

Environment Setup

Select a project

NEW PROJECT

Search projects and folders

RECENT STARRED ALL

Name	ID
CMPE260 ?	cmpe260-334300

CANCEL OPEN

Google Cloud Platform

New Project

You have 22 projects remaining in your quota. Request an increase or delete projects. [Learn more](#)

Project name * My Project 8894

Project ID: acquired-subset-334316. It cannot be changed later. [EDIT](#)

Location * No organization [BROWSE](#)

Parent organization or folder

[CREATE](#) [CANCEL](#)

Loading Data in Big Query

The screenshot shows the Google Cloud Platform interface for creating a new dataset. The top navigation bar includes 'Google Cloud Platform', 'CMPE260', a search bar, and account-related buttons. On the left, there's a sidebar with 'Explorer' and 'FEATURES & INFO' sections. The main area is titled 'Create dataset' with a sub-section for 'cmpe260-334300'. It asks for a 'Dataset ID' (set to 'titanic') and a 'Data location' (set to 'us-east1 (South Carolina)'). Other settings include 'Default table expiration' (unchecked), 'Encryption' (set to 'Google-managed key'), and a 'Create dataset' button.

Upgrade your account to avoid a break in service (\$159.65 credit and 8 days left in your trial).

LEARN MORE UPGRADE

Google Cloud Platform CMPE260 Search products and resources

Navigation menu FEATURES & INFO SHORTCUT DISABLE EDITOR TABS

Explorer + ADD DATA

cmpe260-334300

Create dataset

Dataset ID
Letters, numbers, and underscores allowed

Data location (Optional) Default

Default table expiration Never

Encryption Data is encrypted automatically. Select an encryption key management solution.

Google-managed key No configuration required

Customer-managed key Manage via Google Cloud Key Management Service

Create dataset Cancel

Resources in this project

PERSONAL HISTORY PROJECT HISTORY SAVED QUERIES

Upgrade your account to avoid a break in service (\$159.65 credit and 8 days left in your trial).

LEARN MORE UPGRADE

Google Cloud Platform CMPE260 Search products and resources

FEATURES & INFO SHORTCUT DISABLE EDITOR TABS

Explorer + ADD DATA

Type to search

Viewing pinned projects.

cmpe260-334300

Create dataset

Project ID cmpe260-334300 CHANGE

Dataset ID * titanic Letters, numbers, and underscores allowed

Data location us-east1 (South Carolina)

Default table expiration

Enable table expiration

Default maximum table age Days

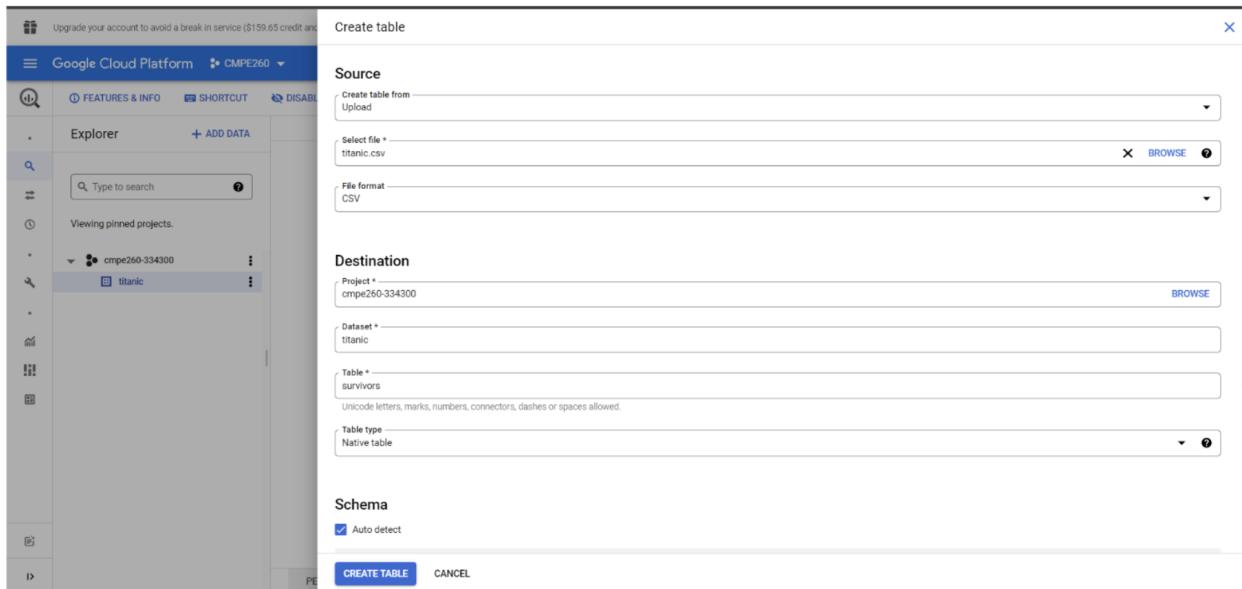
Encryption

Google-managed encryption key No configuration required

Customer-managed encryption key (CMEK) Manage via Google Cloud Key Management Service

CREATE DATASET CANCEL

PERSONAL HISTORY PROJECT HISTORY SAVED QUERIES



Create ML Dataset

SCHEMA	DETAILS	PREVIEW
pc835	INCLUDED	NULLABLE
survived	INTEGER	NULLABLE
name	STRING	NULLABLE
sex	STRING	NULLABLE
age	STRING	NULLABLE
sibsp	INTEGER	NULLABLE
parch	INTEGER	NULLABLE
ticket	STRING	NULLABLE
fare	STRING	NULLABLE
cabin	STRING	NULLABLE
embarked	STRING	NULLABLE
boat	STRING	NULLABLE
body	STRING	NULLABLE
home.dest	STRING	NULLABLE

