# Google Cloud AI

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**Abstract:**

A cloud-based service called Google Cloud AI Platform gives users access to resources and infrastructure for creating, honing, and scalably deploying machine learning models. For machine learning activities including text and image analysis, NLP, and predictive analytics, it provides a variety of services and APIs.

Applying well-known open-source frameworks like TensorFlow, PyTorch, and scikit-learn, users of the Google Cloud AI Platform may quickly develop and train machine learning models. A variety of pre-built machine learning models are also available on the platform, and they may be quickly modified and used.

The AutoML machine learning product suite from Google Cloud AI Platform enables customers to train high-quality custom models without having to have extensive machine learning knowledge. Users may build unique models using AutoML for a variety of purposes, including tabular data analysis, natural language processing, and picture categorization.

The capacity of Google Cloud AI Platform to scale up or down based on customer demands is one of its primary strengths. This implies that customers don't need to worry about managing the underlying infrastructure and can simply train models on massive datasets utilising strong distributed computing resources.

Additionally, the Google Cloud AI Platform provides a selection of tools for model evaluation, monitoring, and optimisation, enabling users to find and correct model problems fast. The platform also allows for interaction with other Google Cloud services and a variety of deployment methods, such as batch and real-time prediction.

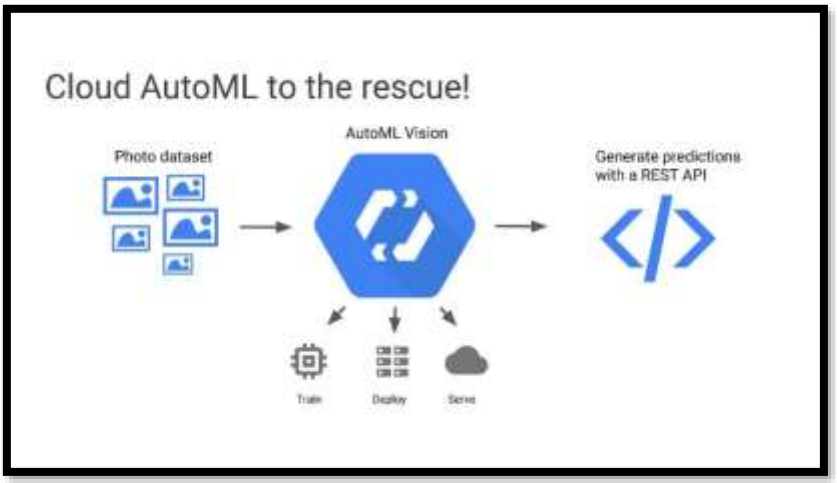
In general, the Google Cloud AI Platform offers a robust and adaptable platform for creating, honing, and deploying machine learning models, allowing users to integrate machine learning into their products and services.

**what is google cloud ai?**

A group of tools and services that Google Cloud Platform provides for machine learning (ML) and artificial intelligence (AI) are together referred to as Google Cloud AI. It enables users to create, train, and deploy unique ML models on the infrastructure of Google Cloud.

A variety of pre-built machine learning models are available through Google Cloud AI for a variety of purposes, including image identification, natural language processing, and predictive analytics. Additionally, it offers resources for pre-processing data, developing features, training models, assessing them, and deploying them.


Additionally, AutoML is a set of tools that Google Cloud AI provides that let users build unique machine learning models without having to be highly skilled in the field. Data pretreatment and feature engineering are only a couple of the activities that AutoML automates when creating bespoke ML models, making it simpler for users to create reliable models rapidly.




All things considered, Google Cloud AI offers a strong and adaptable platform for creating, honing, and deploying machine learning models, allowing users to harness the potential of AI in their products and services.

**Google Cloud AI tools:**

A variety of tools and services are available through the Google Cloud AI Platform for creating, honing, and deploying machine learning models. The following are a few of the main tools and services provided:

Cloud AutoML: Without having to have a lot of machine learning experience, users may build bespoke machine learning models for text and picture analysis as well as natural language processing using cloud autoML.

Cloud AI Platform Notebooks: Offers data scientists and ML developers a fully managed Jupyter notebook environment in which to experiment, create, and repeat their models.

Cloud AI Platform Training: Makes advantage of the potent distributed computing capabilities of Google Cloud to enable customers to train machine learning models at scale using well-known open-source frameworks like TensorFlow and PyTorch.

Cloud AI Platform Prediction: Users may deploy their trained models for real-time and batch predictions, with low latency and high throughput, using the cloud AI platform.

AI Hub: A platform for finding, exchanging, and using machine learning models as well as associated tools and services.

Dialogflow: It is a framework for natural language processing that enables users to create chatbots and conversational user interfaces for their software.

Vision AI: Object identification and categorization are only two examples of the advanced image processing capabilities offered by vision artificial intelligence (AI).

Video AI: Offers pre-trained models for object tracking, object categorization, and activity identification in videos.

These are just a handful of the numerous products and services that Google Cloud AI Platform provides. The platform also provides a huge selection of APIs for various machine learning applications, including sentiment analysis, speech recognition, and translation.

**How model train on google cloud ai?**

The steps below are typical for training a machine learning model on Google Cloud AI:

Data preparation: The preparation of the training data is the initial stage in training a machine learning model. This usually entails gathering, purifying, and preparing the data to make sure it is in an appropriate format for training the model.

Model selection: Choosing a model the next step is to choose the best machine learning model or algorithm for the current issue. In addition to a variety of pre-built machine learning models and algorithms, Google Cloud AI also provides tools for creating unique models.

