



MACHINE LEARNING AS A SERVICE (MLAAS)

CONTENT

DaaS:
Foundational
aspects

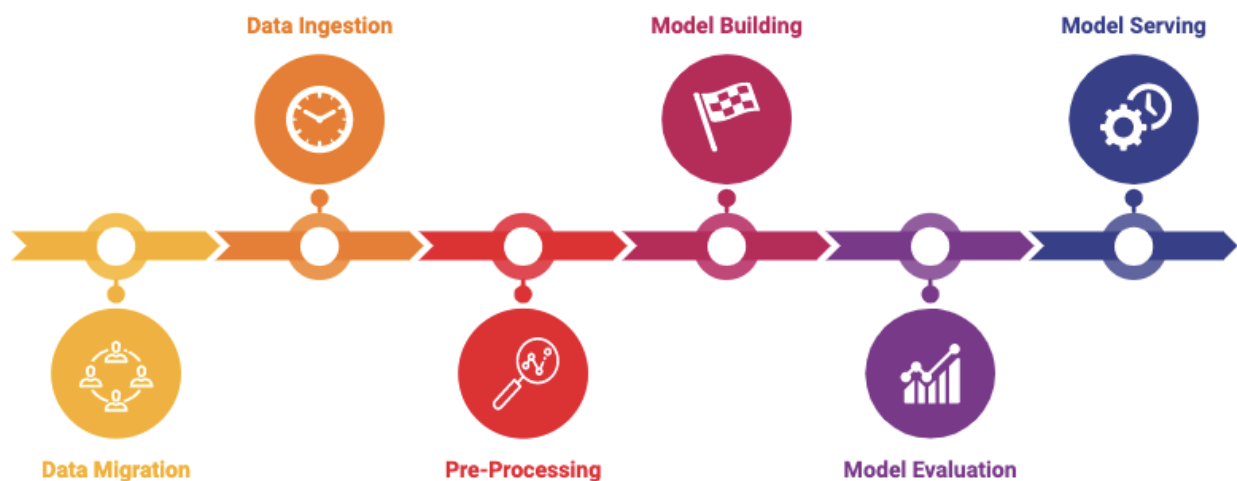
Rethinking model
as a service

MLaaS on Google
Cloud

INTRODUCTION



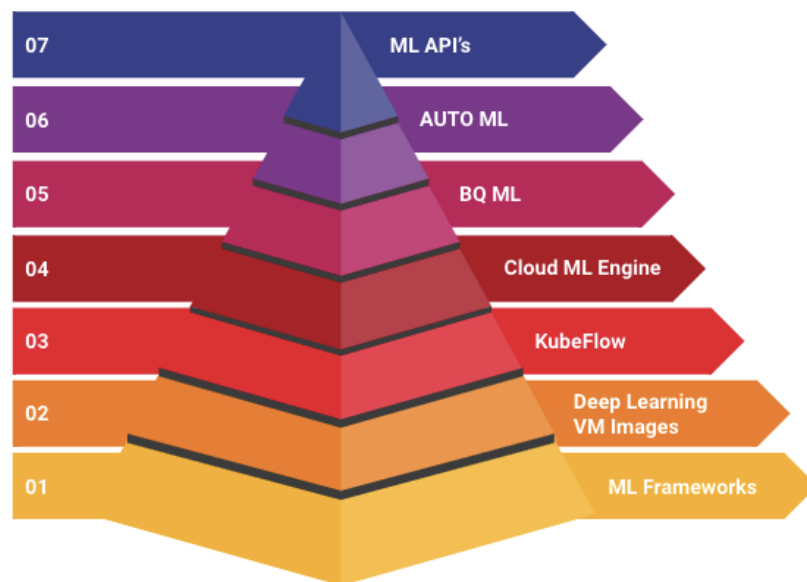
ML as a Service provides us the ability to execute the Machine Learning Model Serving as an API service, once model training is completed. The state-of-the-art as shown below includes data extraction, data ingestion, pre-processing and model serving as the major component apart from solely focusing on model building and evaluation. The framework also provides an interoperable, easier and faster to scale environment, intending us to build an end-to-end solution into production by provisioning the taste of real-time Machine Learning Models.



To quote the Four Seasons Hotel... "Systemize the predictable, so you can humanize the exceptional." There are several ways to deliver a model as a service for a downstream product team, few approaches have been discussed in the paper below. Also, the main benefits observed among the clients using Machine Learning Model as a Service are as follows -

- Faster deployment rates leading to reduced delivery time
- Building more standardised solution lead to reduced custom development efforts
- Having the flexibility and dexterity to adapt to future changes
- Project scoping is significantly improved by enabling confident estimates of the resources required.