Enable Vertex AI API

Google Cloud Platform CMPE260 Search products and resources

Navigation menu Dashboard

Get started with Vertex AI

Vertex AI empowers machine learning developers, data scientists, and data engineers to take their projects from ideation to deployment, quickly and cost-effectively. [Learn more](#)

Try an interactive tutorial to learn how to train, evaluate, and deploy a Vertex AI AutoML or custom-trained model

[VIEW TUTORIALS](#)

[ENABLE VERTEX AI API](#)

Region us-east1 (South Carolina)

Prepare your training data
Collect and prepare your data, then import it into a dataset to train a model
[+ CREATE DATASET](#)

Train your model
Train a best-in-class machine learning model with your dataset. Use Google's AutoML, or bring your own code.
[+ TRAIN NEW MODEL](#)

Get predictions
After you train a model, you can use it to get predictions, either online as an endpoint or through batch requests
[+ CREATE BATCH PREDICTION](#)



Google Cloud Platform CMPE260 Search products and resources

Dashboard

Get started with Vertex AI

Vertex AI empowers machine learning developers, data scientists, and data engineers to take their projects from ideation to deployment, quickly and cost-effectively. [Learn more](#)

Try an interactive tutorial to learn how to train, evaluate, and deploy a Vertex AI AutoML or custom-trained model

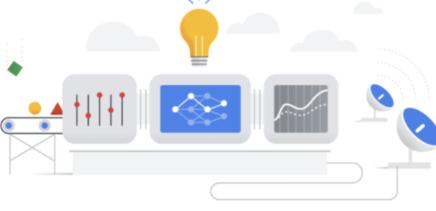
[VIEW TUTORIALS](#)

Region us-east1 (South Carolina)

Prepare your training data
Collect and prepare your data, then import it into a dataset to train a model
[+ CREATE DATASET](#)

Train your model
Train a best-in-class machine learning model with your dataset. Use Google's AutoML, or bring your own code.
[+ TRAIN NEW MODEL](#)

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[+ CREATE BATCH PREDICTION](#)



Google Cloud Platform CMPE260 Search products and resources

Create dataset

Dataset name Can use up to 128 characters.

Select a data type and objective

First select the type of data your dataset will contain. Then select an objective, which is the outcome that you want to achieve with the trained model. [Learn more about model types](#)

IMAGE TABULAR TEXT VIDEO

Regression/classification Predict a target column's value. Supports tables with hundreds of columns and millions of rows.

Forecasting [PREVIEW](#) Predict the likelihood of certain events or demand.

Region us-central1 (Iowa)

[ADVANCED OPTIONS](#)

[CREATE](#) CANCEL

Upgrade your account to avoid a break in service (\$159.65 credit and 8 days left in your trial).

Google Cloud Platform CMPE260 Search products and resources

titanic

SOURCE ANALYZE

Add data to your dataset

Before you begin, read the [data guide](#) to learn how to prepare your data. Then choose a data source.

Select a data source

- CSV file: Can be uploaded from your computer or on Cloud Storage. [Learn more](#)
- BigQuery: Select a table or view from BigQuery. [Learn more](#)

Upload CSV files from your computer

Select CSV files from Cloud Storage

Select a table or view from BigQuery

Select a table or view from BigQuery

Use a BigQuery table or view as your data source. You'll need [permission](#) to access the dataset and get the [dataset ID](#) and [table ID](#). [Learn more](#)

BigQuery path: BROWSE

Enter the qualified id: projectid.datasetid.tableid

What happens next?

The selected BigQuery table will be associated with your dataset. Making changes to the referenced BigQuery table will affect the dataset before training.

CONTINUE

Select path

Enter property name or value

SEARCH

Name	Description	Project
survivors	-	cmpe260-334300
Dataset: titanic	-	-

SELECT CANCEL

Google Cloud Platform CMPE260 Search products and resources

titanic

SOURCE ANALYZE

Dataset Info

Created: Dec 06, 2021 4:16 PM

Dataset format: BigQuery

Dataset location(s): <bq://cmpe260-334300.titanic.survivors>

Summary

Total columns: 14	INTEGER	4 (28.57%)
	STRING	10 (71.43%)

Total rows: -

GENERATE STATISTICS

Filter Enter property name or value

Column name ↑	BigQuery type	BigQuery mode	Missing % (count) ⓘ	Distinct values ⓘ
age	STRING	NULLABLE	-	-
boat	STRING	NULLABLE	-	-
body	STRING	NULLABLE	-	-
cabin	STRING	NULLABLE	-	-
embarked	STRING	NULLABLE	-	-
fare	STRING	NULLABLE	-	-
home_dest	STRING	NULLABLE	-	-
name	STRING	NULLABLE	-	-
parch	INTEGER	NULLABLE	-	-
titles	STRUCT<RECORD>	NULLABLE	-	-

Training jobs and models

Use this dataset and annotation set to train a new machine learning model with AutoML or custom code

