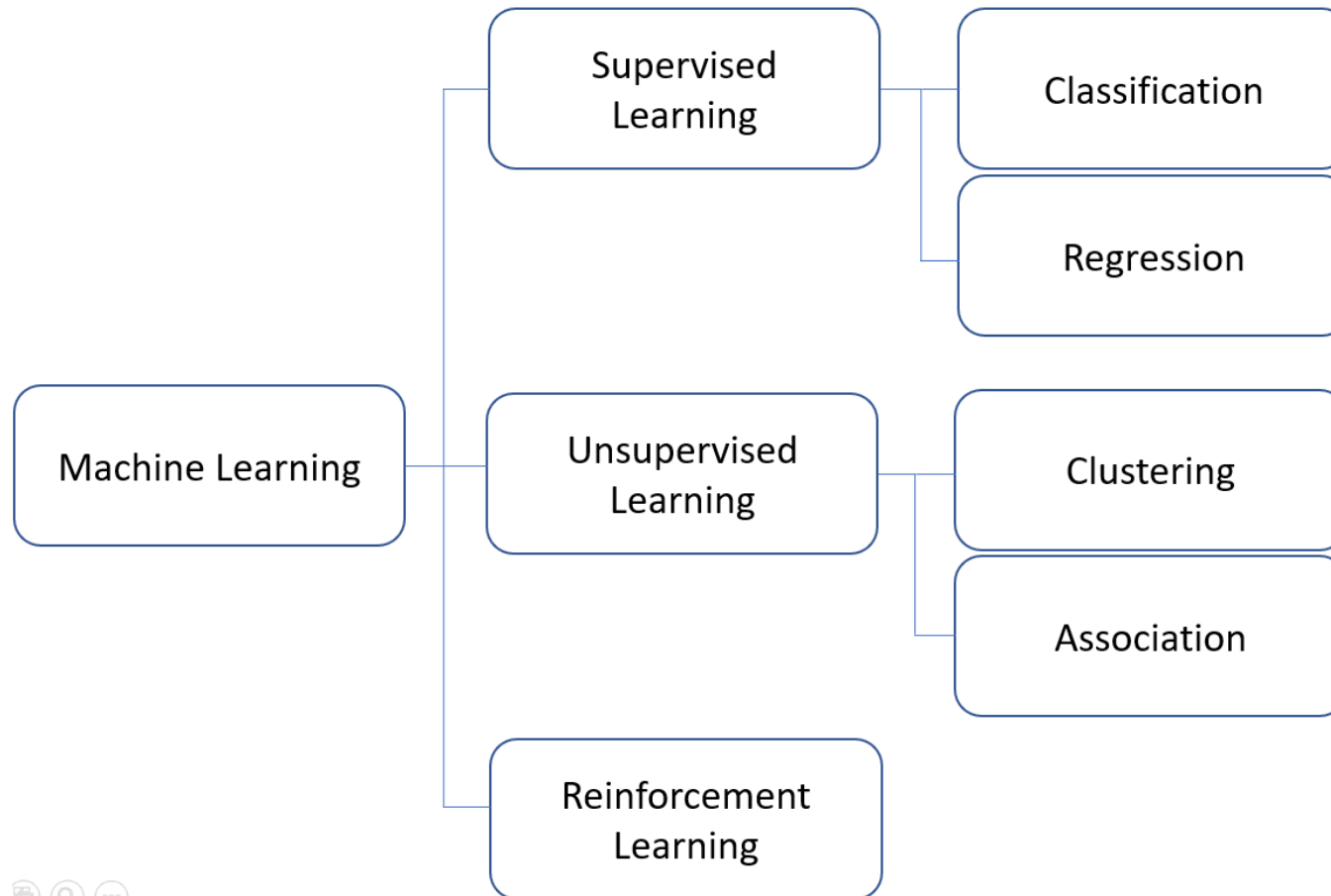
Learns by ~~experience~~ data



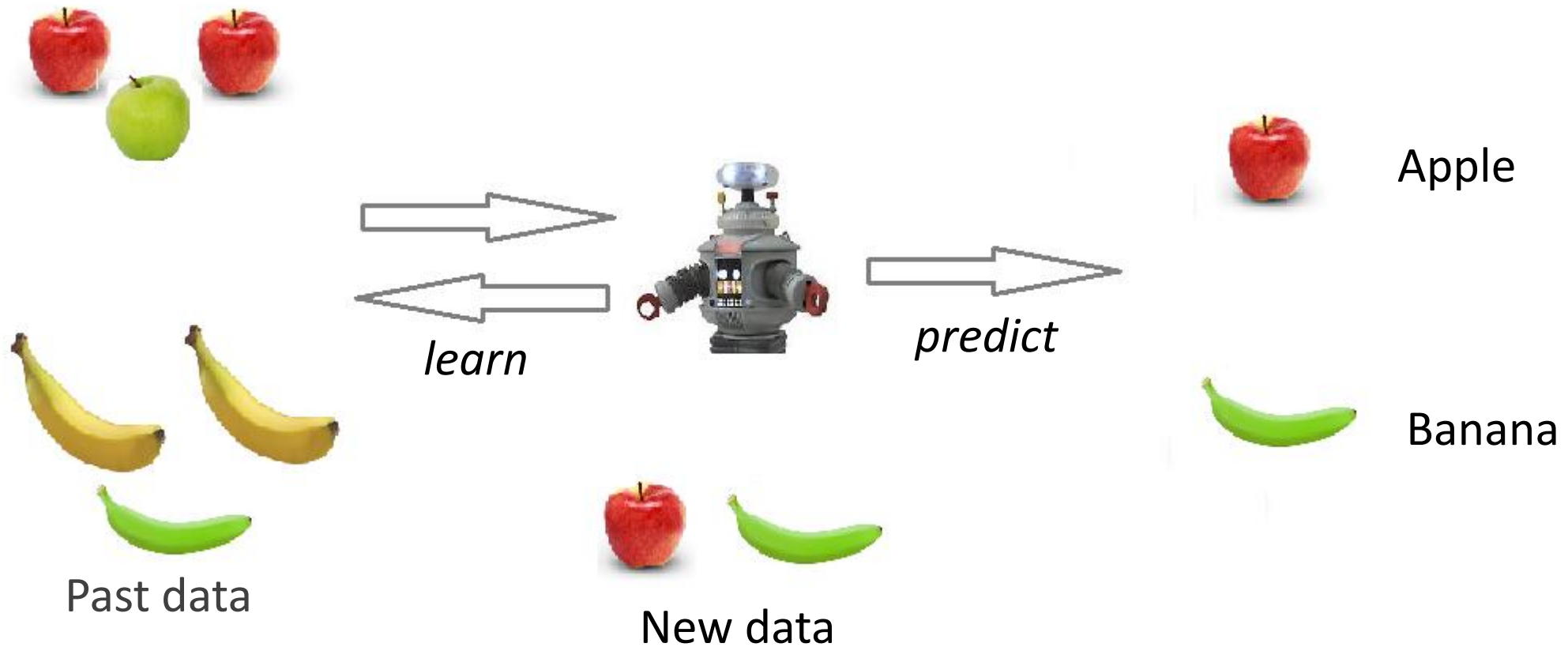
Application of artificial intelligence (AI) that provides systems the ability to learn and improve from “experience” (data) without being explicitly programmed