Configuration: After a model has been chosen, it must be set up for the particular training assignment. In addition to establishing the training and validation data sets, this also entails selecting hyperparameters such learning rates and regularisation strengths.

Training: The following step is to use the training data to train the machine learning model. Cloud AI Platform and AutoML are only two of the tools and services offered by Google Cloud AI for training machine learning models.

Evaluation: Once the model has been trained, it has to be assessed to see how accurate and useful it is. This often entails evaluating measures like accuracy, precision, recall, and F1 score by running the model on a different validation data set.

Deployment: The model can be used in production contexts after it has been trained and assessed. Machine learning models may be deployed using Google Cloud AI's tools and services, such as Cloud Functions and the Cloud AI Platform.

Overall, there are several processes involved in training a machine learning model on Google Cloud AI. Particular attention must be paid to data preparation, model selection and setup, training and assessment, and deployment. However, Google Cloud AI offers a variety of tools and services to make the machine learning workflow easier and more efficient.

**What is the important factor for training model on google cloud platform:**

The number and quality of the data, the complexity of the machine learning model, and the resources allotted to the machine learning job all affect how well machine learning performs in Google Cloud AI.

A variety of machine learning services are offered by Google Cloud AI, including tools for creating unique machine learning models as well as pre-built machine learning models and APIs. These services make use of Google's cloud infrastructure to deliver machine learning capabilities that are incredibly scalable and effective.

Google Cloud AI also offers access to specialised hardware, such as Tensor Processing Units (TPUs), which are optimised for deep learning workloads and can significantly accelerate machine learning model training.

Organisations should use high-quality data to achieve optimal machine learning performance on Google Cloud AI.

Use high-quality data: The quality and quantity of data used to train machine learning models substantially influence their accuracy and efficacy. Organisations must ensure that their data is thorough, accurate, and representative of the problem at hand.

Select suitable algorithms: Google Cloud AI offers a variety of machine learning techniques and models, including deep learning models, decision trees, and linear models. Organisations should select the best algorithm for their problem and data.

Optimise hyperparameters: Machine learning models frequently have hyperparameters that affect their performance, such as learning rates and regularisation strengths. Organisations should experiment with different hyperparameter values to determine the ones that produce the greatest results.

Performance should be monitored and tuned: Organisations should keep an eye on the performance of their machine learning models and make adjustments as needed to optimise performance over time.

Overall, machine learning performance on Google Cloud AI can be extremely successful, particularly when specialised hardware and optimised algorithms are used. To obtain best outcomes, however, great attention must be paid to data quality, algorithm selection, and performance monitoring.

**Pricing for google cloud ai:**

Google Cloud AI has a number of pricing options depending on the services and features needed. Some services, such as Cloud AutoML and Cloud Vision API, charge on a per-use basis, whilst others, such as Cloud AI Platform, charge on a subscription basis.

Here are some pricing samples for specific Google Cloud AI services:

Cloud AutoML: This service has a pay-as-you-go pricing approach, with training starting at $0.19 per hour and batch prediction starting at $4.90 per hour. A free tier is also available, with up to 60 minutes of training and 1,000 forecasts every month.

Cloud Vision API: This service likewise has a pay-as-you-go pricing mechanism, with label detection starting at $1.50 per 1,000 photos and object detection starting at $2.50 per 1,000 images. There is also a free tier that allows for up to 1,000 requests per month.Cloud AI Platform: The pricing model for this service is subscription-based, with fees starting at $0.10 per hour for basic machine types and $0.75 per hour for high-memory machine types. Additional charges apply for storage, data processing, and training.

It's crucial to remember that these costs are subject to change and may differ depending on factors including geography, usage volume, and additional services or features used. Organisations should thoroughly study each service's pricing details and plan their consumption and budget accordingly. Additionally, Google Cloud AI provides cost optimisation capabilities such as cost analysis and budget alerts to assist organisations in successfully managing their expenditures.

**Database:**

**Tabular Dataset:** Credit Card Fraud Detection

The data set was obtained from the Kaggle website and contains a total of 2,84,807 transactions, 492 of which are fake. Because the data set is severely unbalanced, it must be dealt with before developing the model.Credit card firms must be able to detect fraudulent credit card transactions so that clients are not charged for products they did not purchase.The dataset includes credit card transactions performed by European cardholders in September 2013. This dataset contains 492 frauds out of 284,807 transactions that occurred over the course of two days. The dataset is very uneven, with positive transactions accounting for 0.172% of all transactions.

**Image dataset:** Flowers Recognition

This dataset comprises 4242 flower photos. The data is gathered via Flickr, Google Images, and Yandex Images.I can use this dataset to identify plants in photos. The images are organised into five categories: chamomile, tulip, rose, sunflower, and dandelion. There are over 800 images for each class. Photos have a low resolution of roughly 320x240 pixels. Photos aren't all the same size; they have varying proportions.

**Goals:**

1 Recognise the primary characteristics and capabilities of Google Cloud AI Platform.

2 Investigating the many tools and services available on Google Cloud AI Platform, such as AutoML, and learning how they function.