TRAIN NEW MODEL

Google Cloud Platform CMPE260

Search products and resources

titanic

SOURCE ANALYZE

General statistics generated by Dec 06, 2021 4:35 PM GENERATE STATISTICS

Filter Enter property name or value

Column name	BigQuery type	BigQuery mode	Missing % (count)	Distinct values
age	STRING	NULLABLE	-	99
boat	STRING	NULLABLE	-	28
body	STRING	NULLABLE	-	122
cabin	STRING	NULLABLE	-	187
embarked	STRING	NULLABLE	-	4
fare	STRING	NULLABLE	-	282
home_dest	STRING	NULLABLE	-	370
name	STRING	NULLABLE	-	1307
parch	INTEGER	NULLABLE	-	8
pclass	INTEGER	NULLABLE	-	3
sex	STRING	NULLABLE	-	2
sibsp	INTEGER	NULLABLE	-	7
survived	INTEGER	NULLABLE	-	2
ticket	STRING	NULLABLE	-	929

Rows per page: 50 1 - 14 of 14

Training jobs and models

Use this dataset and annotation set to train a new machine learning model with AutoML or custom code

TRAIN NEW MODEL

Google Cloud Platform CMPE260

Search products and resources

Vertex AI

Dashboard Datasets Features Labeling tasks Workbench Pipelines Training Experiments Models Endpoints Batch predictions Metadata Marketplace

Notebooks NEW NOTEBOOK REFRESH START STOP RESET DELETE SHOW INFO PANEL

MANAGED NOTEBOOKS

Customize...

As of the M80 DLMV release, all environments will include JupyterLab 3.x by default. To continue using an existing environment's JupyterLab 1.x version, disable auto-upgrade (if enabled) and do not manually upgrade the environment to a new environment version. To create new Notebooks with JupyterLab 1.x installed, see creating specific versions of Notebooks.

Python 3 Includes scikit-learn, pandas and more

Python 3 (CUDA Toolkit 11.0) Optimized for NVIDIA GPUs

TensorFlow Enterprise Includes Keras, scikit-learn, pandas, NLTK and more

PyTorch 1.9 Includes scikit-learn, pandas, NLTK and more

R 4.1 Includes basic R packages, scikit-learn, pandas, NLTK and more

RAPIDS 0.18 [EXPERIMENTAL] Optimized for NVIDIA GPUs

Kaggle Python [BETA] Python image for Kaggle Notebooks, supporting hundreds of machine learning libraries popular on Kaggle

Theia IDE [EXPERIMENTAL] IDE with notebook support including scikit-learn, pandas, and more

Smart Analytics Frameworks BigQuery, Apache Beam, Apache Spark, Apache Hive, and more

SCHEDULES PREVIEW

Environment Machine type GPUs Permission Last modified

You don't have any notebooks in this project yet

Google Cloud Platform CMPE260

Search products and resources

Vertex AI

Dashboard Datasets Features Labeling tasks Workbench Pipelines Training Experiments Models Endpoints Batch predictions Metadata Marketplace

Notebooks NEW NOTEBOOK REFRESH START STOP RESET DELETE Notifications PANEL

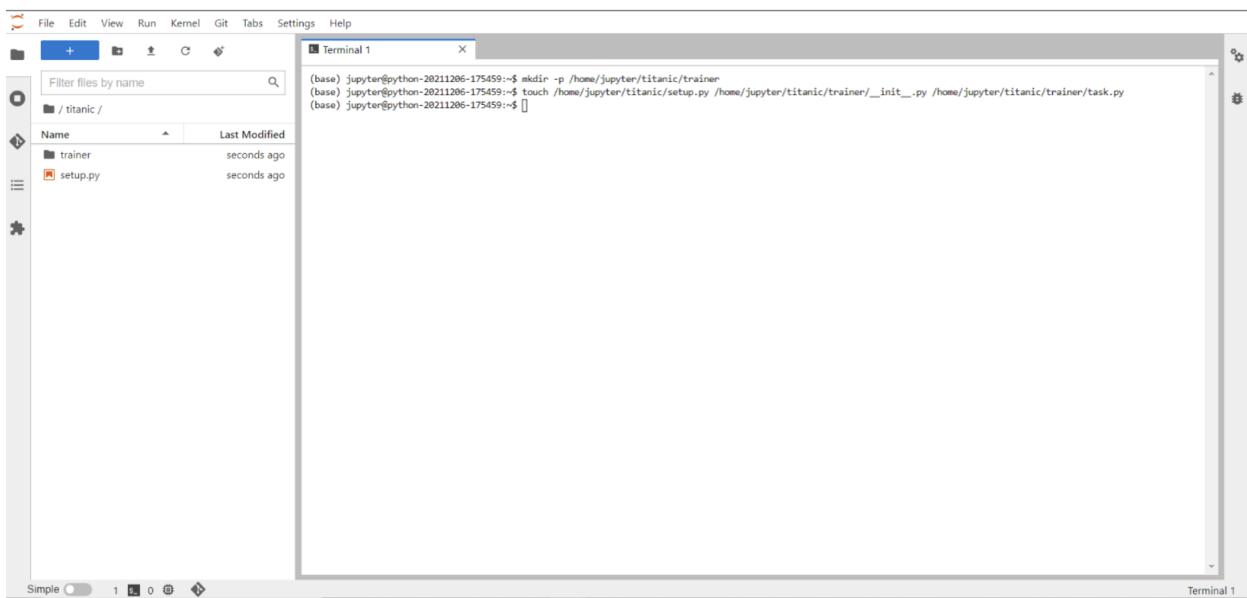
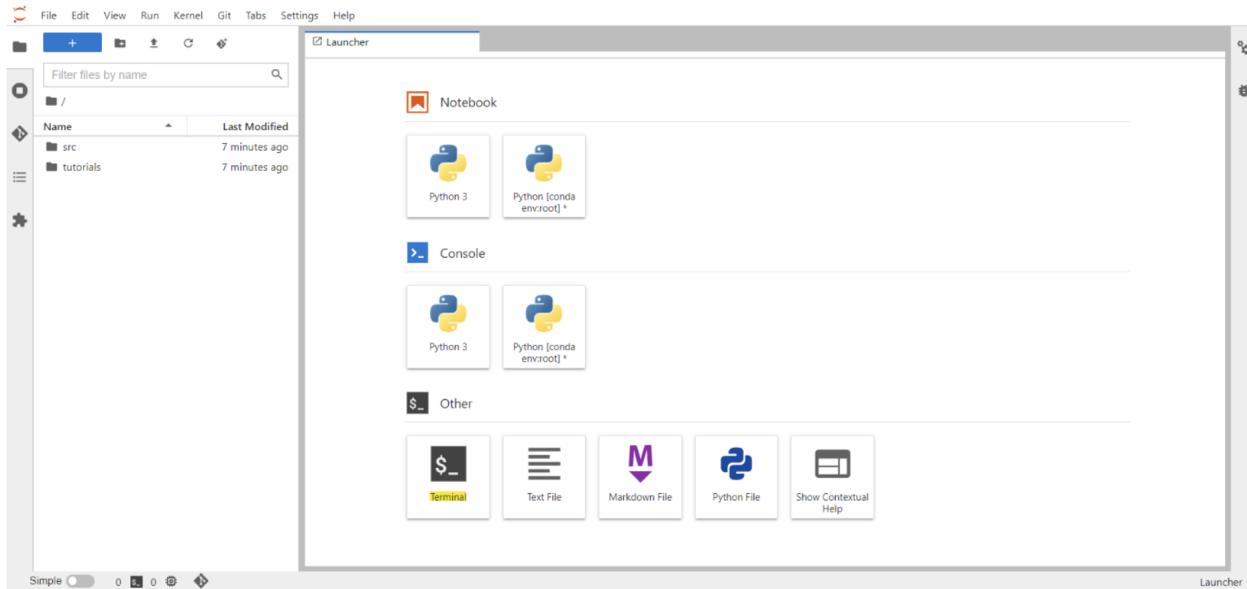
MANAGED NOTEBOOKS PREVIEW USER-MANAGED NOTEBOOKS EXECUTIONS PREVIEW SCHEDULES PREVIEW