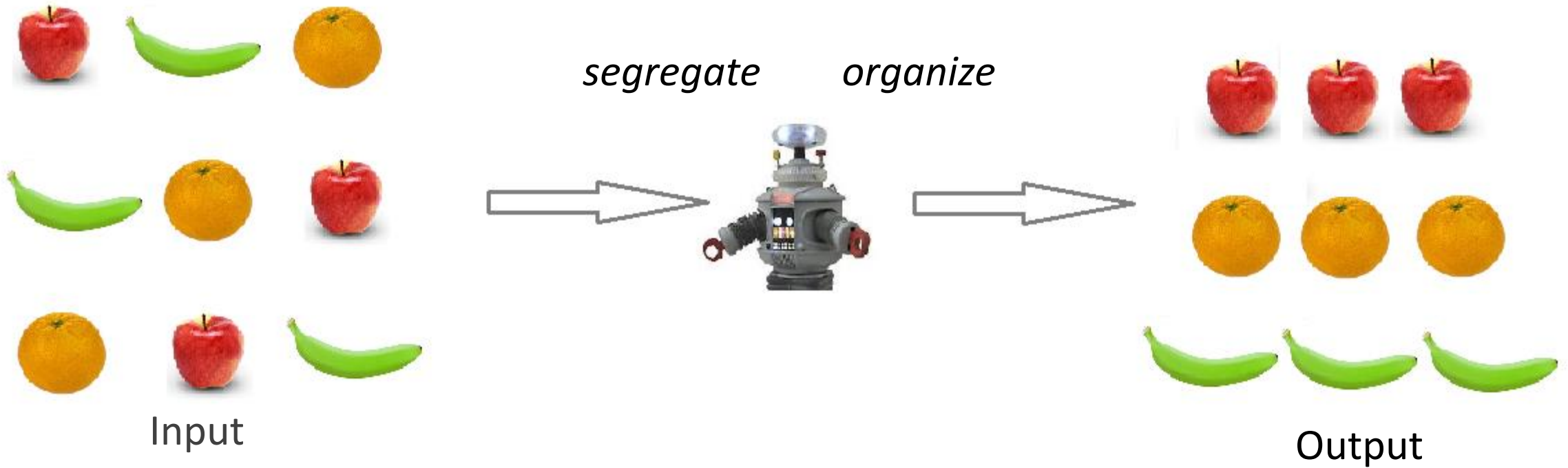
Learning types

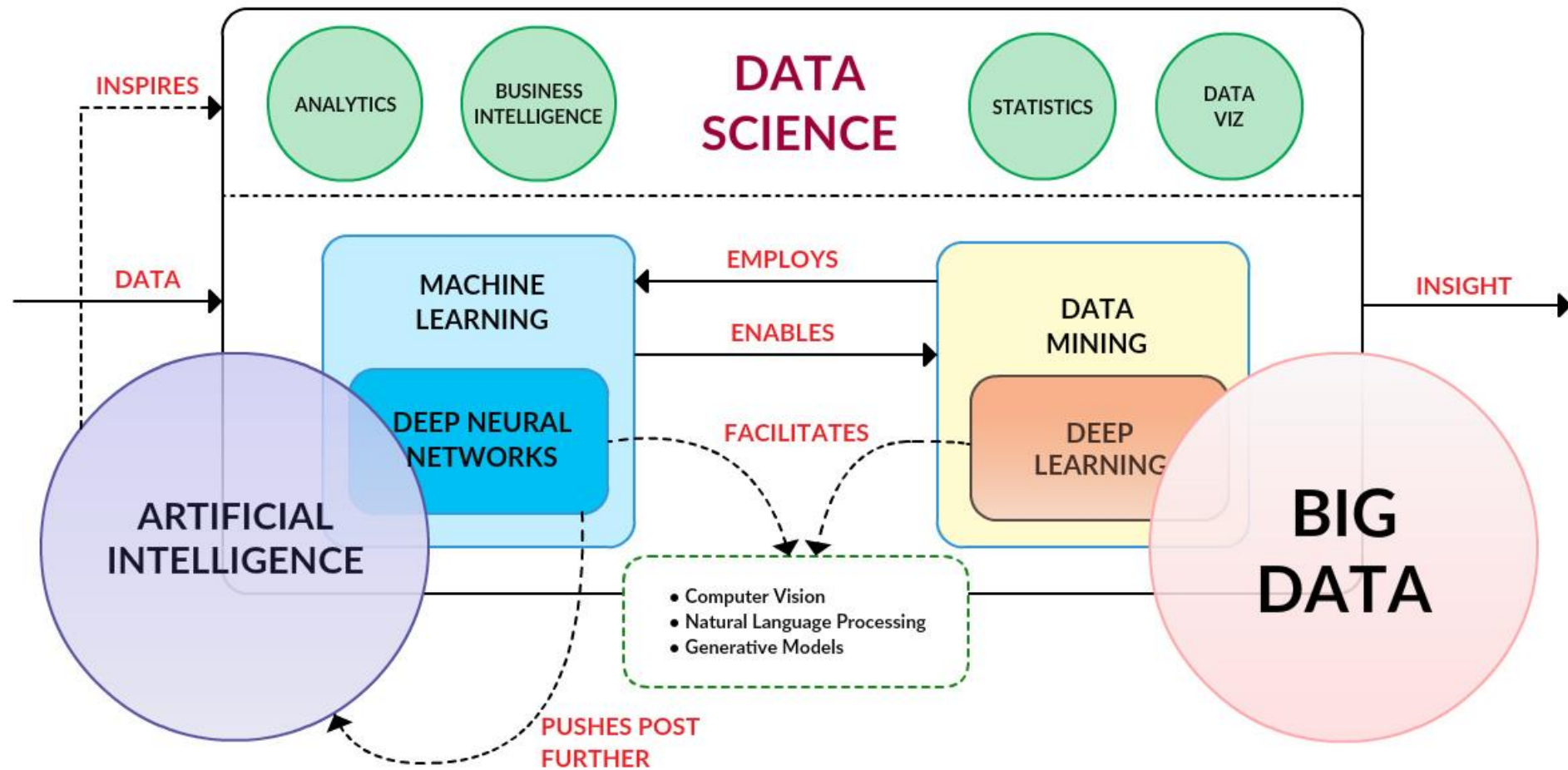


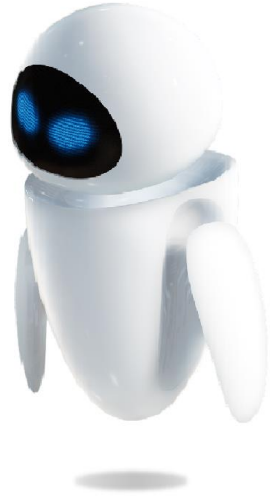
Supervised Learning – make predictions



Unsupervised Learning – finding hidden patterns







My computer suddenly started
singing "Hello from the other side"!

Of course it did, after all ...



It's A Dell!

Applying ML

Addressing pain points

New capabilities

Challenges for IT Operations

Support innovation and digital transformation – while maintaining legacy and traditional systems

Difficulty getting actionable insights out of monitoring tools

“Noisy” and incomplete data

Difficulty performing root cause analysis

High volume of persistent and recurring issues

High ticket volumes (especially for low-level issues)

Pressure from the business to do more without increasing staff

Difficulty addressing issues proactively

Productivity loss and decreased employee satisfaction due to poorly performing technology