A prime example of MLaaS, Organizations can develop personalized solutions for their internal clients by creating individual recommendations to their users, based on their desired specifications. The procedure begins by processing and examining clients company data, followed by identifying meaningful insights, generating ML recommendations by selecting the right algorithms and training a personalized model customized to clients requirements.



Google Cloud ML Decision Pyramid



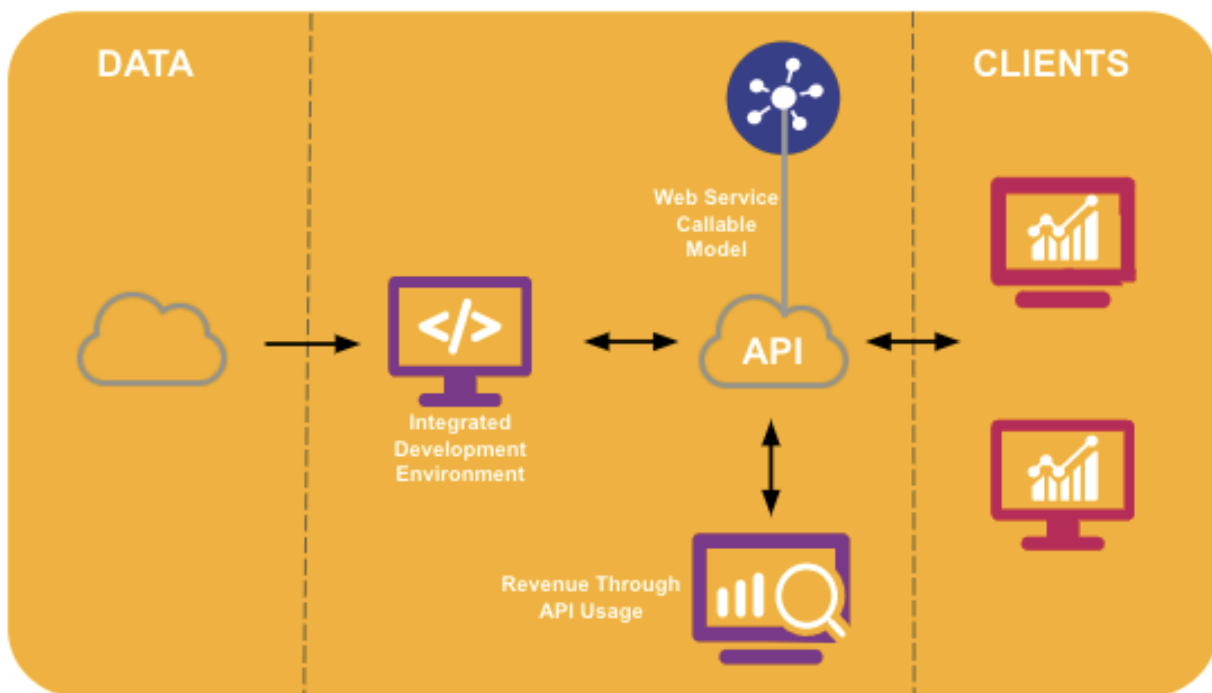
**DIGITAL TRANSFORMATION LEADING
TO GROWTH WITH MLAAS**

As new technologies such as Machine Learning, Industrial Internet of Things (IOT), Digital Engineering, Intelligence Economics, Artificial Intelligence, Virtual Reality and Robotics are rapidly growing, Organizations are under massive pressure to rethink not just their design and technology strategy but also their entire operational strategy. Hence the pace of disruption is only set to increase. Our speculation based on the research is quite simple - Due to the ongoing digital trend every small or big business will become digital. This new normal will push your Organization to explore, deploy and scale with the new digital technologies and also make them relevant to your business.

RETHINKING MODEL AS A SERVICE



Due to the development of the full fledged products and their services on the cloud platform there is an ongoing battle amongst the cloud market resulting in the rise of new services such as Platform as a service(PaaS), Infrastructure as a Service(IaaS) and Software as a Service(SaaS). An Overview of digital era - model as a service is outlined below.



In Addition to these services as a result of evolving technology, a new cloud based service is emerging into the market i.e Machine Learning as a Service, this growing trend involves processes from storing the data on top of the cloud till deriving the best insights from the data at a reasonable cost.

1

WHAT IS MLAAS?