As of the M80 DLMV release, all environments will include JupyterLab 3.x by default. To continue using an existing environment's JupyterLab 1.x version, disable auto-upgrade (if enabled) and do not manually upgrade the environment to a new environment version. To create new Notebooks with JupyterLab 1.x installed, see creating specific versions of Notebooks.

Notebooks have JupyterLab pre-installed and are configured with GPU-enabled machine learning frameworks. Learn more

Filter Enter property name or value

Notebook name	Zone	Auto-upgrade	Environment	Machine type	GPUs	Permission	Last modified
python-20211206-175459	us-central1-a	-	NumPy/SciPy/scikit-learn	2 vCPUs, 7.5 GB RAM	None	Service account	Dec 6, 2021, 5:57:15 PM



The screenshot shows a Jupyter Notebook environment. On the left is a file browser pane titled 'titanic /' showing files: 'trainer' (3 minutes ago), 'src' (titanic tutorials), and 'setup.py' (3 minutes ago). On the right are two terminal windows. The top terminal window is titled 'Terminal 1' and contains the following command history:

```
(base) jupyter@python-20211206-175459:~$ mkdir -p /home/jupyter/titanic/trainer  
(base) jupyter@python-20211206-175459:~$ touch /home/jupyter/titanic/setup.py /home/jupyter/titanic/trainer/__init__.py /home/jupyter/titanic/trainer/task.py  
(base) jupyter@python-20211206-175459:~$ ls  
src titanic tutorials  
(base) jupyter@python-20211206-175459:~$ export REGION="us-central1-a"  
(base) jupyter@python-20211206-175459:~$ export PROJECT_ID=$(gcloud config list --format 'value(core.project)')  
(base) jupyter@python-20211206-175459:~$ export BUCKET_NAME=$PROJECT_ID"-bucket"  
(base) jupyter@python-20211206-175459:~$
```