3 Learning how to work with different types of datasets on Google Cloud AI Platform, such as tabular and image datasets.

4 Learn how to use AutoML tools to train a model on a dataset using Google Cloud AI Platform.

5 Understanding how to test the trained model to guarantee accuracy and effectiveness.

6 Learn how to deploy the learned model on the Google Cloud AI Platform.

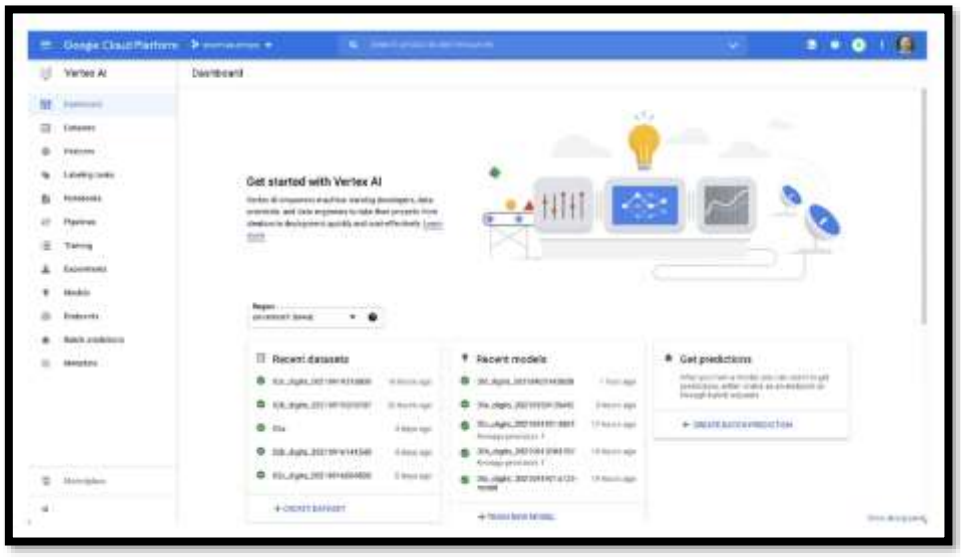
7 Using essential aspects such as accuracy, performance, scalability, and ease of use to assess the success of a project on Google Cloud AI Platform.

**Vetex AI**

Vetex AI is an end-to-end model development platform. It consists of key components that enable MLOps procedures for various types of design patterns.

**Google cloud vertex ai dashboard:**

The Google Cloud Vertex AI Dashboard is a centralised management and monitoring interface for machine learning models and resources on the Google Cloud Platform. The dashboard includes several features and tools for controlling machine learning workflows, such as:




Model management: The Vertex AI Dashboard makes it simple for users to design, maintain, and deploy machine learning models. Users can develop new models, upload old ones, and customise model features including deployment environments and scaling choices.

Data management: The dashboard includes tools for managing and storing data that is used to train and test machine learning models. Users can use the dashboard to upload, download, and manage data sets, as well as establish data storage and access permissions.

Monitoring and logging: The Vertex AI Dashboard monitors and logs machine learning model performance, resource utilisation, and faults in real time. To identify errors and optimise model performance, users can see and analyse metrics, logs, and alarms.

Collaboration and sharing: The dashboard include tool for collaboration and sharing, allowing users to exchange models, data sets, and resources with other users in the same organisation or project.

Integration with other Google Cloud services: To support end-to-end machine learning processes, the Vertex AI Dashboard connects with other Google Cloud services such as BigQuery and Cloud Storage.

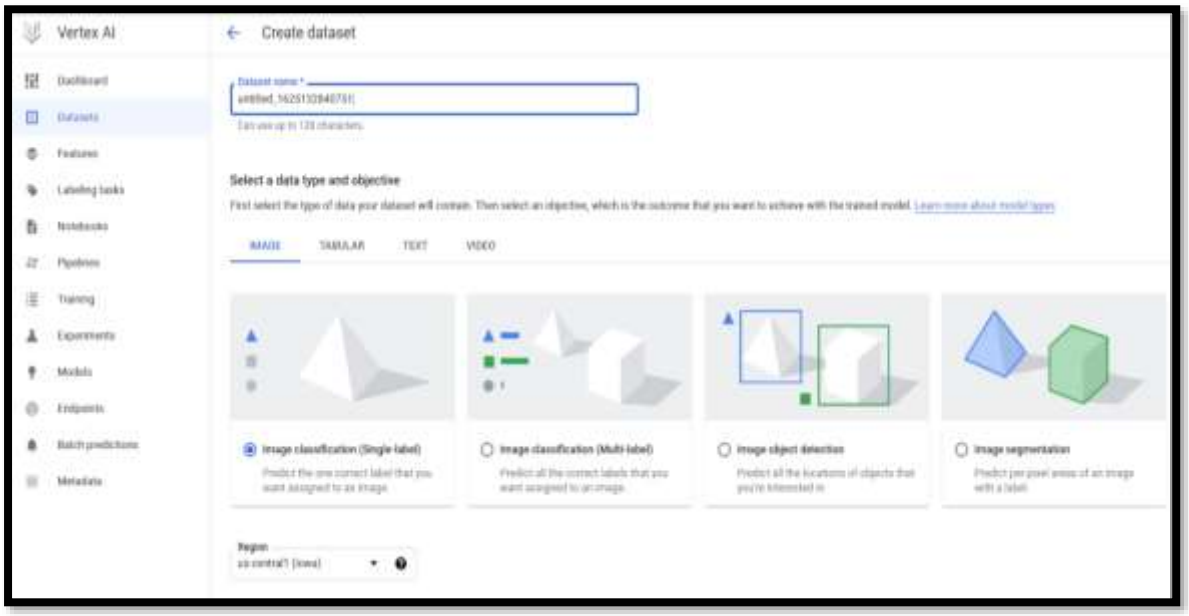
Overall, the Vertex AI Dashboard offers a sophisticated and user-friendly interface for managing and monitoring machine learning workflows on Google Cloud Platform. Its features and technologies can assist organisations in streamlining their machine learning processes, improving model performance, and effectively collaborating on machine learning projects.