Loss of visibility into the environment as organizations adopt SaaS and cloud services

Cont-

Netflix – Three Billion new containers each week

Google – Four Billion containers each week

-451 Research

Every 100ms delay costs 1% of sales

-Greg Linden, developer of Amazons recommendation engine

Machine Learning can help

Learns about your environment

Can handle the known knowns and the unknown unknowns

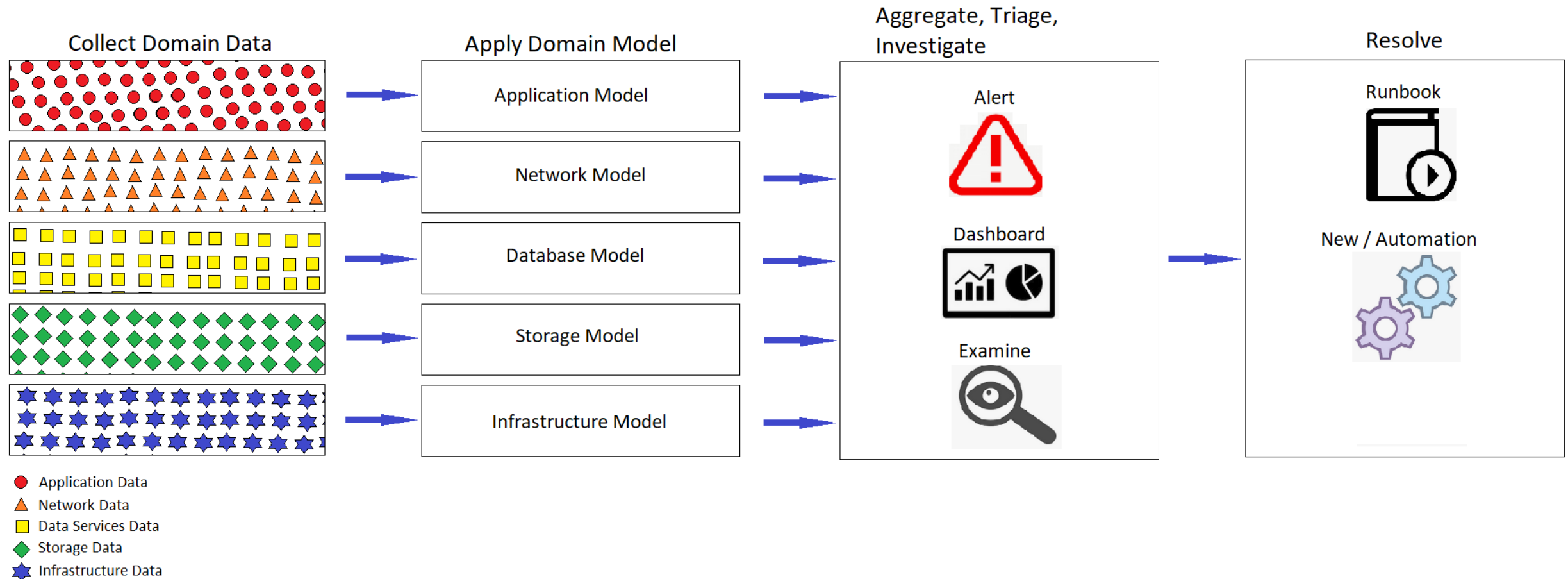
Cost effective and scales

Autonomously respond 24X7X365

New term evolved and tools/platforms are developing with it - AIOps

Traditional approach

Best-of-breed tools, manual processes, ad-hoc automation



ML / AI enables

Move away from silod operations management

Provides intelligent insight

Drive automation and collaboration

Enhance and/or replace a broad range of tasks, including availability and performance monitoring, event correlation and analysis, it service mgmt. and automation

Like what?