The screenshot shows a Jupyter Notebook environment. On the left is a file browser pane titled 'titanic /' showing files: 'trainer' (7 minutes ago), 'src' (titanic tutorials), and 'setup.py' (7 minutes ago). On the right are two terminal windows. The top terminal window is titled 'Terminal 1' and contains the following command history:

```
(base) jupyter@python-20211206-175459:~$ mkdir -p /home/jupyter/titanic/trainer  
(base) jupyter@python-20211206-175459:~$ touch /home/jupyter/titanic/setup.py /home/jupyter/titanic/trainer/__init__.py /home/jupyter/titanic/trainer/task.py  
(base) jupyter@python-20211206-175459:~$ ls  
src titanic tutorials  
(base) jupyter@python-20211206-175459:~$ export REGION="us-central1-a"  
(base) jupyter@python-20211206-175459:~$ export PROJECT_ID=$(gcloud config list --format 'value(core.project)')  
(base) jupyter@python-20211206-175459:~$ export BUCKET_NAME=$PROJECT_ID"-bucket"  
(base) jupyter@python-20211206-175459:~$ gsutil mb -l $REGION "gs://$BUCKET_NAME  
Creating gs://cmpe260-334300-bucket/...  
Bucket creation: 400 The specified location constraint is not valid.  
(base) jupyter@python-20211206-175459:~$ export REGION="us-central1"  
(base) jupyter@python-20211206-175459:~$ export PROJECT_ID=$(gcloud config list --format 'value(core.project)')  
(base) jupyter@python-20211206-175459:~$ export BUCKET_NAME=$PROJECT_ID"-bucket"  
(base) jupyter@python-20211206-175459:~$ gsutil mb -l $REGION "gs://$BUCKET_NAME  
Creating gs://cmpe260-334300-bucket/...  
(base) jupyter@python-20211206-175459:~$
```

```

File Edit View Run Kernel Git Tabs Settings Help
Filter files by name
Name Last Modified
build seconds ago
dist seconds ago
trainer 11 minutes ago
trainer.egg-info seconds ago
setup.py 10 minutes ago

Terminal 1 task.py setup.py
e release
  PkgResourcesDeprecationWarning,
  /opt/conda/lib/python3.7/site-packages/pkg_resources/_init_.py:119: PkgResourcesDeprecationWarning: api-core-2.2.2 is an invalid version and will not be supported in a future release
    PkgResourcesDeprecationWarning,
  /opt/conda/lib/python3.7/site-packages/pkg_resources/_init_.py:119: PkgResourcesDeprecationWarning: core-2.2.2 is an invalid version and will not be supported in a future release
  e release
  PkgResourcesDeprecationWarning,
  Downloading https://files.pythonhosted.org/packages/ab/a5/4c97704976f1c8a8a2e8a1af2b2026f56f34cf76ab8788b3bf6dc6ba0679/google_api_core-1.31.4-py3-none-any.whl#sha256=e
  Best match: google-api-core 1.31.4
Processing google_api_core-1.31.4-py2.py3-none-any.whl
Installing google_api_core-1.31.4-py2.py3-none-any.whl to /opt/conda/lib/python3.7/site-packages
Adding google-api-core 1.31.4 to easy-install.pth file

Installed /opt/conda/lib/python3.7/site-packages/google_api_core-1.31.4-py3.7.egg
Searching for toolz<0.8.2
Reading https://pypi.org/simple/toolz/
Downloading https://files.pythonhosted.org/packages/b5/f1/3df506bd93736e3ee11fc1a3c2de8014a55f025d830a71bb499ac049a2c/toolz-0.11.2-py3-none-any.whl#sha256=a5700ce83414c64
514d82d6b0ccabaa92d1c1a8663f9200c07fcccc6da8f
Best match: toolz 0.11.2
Processing toolz-0.11.2-py3-none-any.whl
Installing toolz-0.11.2-py3-none-any.whl to /opt/conda/lib/python3.7/site-packages
Adding toolz-0.11.2 to easy-install.pth file

Installed /opt/conda/lib/python3.7/site-packages/toolz-0.11.2-py3.7.egg
Searching for partd<0.3.10
Reading https://pypi.org/simple/partd/
Downloading https://files.pythonhosted.org/packages/41/94/360258a68b55f47859d72b2d8b2b3cf0ca4fbcb81b78812bd00ae86b7c/partd-1.2.0-py3-none-any.whl#sha256=5c3a5d70da89485c
27916328dc1e26232d8e270771bd4cae4a5124b6a457288
Best match: partd 1.2.0
Processing partd-1.2.0-py3-none-any.whl
Installing partd-1.2.0-py3-none-any.whl to /opt/conda/lib/python3.7/site-packages
Adding partd 1.2.0 to easy-install.pth file

Installed /opt/conda/lib/python3.7/site-packages/partd-1.2.0-py3.7.egg
error: google-auth 2.3.3 is installed but google-auth<2.0dev,>=1.25.0 is required by {'google-api-core'}
(base) jupyter@python-20211206-175459:/titanic$ 

```

```

File Edit View Run Kernel Git Tabs Settings Help
Filter files by name
Name Last Modified
build 2 minutes ago
dist 2 minutes ago
trainer seconds ago
trainer.egg-info 2 minutes ago
setup.py 12 minutes ago

Terminal 1 task.py setup.py
Searching for partd<0.3.10
Reading https://pypi.org/simple/partd/
Downloading https://files.pythonhosted.org/packages/41/94/360258a68b55f47859d72b2d8b2b3cf0ca4fbcb81b78812bd00ae86b7c/partd-1.2.0-py3-none-any.whl#sha256=5c3a5d70da89485c
27916328dc1e26232d8e270771bd4cae4a5124b6a457288
Best match: partd 1.2.0
Processing partd-1.2.0-py3-none-any.whl
Installing partd-1.2.0-py3-none-any.whl to /opt/conda/lib/python3.7/site-packages
Adding partd 1.2.0 to easy-install.pth file

Installed /opt/conda/lib/python3.7/site-packages/partd-1.2.0-py3.7.egg
error: google-auth 2.3.3 is installed but google-auth<2.0dev,>=1.25.0 is required by {'google-api-core'}
(base) jupyter@python-20211206-175459:/titanic$ python -m trainer.task -v \
> --model_dir="gs://$PROJECT_NAME/titanic/trial" \
> --data_format=bigquery \
> --training_data_uri="gs://$PROJECT_ID/titanic_survivors" \
> --test_data_uri="gs://$PROJECT_ID/titanic_survivors" \
> --validation_data_uri="gs://$PROJECT_ID/titanic_survivors"
INFO:root:Model artifacts will be exported here: gs://cmpe260-334300-bucket/titanic/trial
INFO:root:Data format: bigquery
INFO:root:Training data uri: gs://cmpe260-334300.titanic_survivors
INFO:root:Validation data uri: gs://cmpe260-334300.titanic_survivors
INFO:root:Test data uri: gs://cmpe260-334300.titanic_survivors
INFO:root:Loading bigquery data
bsr:///cmpe260-334300.titanic_survivors
INFO:root:Model artifacts will be stored at bsr:///cmpe260-334300.titanic_survivors
INFO:root:Reading training data: bsr:///cmpe260-334300.titanic_survivors
INFO:root:Reading test data: bsr:///cmpe260-334300.titanic_survivors
INFO:root:Reading validation data: bsr:///cmpe260-334300.titanic_survivors
INFO:root:Defining model parameters
/home/jupyter/titanic/trainer/task.py:104: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError. Select only valid columns before calling the reduction.
  df = df.fillna(df.mean())
INFO:root:Running feature selection
INFO:root:Training pipelines in CV
INFO:root:Export trained pipeline and report
INFO:root:fiscore: 0.857276807883355
INFO:root:Training job completed. Exiting...
(base) jupyter@python-20211206-175459:/titanic$ 

