

Artificial Intelligence, Machine Learning & Analytics

Reinvent Network Management

Mobility is continually evolving from both a client device and infrastructure point of view, and it can be difficult for organizations to keep up with the latest performance, security, and management options out there today. Regardless of the business or objectives, mobility is already part of the environment, and it is only going to grow. So, the question is, how can it be both supported and controlled?

The answer: Artificial Intelligence (AI) and Machine Learning (ML) for IT automation.

An IT Manager's Job is Growing More Complex and Multifaceted

By 2020, it is predicted that 50 billion devices will be connected to the Internet, the vast majority of which are connecting wirelessly. While we've all gotten very comfortable in a world of phones, tablets and laptops, the phenomenon of the Internet of Things is happening.

Accelerating demand for network usage by both users and IoT devices brings increased complexity for network managers. It's adding to the complexity of bandwidth management triggering IT admin to need to identify 'all' of the devices connecting to the network in order to take appropriate measures. In addition, each day or stage of network management brings about different processes and needed procedures. From deployment planning and configuration setup to daily monitoring, reporting and troubleshooting across multiple locations, an IT managers job is growing more complex and multifaceted.

The ever-evolving world of ML and AI means IT can keep up with the ever-evolving world of networking.

What is Artificial Intelligence & Machine Learning?

Machine Learning and Artificial Intelligence have been buzzwords lately, especially when the conversation circles around Big Data and analytics. But what do they really mean, how do they relate to each other, and what effect do they have in networking? ML is a subset of AI, which is an umbrella term for any computer program that does something smart. As knowledge enables wisdom, ML enables AI. In other words, all ML is AI, but not all AI is ML.

MACHINE LEARNING VERSUS ARTIFICIAL INTELLIGENCE

Machine Learning

The overall goal of machine learning is to make the correct prediction based on the data set provided. This means either predicting an outcome based on past outcomes or looking for trends and similarities within the data sets.

Examples of Machine Learning:

- **Character recognition** – Handwriting to text
- **Speech recognition** – Speech to text
- **Email spam detection** – Is this email spam?
- **Google Traffic** – Will there be traffic on a road in the future?

Artificial Intelligence

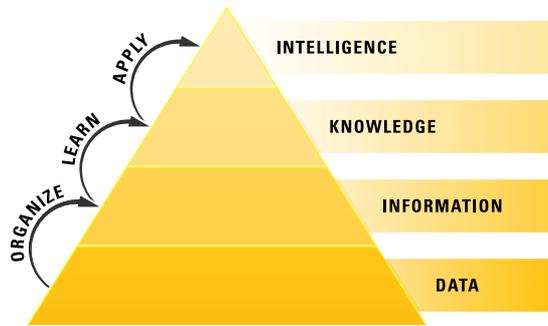
Artificial intelligence enables machines to perform human tasks or mimic human intelligence and relies on the data output gained from machine learning. AI uses that output to make an informed decision, much like a human would.

Examples of Artificial Intelligence:

- **Amazon suggestions** – Based on purchase history
- **Alexa App** – Network Status update
- **Tesla** – Autonomous vehicle maneuverability
- **IBM Watson** – Self-performing on Jeopardy

“Artificial Intelligence is defined as the science and engineering of making intelligent machines.”

– John McCarthy



The ML / AI Paradigm

What does AI and ML have to do with access networking?

The networking industry is using ML to create data baselines that reflect typical network usage. Once those baselines have been created, AI features can be used to alert IT of anomalies and even take action to rectify certain issues without the need for manual intervention. Vendors have been building out platforms and systems that take advantage of ML and AI to do things like simplify monitoring of network health, performance analysis, and reporting on network KPIs, or even providing tools for troubleshooting client devices. ML and AI services allow networks to be managed using insights driven by network performance data that is collected frequently.

There are some inherent benefits to utilizing a network that has AI/ML components built in:

- AI/ML enables IT teams to automate previously manual tasks decreasing the time and budgetary overheads attributed to manual processes
- The ability to provide increased visibility, rapid analytics and insights into network performance & user experience
- Capturing data will come from a variety of sources including IoT and edge devices (as well as mainframe and enterprise systems)
- Growth in using ML in applications such as network threat monitoring and giving IT teams better insight into how enterprise network speed, power, efficiency and intelligence can be improved

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Infrastructure requirements needed to support AI and ML

Cloud Architecture

Cloud networking and cloud architectures are the unifying factor that enable ML and AI. The most recent 3rd generation of cloud services is focused on real-time innovation and adding features that relate to ML and AI. Continuous operation and real-time innovation as it relates to cloud means that operations of applications and data services are continuously available without interruption – downtime is unacceptable. Delivery of releases, updates, and patches are fully automated.

Microservices

It is very important to look for a microservices based architecture to take advantage of AI and ML.

Microservices is a software development technique that structures an application as a collection of loosely coupled services. The benefit of a true microservices architecture is that the application is broken down into smaller modules and services, enabling parallel development and updating as well as improving resiliency and scale. Each of these services can be deployed, tweaked, and then redeployed independently without compromising the integrity of an application. Microservices based architecture is an evolutionary design and is ideal for systems where IT can't fully anticipate the types of devices that may one day be accessing the network...which is perfect for the ever-evolving world of ML and AI.

“Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed.”

– Arthur Samuel

Analytics

Network analytics is the driving force behind ML and AI. No analytics means no data which means no ML and therefore, no AI. Analytics provide a wealth of valuable data on overall network performance, both real-time and historical, about the devices, clients and applications accessing a network. More recently, comparative analytics leverages big data technology, providing admins with the ability to compare their network performance against the average, anonymized metrics of other deployments. With this, IT can recognize and address network performance issues proactively, before they even become noticeable for the employees and users on the network, allowing networks to run at peak performance and keeps users satisfied.

Aerohive: Continuously innovating with AI and ML

Aerohive has extended its Cloud Networking leadership with native ML and AI capabilities to radically simplify and secure the access network. ML and AI tools enable users to view key performance indicators of a network and if need be, to quickly identify, locate, and comparatively assess the context of an issue.

- The combination of Machine Learning and Artificial Intelligence means networks are increasingly more intelligent, even as capacity needs and density increases
- Track network health and performance with Network 360 to view key performance indicators that can be adjusted for day, week, and month
- Collect, process, and analyze vast amounts of client experience data, and distill the data to consumable and actionable insights, with Client 360
- Comparative Analytics anonymously compares network performance metrics against other Aerohive customer Wi-Fi deployments so an IT administrator can recognize and address network performance issues proactively before they become noticeable for users on the network

◀ ***ML and AI tools enable users to view key performance indicators of a network and if need be, to quickly identify, locate, and comparatively assess the context of an issue.***