MLaaS hosts an assembly of services that provisions machine learning tools to be the part of cloud computing services. MLaaS also attenuates infrastructure concerns like data migration, data ingestion, pre-processing, model building, model training, model evaluation and model serving. It is a framework championed by several key players in the market. These service providers assist customer benefits from reasonable costs, handling complete computational complexities, save time and reduce risks in establishing an ML development team by offering tools such as predictive and prescriptive analytics, data visualization, deep learning, computer vision, natural language processing, speech recognition and others.

2

HOW MLAAS FUNCTIONS?

MLaaS provides a set of services to find the data patterns, based on patterns found mathematical models are built to make new predictions on the new data. These computations are actually handled by the service providers on their private data centers. MLaaS supports both semi-automated ML Services and custom modelling and provides a full-stack AI Platform by combining them with RESTful services. Both custom models and semi-automated ML services support algorithms like classification, regression, clustering, anomaly detection, time series, recommender systems, but semi-automated ML services mostly work on built in algorithms. Google Cloud ML services combined with GCP AI platform is ideal for enabling MLaaS.

For Example, Google's natural language processing (NLP) API for MLaaS analyzes conversations between human agents and customers. A procedure explains, after transcribing each call with Google CCAI, sentiment analysis can be run on GCP through NLP API to draw correlations between the support agent's verbal and behavioral data and the customer's happiness level. Which ultimately helps us determine customer satisfaction and interests. In addition to these earlier findings, further Individual predictions, models and the corresponding data is then used to benchmark and find best practices across teams. The results can also be applied to other discrete use cases in Retail, HiTech, Higher Education, Manufacturing and as well as Healthcare, like monitoring compliance in Healthcare, where conversations involve sensitive and often legally protected information.

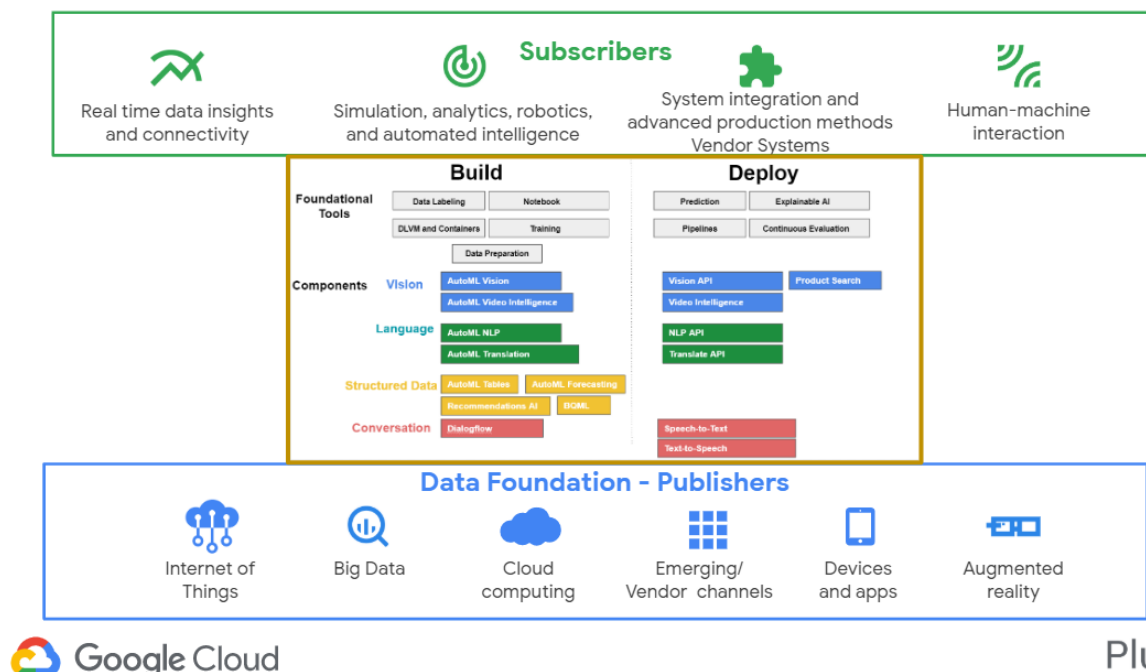
PRODUCT & SERVICES - GOOGLE CLOUD PLATFORM (GCP)



Google Cloud Platform is a hub of several products and services providing solutions ranging from data management, hybrid & multi-cloud, and AI & ML. As a result of increasing trends and growing interest towards Machine Learning and its relevant services, it makes a new tool of the future. Google being in the forefront among the key players in the cloud market, with 4000+ ML models being run internally within Google to run the core Google Products that serve billions of users worldwide.