```

Screenshot of a Jupyter Notebook interface showing a terminal window output and a file browser.

Terminal Window Output:

```

INFO:root:Running feature selection
INFO:root:Training pipelines in CV
INFO:root:Export trained pipeline and report
INFO:root:fiscore: 0.8572768078833535
INFO:root:Training job completed. Exiting...
(base) jupyter@python-20211206-175459:~/titanic$ cd /home/jupyter/titanic
(base) jupyter@python-20211206-175459:~/titanic$ python setup.py sdist
running sdist
running egg_info
writing egg_info/titanic.egg-info/PKG-INFO
writing dependency_links to titanic.egg_info/dependency_links.txt
writing requirements to titanic.egg_info/requirements.txt
writing top-level names to titanic.egg_info/top_level.txt
reading manifest file 'titanic.egg-info/SOURCES.txt'
writing manifest file 'titanic.egg-info/SOURCES.txt'
warning: sdist: standard file not found: should have one of README, README.rst, README.txt, README.md

running check
warning: check: missing require meta-data: url

warning: check: missing meta-data: either (author and author_email) or (maintainer and maintainer_email) must be supplied

creating trainer-0.1
creating trainer-0.1/trainer
creating trainer-0.1/trainer.egg-info
copying files to trainer-0.1...
copying setup.py -> trainer-0.1
copying trainer/_init_.py -> trainer-0.1/trainer
copying trainer/task.py -> trainer-0.1/trainer
copying titanic.egg-info/PKG-INFO -> trainer-0.1/trainer.egg-info
copying titanic.egg-info/SOURCES.txt -> trainer-0.1/trainer.egg-info
copying titanic.egg-info/dependency_links.txt -> trainer-0.1/trainer.egg-info
copying titanic.egg-info/requirements.txt -> trainer-0.1/trainer.egg-info
copying titanic.egg-info/top_level.txt -> trainer-0.1/trainer.egg-info
Writing trainer-0.1/setup.cfg
Creating tar archive
removing 'trainer-0.1' (and everything under it)
(base) jupyter@python-20211206-175459:~/titanic$ 

```

File Browser:

- Path: / titanic / dist /
- Items:
 - trainer-0.1-py3.7.egg (Last Modified: 2 hours ago)
 - trainer-0.1.tar.gz (Last Modified: a minute ago)

Google Cloud Platform Bucket Details:

Bucket: cmpe260-334300-bucket

Location	Storage class	Public access	Protection
us-central1 (Iowa)	Standard	⚠ Subject to object ACLs	None

OBJECTS

Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption	Retention expiration date
trainer-0.1.tar.gz	6.3 KB	application/x-tar	Dec 6, 20...	Standard	Dec 6, 202...	Not public	—	Google-managed key	—

Model Training

The screenshot shows two views of the Google Cloud Platform interface for Vertex AI.

Top View: The user is in the "Bucket details" view for the "cmpe260-334300-bucket". The bucket is located in the "us-central1 (Iowa)" region, has a "Standard" storage class, and "Public access" set to "None". The "Protection" section indicates it is "Subject to object ACLs" and "None". The sidebar on the left shows various AI services like Financial Services, Healthcare, Life Sciences, and Dataprep, along with the "ARTIFICIAL INTELLIGENCE" category which includes Vertex AI, AI Platform, Data Labeling, Document AI, Natural Language, Recommendation, Retail, Speech-to-text, Tables, and Talent Solution.

Bottom View: The user is in the "Training" section of the Vertex AI interface. The "CREATE" button is highlighted. The "TRAINING PIPELINES" tab is selected, showing a brief description of what training pipelines are used for. A dropdown menu for "Region" is open, showing "us-central1 (Iowa)" as the current selection. The sidebar on the left includes "Dashboard", "Datasets", "Features", "Labeling tasks", "Workbench", "Pipelines", "Training" (which is currently selected), "Experiments", "Models", "Endpoints", "Batch predictions", and "Metadata".

Train new model

- 1 Training method**
- 2 Model details**
- 3 Training container**
- 4 Hyperparameters (optional)**
- 5 Compute and pricing**
- 6 Prediction container (optional)**

Dataset * **titanic**

Objective * **Classification**

Please refer to the pricing guide for more details (and available deployment options) for each method.

AutoML
Train high-quality models with minimal effort and machine learning expertise. Just specify how long you want to train. [Learn more](#)

Custom training (advanced)
Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

CONTINUE

Train new model

- Training method**
- 2 Model details**
- 3 Training container**
- 4 Hyperparameters (optional)**
- 5 Compute and pricing**
- 6 Prediction container (optional)**

Model name * **titanic_202112744834**

Data split

Random assignment
80% of your data is randomly assigned for training, 10% for validation and 10% for testing.