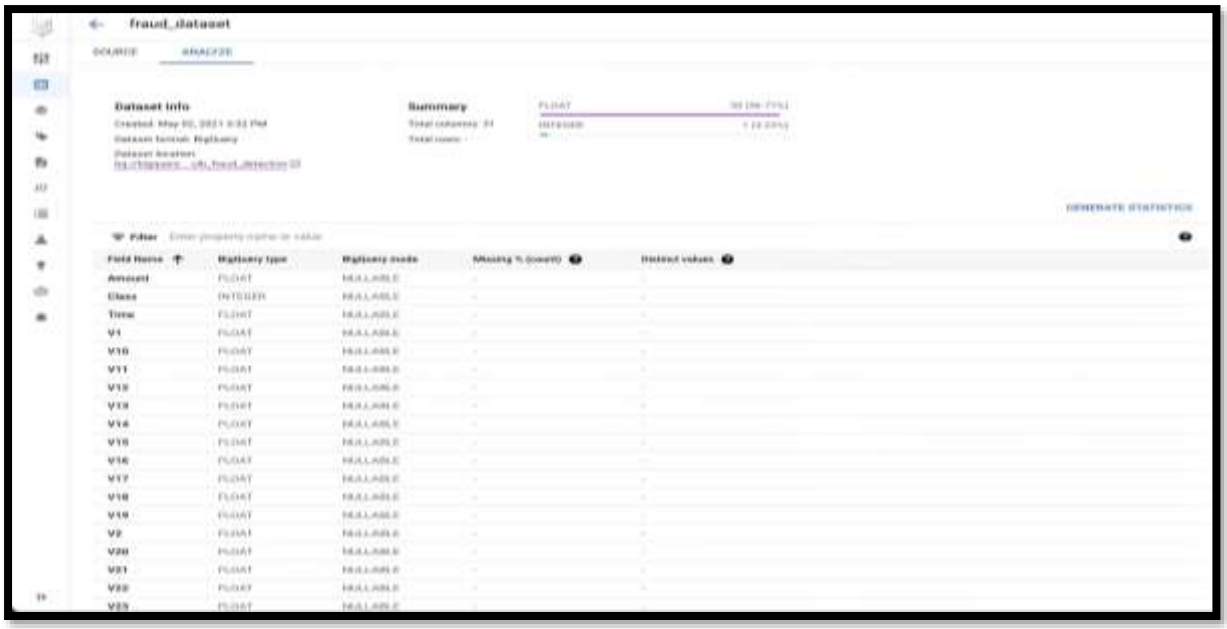
**Methodology:**

- **Create database:**

Google Cloud AI offers many machine learning models for various data types, including tabular data, image data, text data, and audio data. AutoML Tables, Vision API, AutoML Vision, Language API, AutoML Natural Language, Speech-to-Text API, and Text-to-Speech API are among these models. For our project, we are developing a tabular dataset with regression/classification and an image dataset with the Regression/Classification model.