In Addition to this it offers MLaaS services around Natural Language Processing, Speech Recognition, Computer Vision, AI Platform and many more as shown below [visual](#).

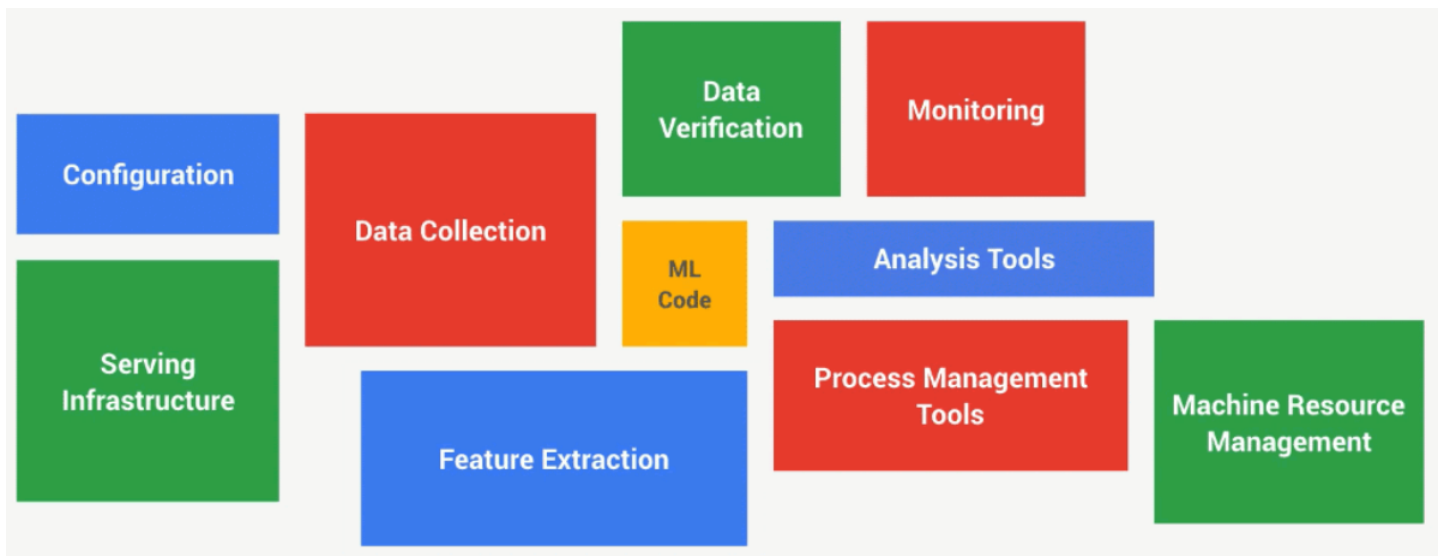
ML as a Service - MLaaS (Model as a Service)



1

MLAAS ON GOOGLE CLOUD

GCP supports a wide range of algorithms to work with, few of them are Neural Networks, Ada Net, Ensembles, Tree Based models, Bayesian networks, etc. These models are already part of ML API's or can be custom built on the AI Platform's enabled frameworks such as TensorFlow, Python 3, Scikit Learn, XGBoost and Keras. Enabling a model and supporting the model for repeatable use or as a publisher subscriber model needs an ecosystem of capabilities that are essential to the model operationalization as shown in the below image.



2

ORCHESTRATING MLAAS ON GOOGLE CLOUD

Our complimentary whitepaper on ML Ops details out the operationalizing MLaaS service on GCP.



CONCLUSION

MLaaS or also known as model as a service is an evolving framework and concepts that allows businesses to publish their models as repeatable assets. AIHub acts as a platform that supports MLaaS. MLaaS is trending in the cloud market and is already used across several industries like Retail, HiTech, Supply Chain, Health Care, Finance, Manufacturing and others. Furthermore, various business processes have widely used it across their different domains, including Inventory Optimization, Supply Chain Planning, Fraud Detection, Sales, Marketing and many more.

References:

1. AI Hub - [Click Here](#)
2. Model Company White Paper - [Click Here](#)
3. Digital Era Technology Operating Models - [Click Here](#)
4. Hidden Technical Debt in Machine Learning Systems - [Click Here](#)
5. ML and ML Ops on Google Cloud - [Click Here](#)