Broad category of tools

Incident and problem management

IT operations analytics

Infrastructure management

Capacity management



How?

Event correlation

Anomaly Detection

Predictive Analytics

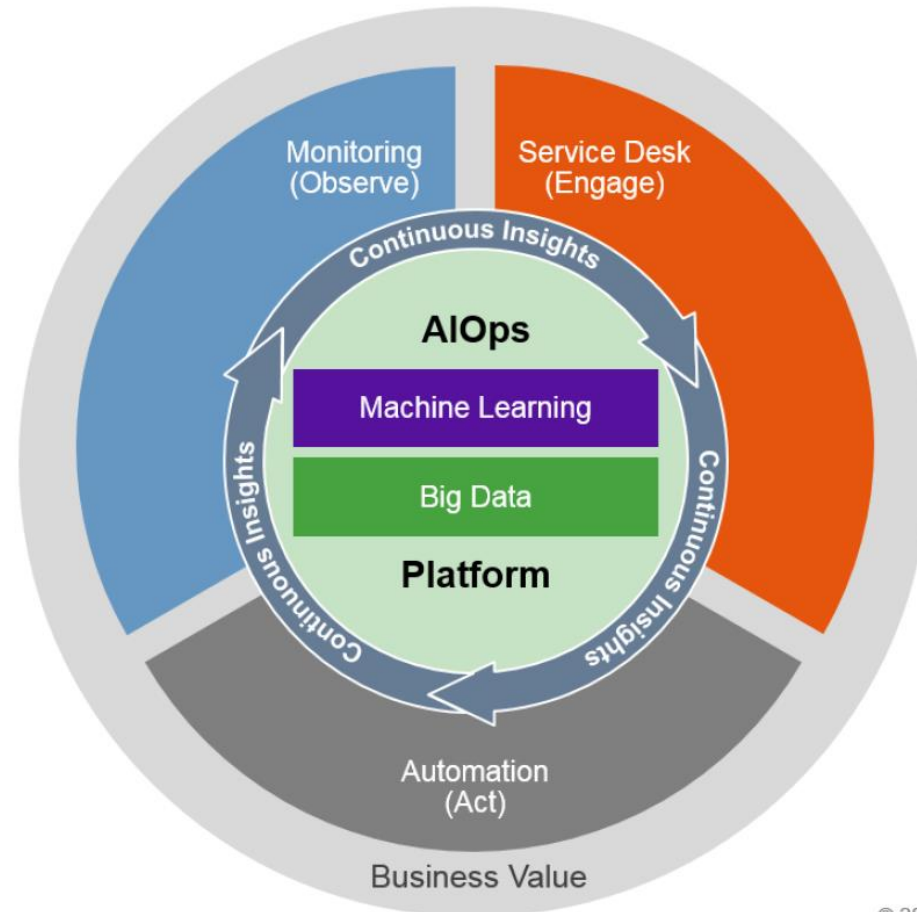
Root Cause Analysis and Reactive Support