**Tabular dataset:**



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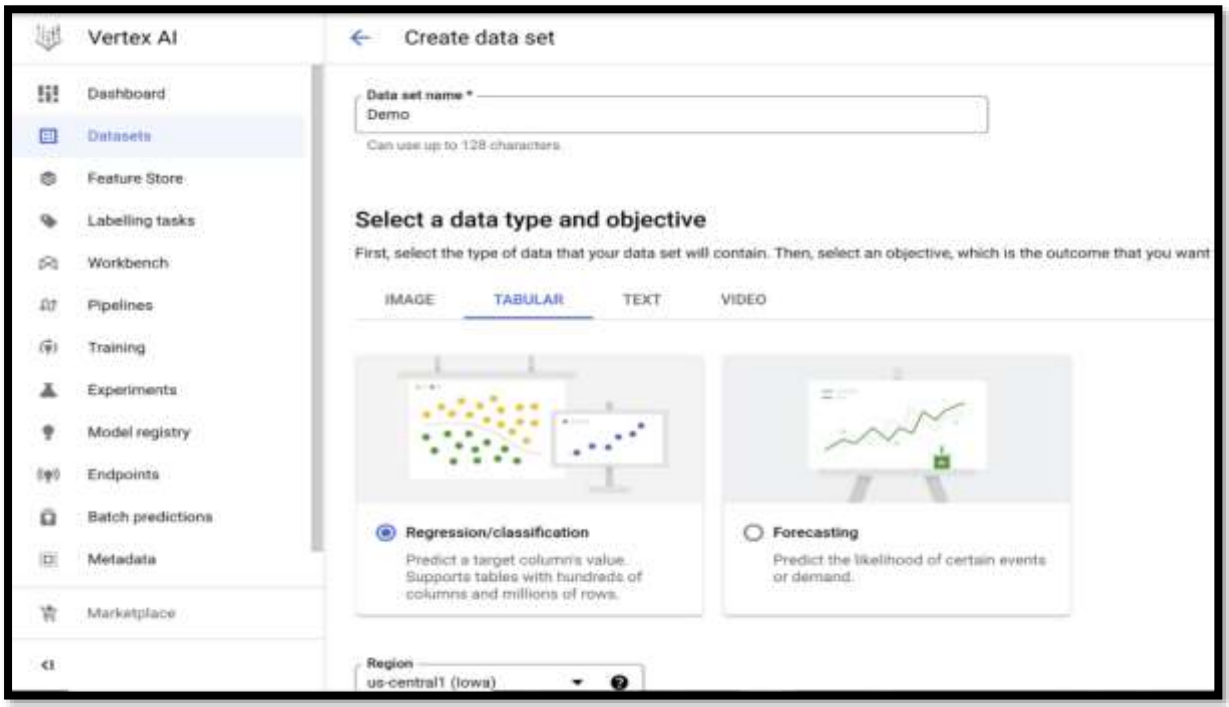
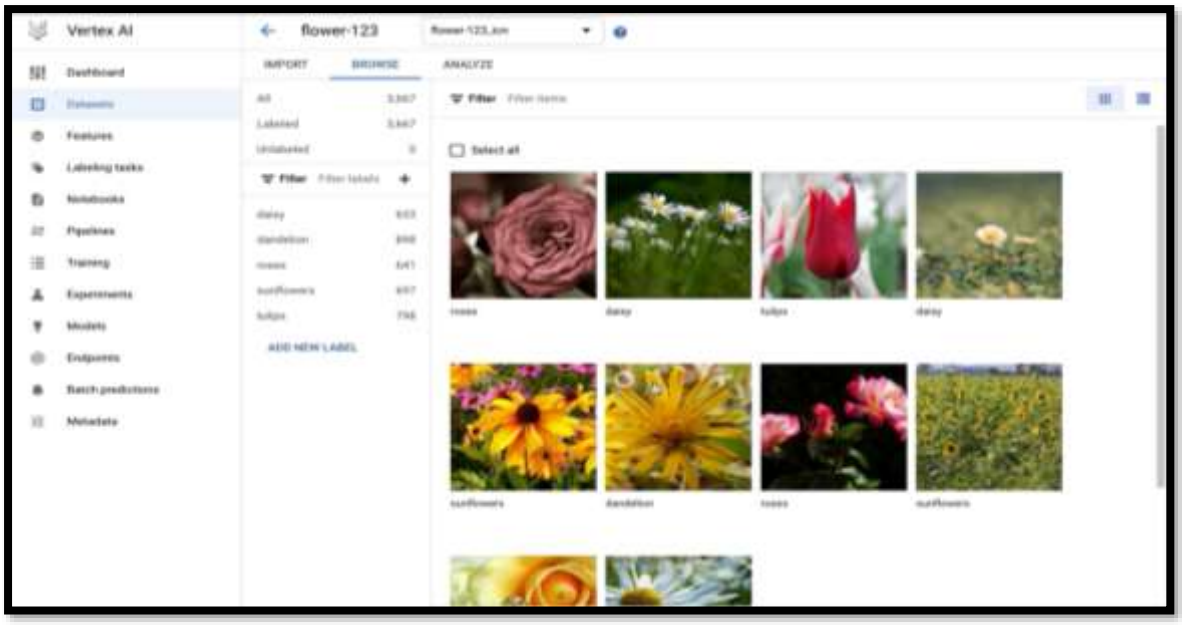





- **Train Model:**

This stage entails building and training the machine learning model on the prepared dataset using tools such as AutoML or custom code. Selecting relevant features, hyperparameters, and model architecture may be required.