Manual
You assign each data row for training, validation, and testing. [Learn more](#)

Chronological assignment
The earliest 80% of your data is assigned to training, the next 10% for validation and the latest 10% for testing. This option requires a Time column in your dataset. [Learn more](#)

Training 80% Validation 10% Testing 10%

Encryption

Use a customer-managed encryption key (CMEK)

Service account

Select a service account to use with your model.

Service account **BROWSE**

The screenshot shows the Google Cloud Platform Vertex AI Training interface. On the left, there's a sidebar with various options like Dashboard, Datasets, Features, Labeling tasks, Workbench, Pipelines, and Training. Under Training, there are sub-options like Experiments, Models, Endpoints, Batch predictions, and Metadata. The main area is titled "Train new model" and has a numbered list of steps: 1. Training method (checkbox checked), 2. Model details (checkbox checked), 3. Training container (selected, highlighted in blue), 4. Hyperparameters (optional) (radio button selected), 5. Compute and pricing, 6. Prediction container (optional). Step 3 is currently active. A sub-section titled "Pre-built container" is expanded, showing a dropdown for "Model framework" set to "scikit-learn" and another dropdown for "Model framework version" set to "0.23". Below this, there's a section for "Pre-built container settings" with fields for "Package location (Cloud Storage path)" containing "gs://cmpe260-334300-bucket/titanic/dl/trainer-0.1.tar.gz", "Python module" set to "trainer.task", "BigQuery project for exporting data" set to "cmpe260-334300", and "Model output directory" set to "gs://cmpe260-334300-bucket/titanic/assets". Buttons for "START TRAINING" and "CANCEL" are at the bottom.

This screenshot shows the same "Train new model" interface as the previous one, but with a different configuration. Step 4 "Hyperparameters (optional)" is selected. A note on the right says: "Hyperparameter tuning optimizes your model through multiple trials in one training job, but will increase the cost of this job. After training finishes, the best-performing model will be saved to your Model List. [Learn more](#)". There is a checkbox labeled "Enable hyperparameter tuning" which is checked. A "CONTINUE" button is visible at the bottom right of the step panel.

Train new model

Model training pricing is based on the length of time spent training, machine types, and any accelerators used. [Learn more](#)

Region
us-central1 (Iowa)

Compute settings

Select the type of virtual machine to use for your worker pool. You can add up to 4 worker pools. To learn about compute costs and how to map your ML framework's roles to specific worker pools, consult the [documentation](#)

Worker pool 0

Machine type * m1-standard-4, 4 vCPUs, 15 GiB memory

Worker count

Disk type SSD

Disk size (GB) 100

CONTINUE

Train new model

You can associate your custom-trained model with a container in order to serve prediction requests using Vertex AI. [Learn more about getting predictions.](#)

No prediction container
You can always import your model artifact later to serve prediction requests

Pre-built container
View the list of [supported runtimes](#) including TensorFlow, scikit-learn and PyTorch versions

Custom container
Build a custom Docker container. Must be stored in [Container Registry](#) or [Artifact Registry](#)

Pre-built container settings

Vertex AI provides Docker container images for serving predictions. To use a pre-built container, your trained model code must be in Python 3.7. [Learn more about pre-built containers](#)

Model framework * scikit-learn

Model framework version * 0.23

Model directory * gs://cmpe260-334300-bucket/titanic/assets/

Cloud Storage location containing the model artifact and any supporting files

Predict schema

Optional. [Learn more about the predict schema](#)

gs:// Instances

Cloud Storage location to a YAML file that defines the format of a single instance used in model-inference requests

Start Training

The screenshot shows the Google Cloud Platform interface for Vertex AI. The left sidebar has a 'Training' section selected under 'PIPELINES'. The main area displays a table of training pipelines. One pipeline named 'titanic_202112744834' is listed with a status of 'Finished'. The table includes columns for Name, ID, Status, Job type, Model type, Created, Elapsed time, and Labels.

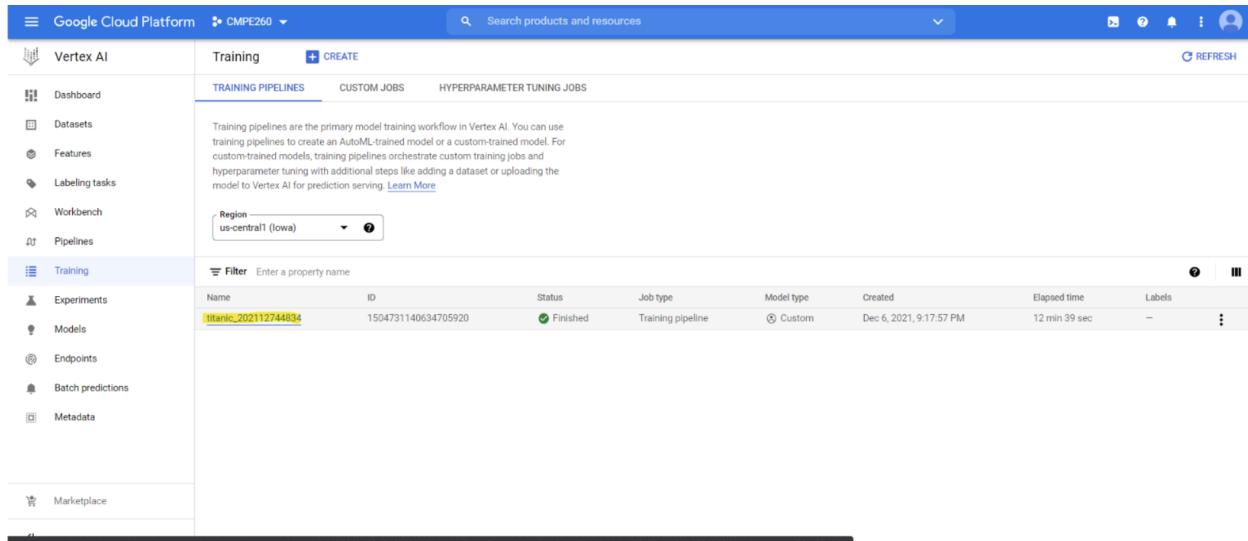
Name	ID	Status	Job type	Model type	Created	Elapsed time	Labels
titanic_202112744834	1504731140634705920	Finished	Training pipeline	Custom	Dec 6, 2021, 9:17:57 PM	12 min 39 sec	-