Proactive Support

Help Desk Optimization



Visualization

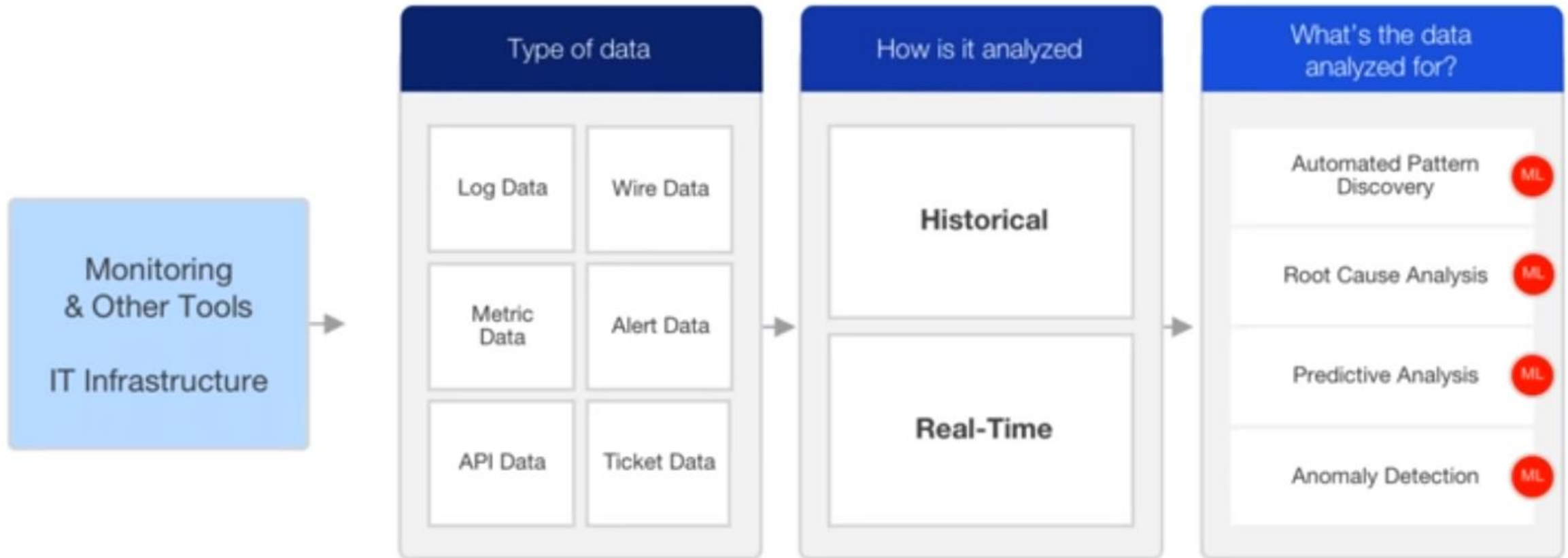


Operational Analytics

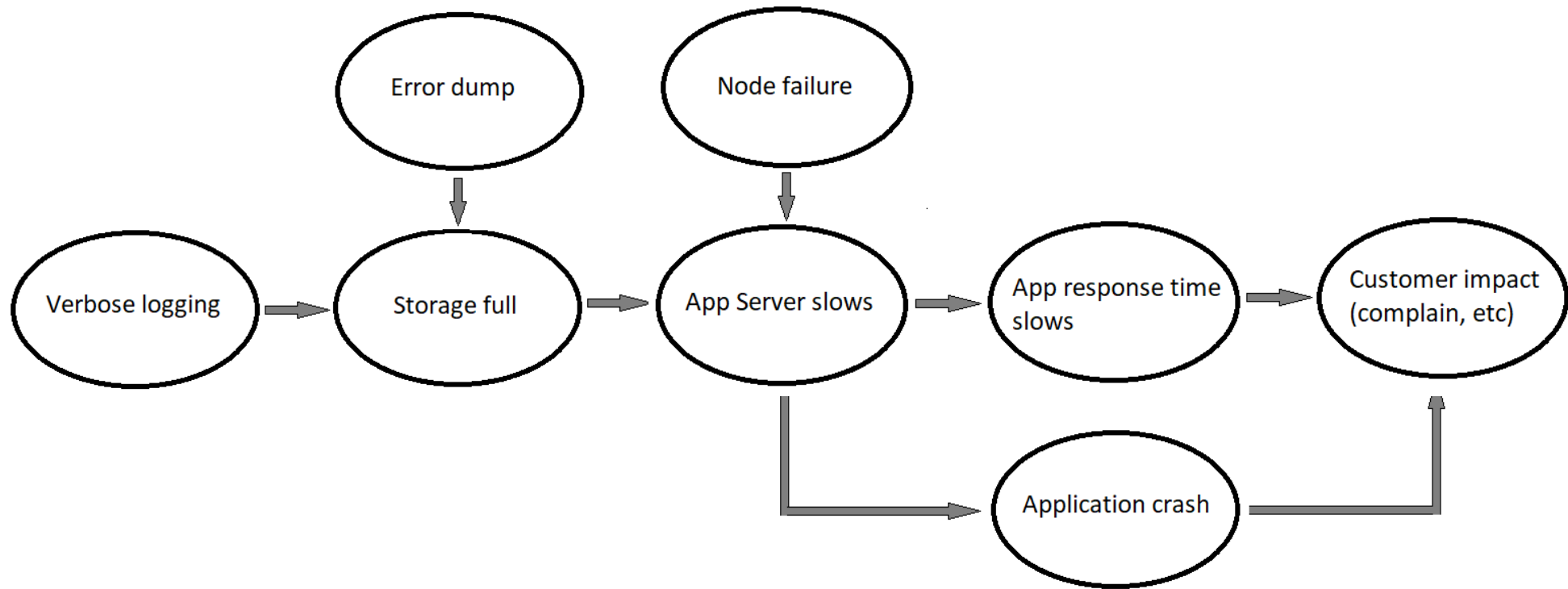
“Operational analytics is a more specific term for a type of business analytics which focuses on improving existing operations. This type of business analytics, like others, involves the use of various data mining and data aggregation tools to get more transparent information for business planning.”