**Tabular dataset:**

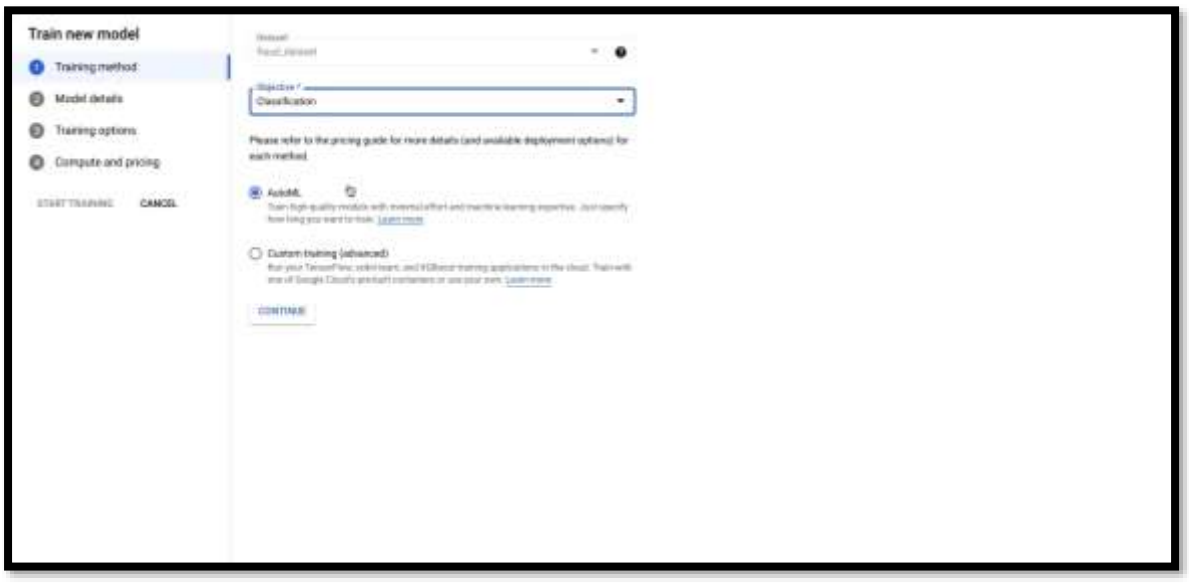
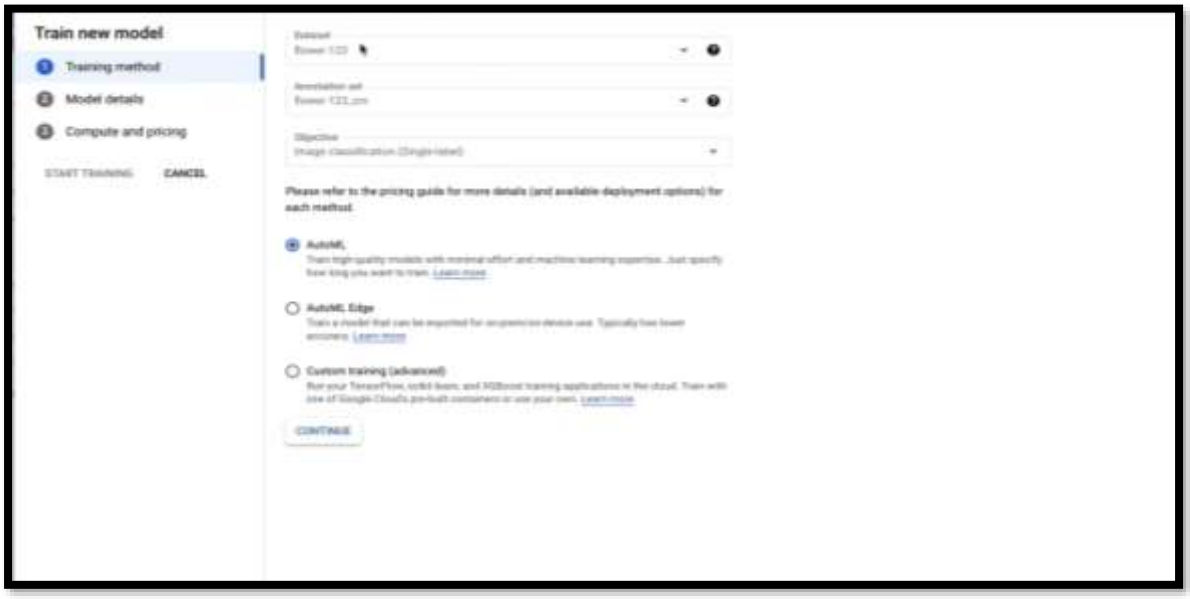


**Image Dataset:**

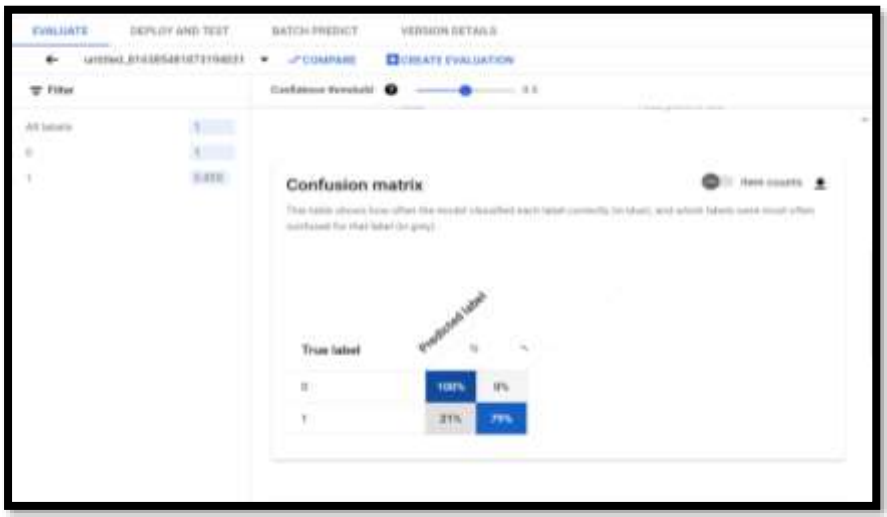



- **Evaluate Dataset:**

This phase involves testing the trained model on a holdout dataset or utilising cross-validation techniques to evaluate its performance. This may entail computing metrics such as accuracy, precision, recall, and F1 score.

**Tabular Dataset:**


EVALUATE
DEPLOY AND TEST
BATCH PREDICT
VERSION DETAILS
COMPARE
CREATE EVALUATION
Filter
Precision-recall curve
ROC curve
Precision


EVALUATE
DEPLOY AND TEST
BATCH PREDICT
VERSION DETAILS
COMPARE
CREATE EVALUATION
Filter
Confusion matrix
Item counts
True label
Predicted label
0
1
100%
0%
21%
79%

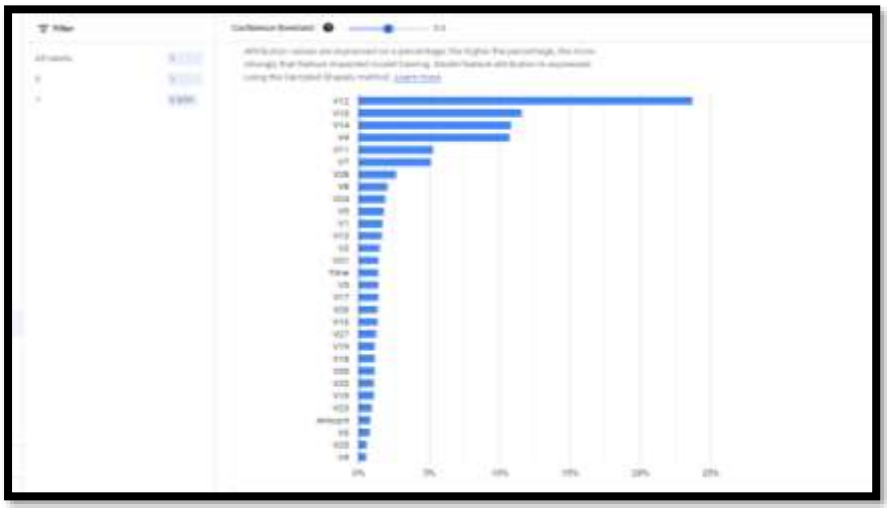

Filter

**Image dataset:**



- **Deploy Model:**

This stage entails deploying the trained model to a production environment so that it may make predictions on new data.

**Tabular dataset:**

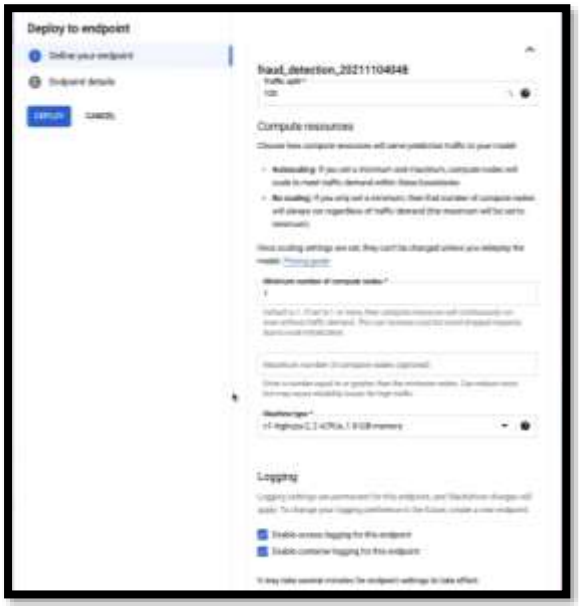
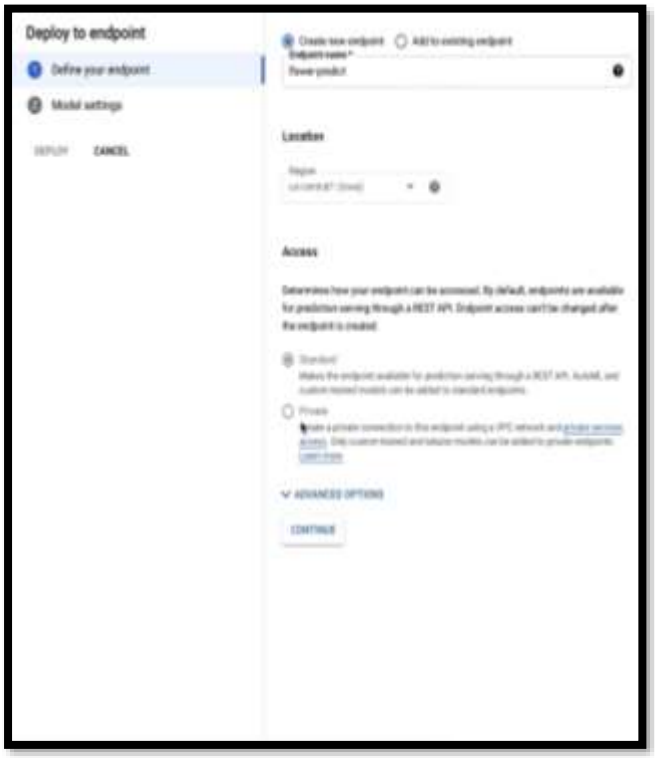


**Image Dataset:**




- **Test Model:**

This step comprises checking the accuracy and efficacy of the deployed model's performance as needed.