<https://www.techopedia.com/definition/29495/operational-analytics>

Data



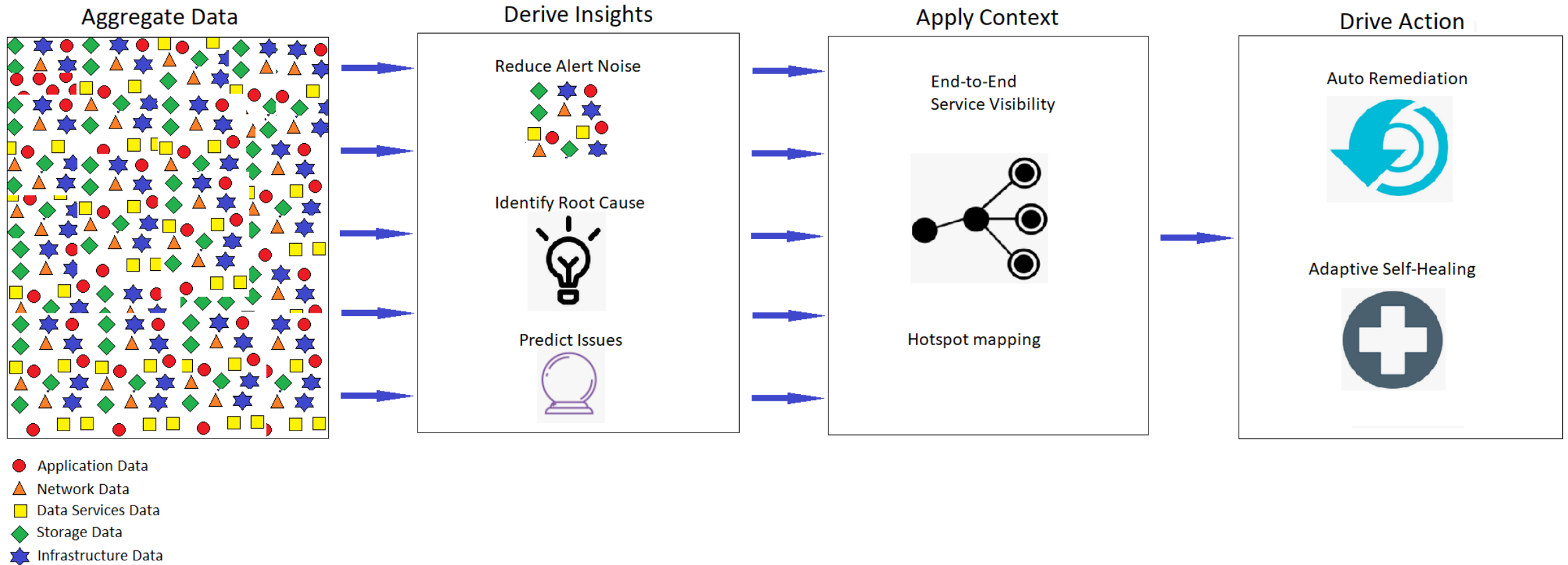
Correlation / Causation



Correlation doesn't imply causation, but it does waggle its eyebrows suggestively and gesture furtively while mouthing 'look over there'
-Randall Munroe

AIOps Approach

Augment IT Ops through comprehensive intelligence and automation





The journalist asked a programmer: "What makes bad code"? His reply?

No Comment!



Benefits

Predict Earlier

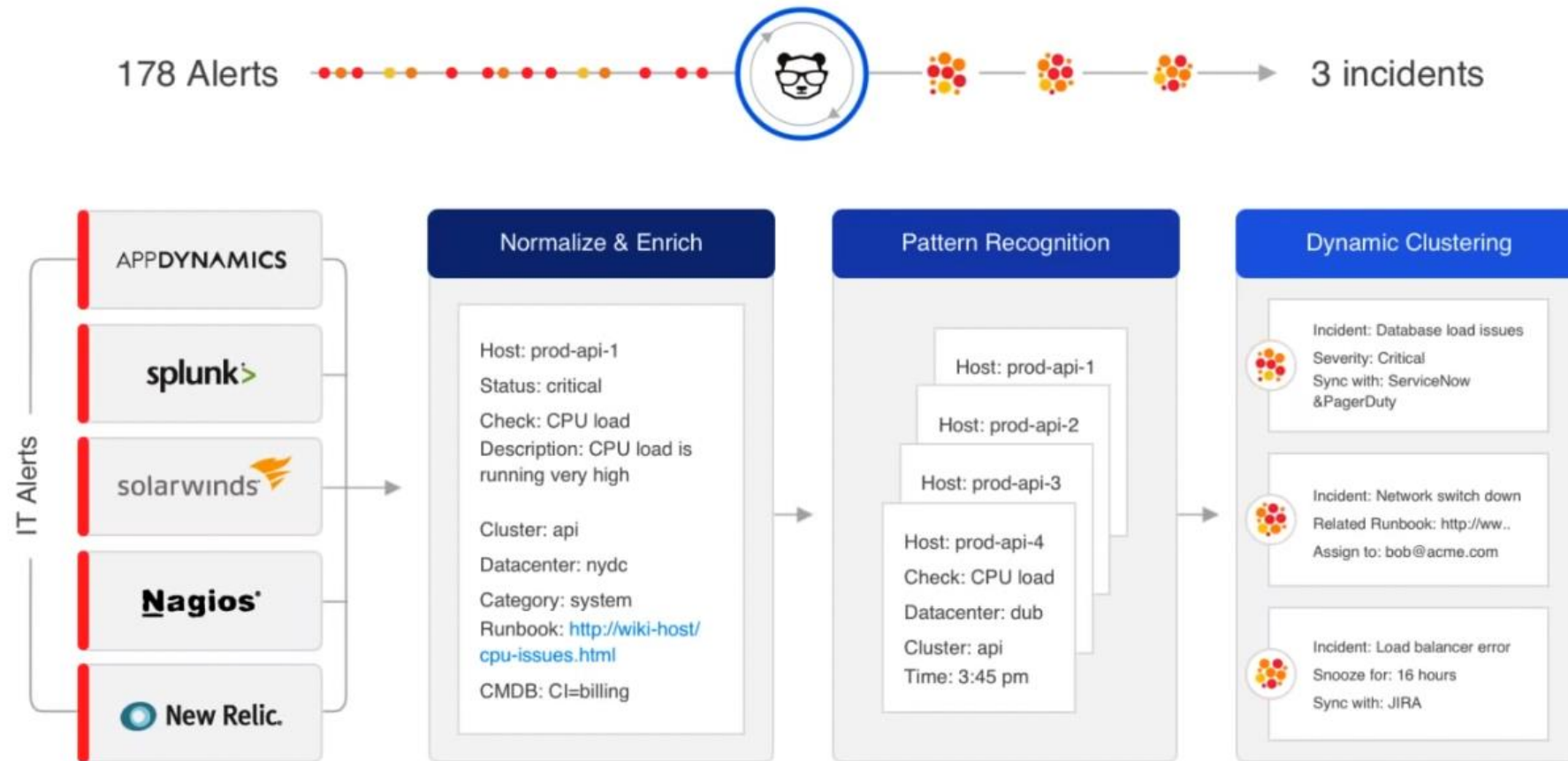
Remediate Faster

Collaborate more efficiently

Continuously Improve



Event Management



Big Panda

Network Availability

Ernest: Efficient Performance Prediction for Large-Scale Advanced Analytics, University of California

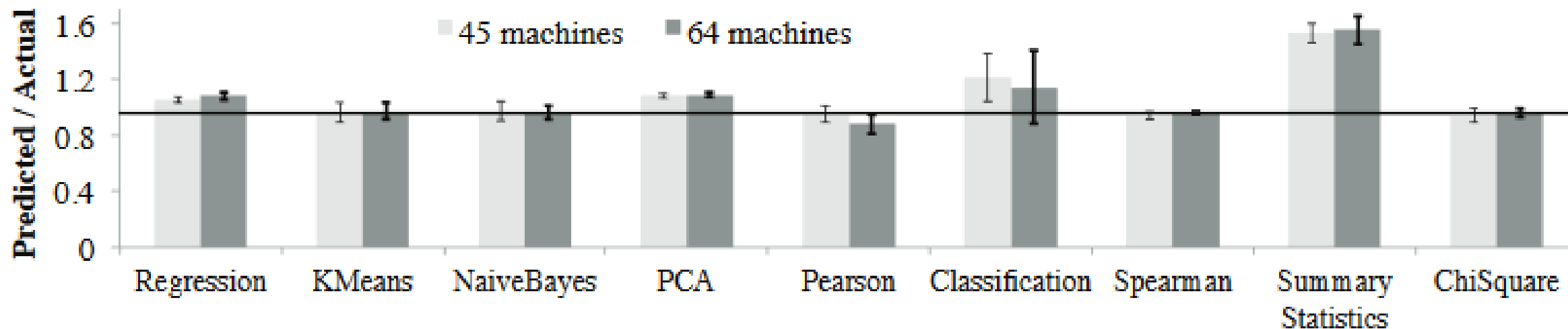


Figure 10: Prediction accuracy using Ernest for 9 machine learning algorithms in Spark MLlib.

UNENIX Symposium on Networked Systems Design and Implementation

<https://www.usenix.org/system/files/conference/nsdi16/nsdi16-paper-venkataraman.pdf>

Automated Problem Resolution

Automated handling of tickets

- Prioritization
- Categorization
- Assignment

Supervised learning classification

- Achieved accuracy up to 90% in automated ticket assignment

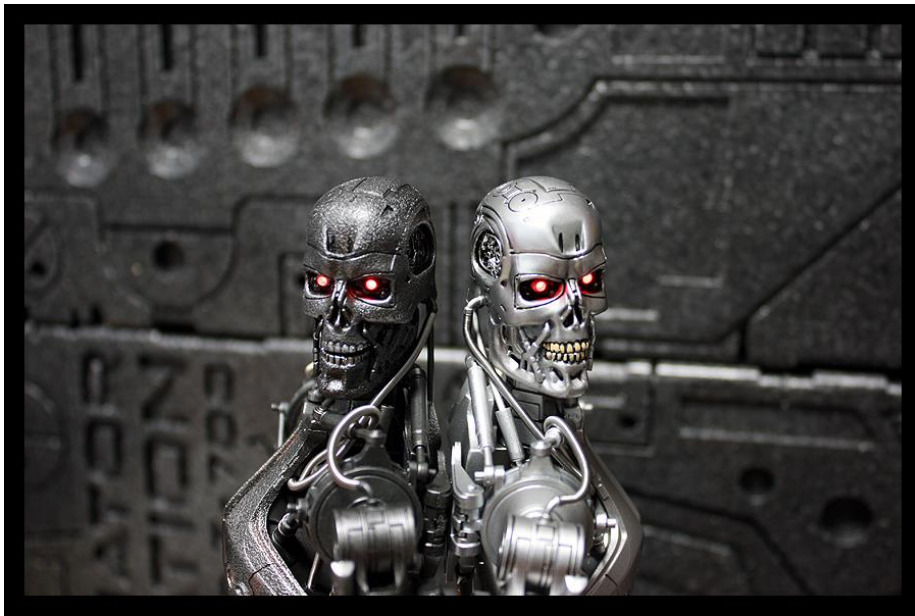
https://www.researchgate.net/publication/281740475_Automated_Bug_Assignment_Ensemble-based_Machine_Learning_in_Large_Scale_Industrial_Contexts/link/55f66f7908ae6a34f6633a76/download

Security

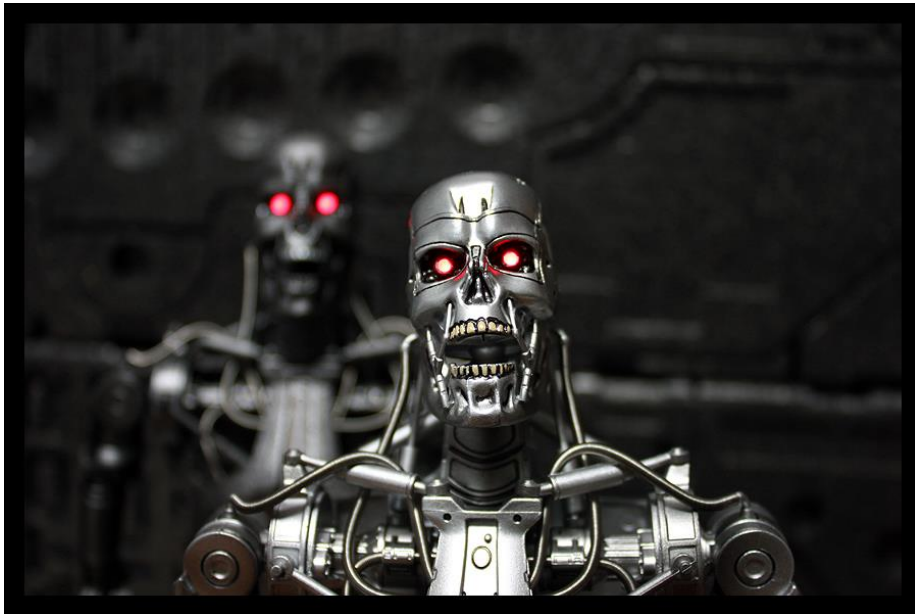
Anomaly detection techniques from machine learning

- Clustering or identifying outliers
- Time series anomaly detection

Feature of many commercial platforms, e.g. IBM X-Force, Anomali ThreatStream, Logz.io

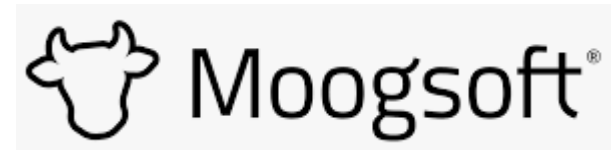


I walked down a street where the houses were numbered 64k, 128k, 256k, 512k, and 1mb



It was a trip down *memory lane*!