**Tabular Dataset:**

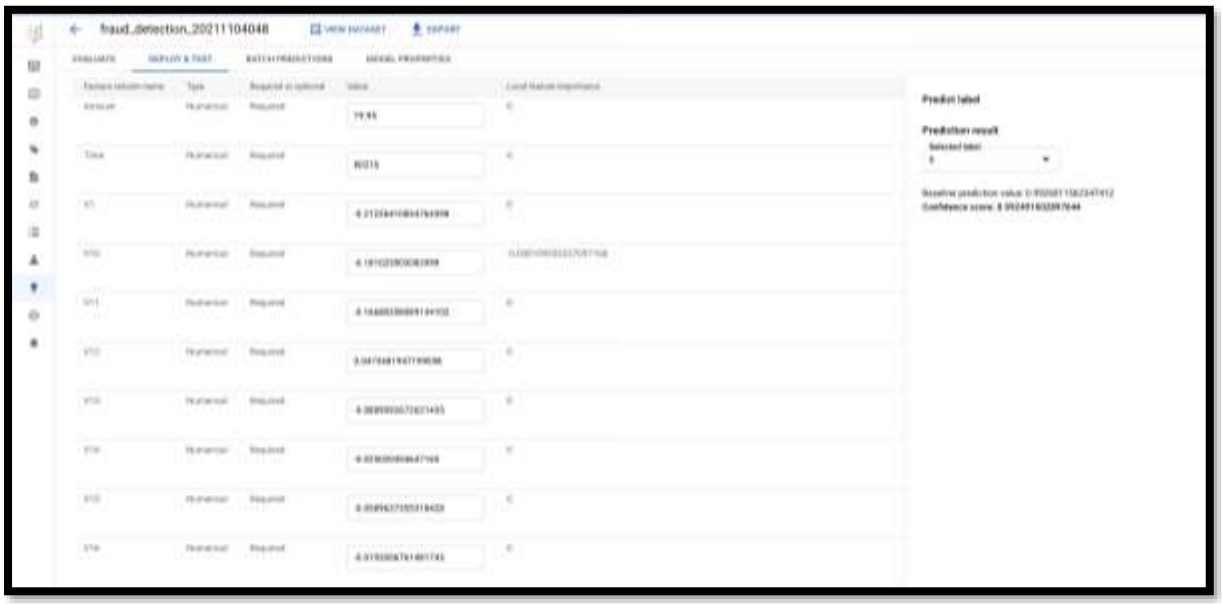
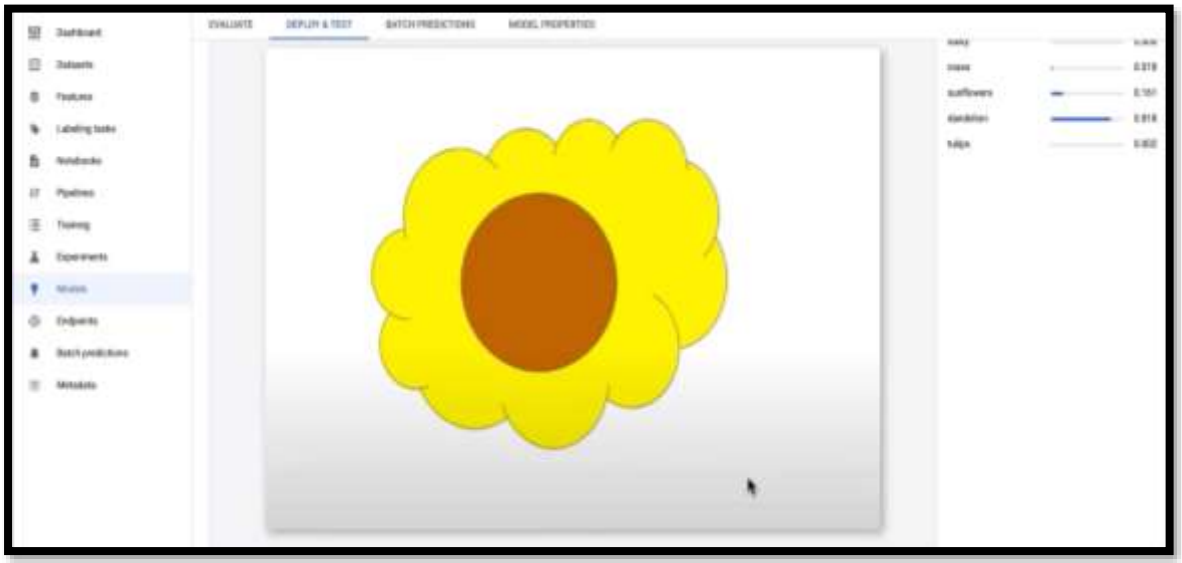


**Image dataset:**



Data preparation, data upload, AutoML tool selection, model training, model evaluation, model deployment, and model monitoring are all steps in the technique for using Google Cloud AI Platform with tabular and picture datasets. We may develop successful machine learning models for numerous applications on the Google Cloud AI Platform by following these steps.

From the results, we can observe that the extremely unbalanced data in the tabular dataset on credit card fraud detection was handled utilising techniques such as oversampling and undersampling. AutoML Tables was used to create a fraud detection model, and the trained model with 99.9% precision was deployed and tested with a baseline prediction value of 0.9926 and a confidence score of 0.9924.

Pre-built computer vision models such as AutoML Vision were used to identify flowers in the image dataset on flower recognition, and the model has 96.7% precision. The trained model was also evaluated, and the matching accuracy rate for the tested images was 0.161 and 0.818, respectively.

**Conclusion:**

In this instance, we have two datasets: one tabular dataset for detecting credit card fraud and one image dataset for flower recognition. The purpose is to learn about the features and capabilities of Google Cloud AI Platform, as well as how to deal with various types of datasets using tools like AutoML.

The Vertex AI Dashboard provided a centralised area for controlling and monitoring machine learning models and Google Cloud Platform resources. It provided us with the ability to see the status of our models, monitor their performance, and view logs and problems. We can simply manage the highly skewed tabular dataset and develop a fraud detection model with Google Cloud AI Platform. To classify flowers in photos, we can utilise pre-built computer vision models such as AutoML Vision.

The process of training a model on a dataset using AutoML tools is straightforward and efficient. We may also test the trained model to confirm its accuracy and efficacy before putting it on Google Cloud AI Platform.

Evaluating the success of a project on Google Cloud AI Platform requires looking at key factors like accuracy, performance, scalability, and ease of use. Using the features of Google Cloud AI Platform, we can build successful machine learning models for a number of applications.

In general, as compared to traditional machine learning models, Google Cloud AI Platform provides a more efficient and effective way to develop machine learning models. Many of the operations required to develop a high-performing model are automated, including feature engineering, hyperparameter tuning, and model selection. This saves us time and effort, allowing us to concentrate on more vital activities like analysing and interpreting the results. Furthermore, the Google Cloud AI Platform is easily scalable, allowing us to train and deploy models on a big scale with little effort.

**Video Link** - https://youtu.be/l4AYcFuFeGo

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