Vendors/Products



Starting challenges

1 in 4 companies, half of AI solutions fail

Cost of solution, lack of qualified staff, data quality issues, unrealistic expectations

Broad and ambitious initiatives

Not enough focus

Too many systems

Too much data

Good to know

Can your existing data sources align with desired outcomes?

Does ROI from ML require major changes to tools/processes?

Where does the training data come from?

Insights from historical and active data?

Ability to audit?



Capabilities

Quick wins or rapid ROI?

Can you deploy ML capabilities incrementally

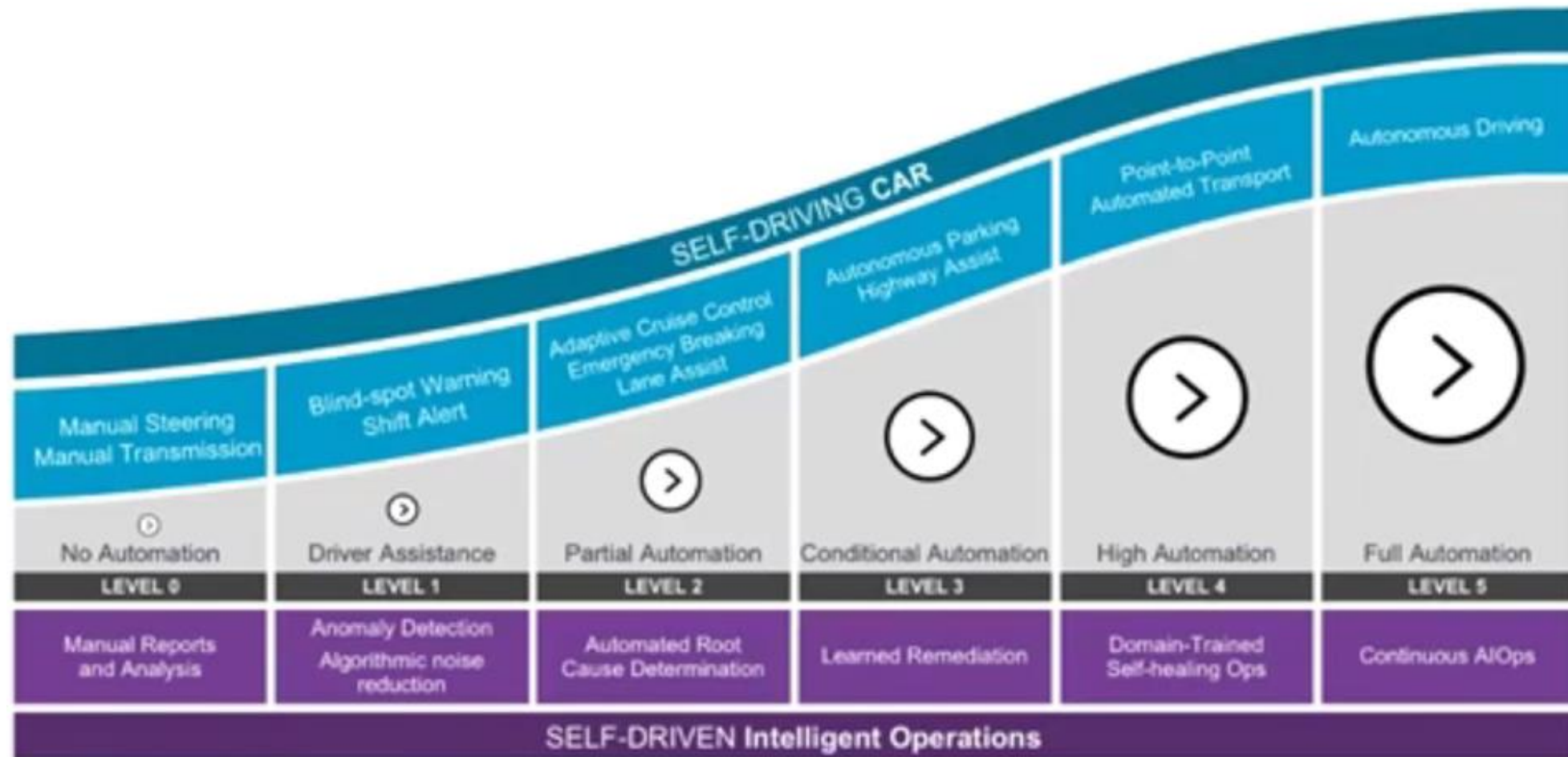
Who develops the ML model?

Algorithms – supervised, unsupervised?

Amount of training data needed?



Journey



Summary

- ✓ What is machine learning
- ✓ Applying ML to IT Ops (AIOps)
- ✓ Use cases
- ✓ Getting started

For more information

Url List - <https://www.theurlist.com/kalal-opsfest-2019>



Introduction to AI - <https://www.coursera.org/learn/ai-for-everyone>

Big Panda webinar - <https://www.youtube.com/watch?v=UYNygjTY4xw>

UNENIX Symposium - <https://www.usenix.org/system/files/conference/nsdi16/nsdi16-paper-venkataraman.pdf>

Automated Bug assignment -
[https://www.researchgate.net/publication/281740475 Automated Bug Assignment Ensemble-based Machine Learning in Large Scale Industrial Contexts/link/55f66f7908ae6a34f6633a76/download](https://www.researchgate.net/publication/281740475_Automated_Bug_Assignment_Ensemble-based_Machine_Learning_in_Large_Scale_Industrial_Contexts/link/55f66f7908ae6a34f6633a76/download)

This slide deck – <https://github.com/mdkalal/aiops>

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Thank you!

Feedback welcome

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@MarkKalal