Model Evaluation

The screenshot shows the Google Cloud Platform interface for a storage bucket named 'cmpe260-334300-bucket'. The 'OBJECTS' tab is selected. The table lists two objects: 'model.pkl' and 'report.txt'. Both files are 88 KB in size, have a 'text/plain' type, and were created on Dec 6, 2021, at 9:30:35. They are stored in 'Standard' storage class and have 'Not public' public access. Both files are encrypted with Google-managed keys and have no retention expiration date.

Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption	Retention expiration date	Holds
model.pkl	88 KB	text/plain	Dec 6, 2021, 9:30:35	Standard	Dec 6, 2021, 9:30:35	Not public	-	Google-managed key	-	None
report.txt	977 B	text/plain	Dec 6, 2021, 9:30:35	Standard	Dec 6, 2021, 9:30:35	Not public	-	Google-managed key	-	None

Model Deployment

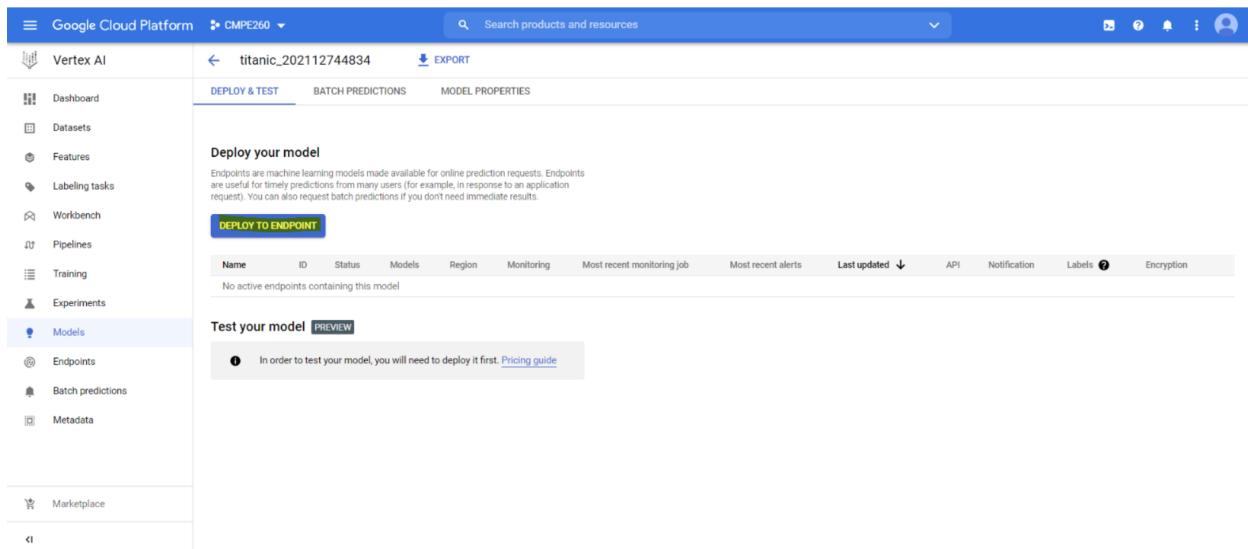


The screenshot shows the Google Cloud Platform Vertex AI Training Pipelines interface. On the left, a sidebar menu includes options like Dashboard, Datasets, Features, Labeling tasks, Workbench, Pipelines, Training (selected), Experiments, Models, Endpoints, Batch predictions, and Metadata. Under Training, there are sub-options: Experiments, Models (selected), Endpoints, Batch predictions, and Metadata. A Marketplace link is also present.

The main content area displays a table of training pipelines. One row is highlighted in yellow, showing the details for the pipeline named "titanic_202112744834".

Name	ID	Status	Job type	Model type	Created	Elapsed time	Labels
titanic_202112744834	1504731140634705920	Finished	Training pipeline	Custom	Dec 6, 2021, 9:17:57 PM	12 min 39 sec	-

A URL at the bottom of the page is: <https://console.cloud.google.com/vertex-ai/locations/us-central1/models/1465534534816990880/deploy/hack10-training&trainingPipelineId=1504731140634705920&project=cmpe260-334300>.



The screenshot shows the Google Cloud Platform Vertex AI Model Properties interface for the model "titanic_202112744834". The sidebar menu is identical to the previous screenshot. The main content area has tabs: DEPLOY & TEST (selected), BATCH PREDICTIONS, and MODEL PROPERTIES.

The "Deploy your model" section contains a sub-section titled "Endpoints". It states: "Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results." A blue "DEPLOY TO ENDPOINT" button is visible.

The "Test your model" section includes a "PREVIEW" button. A note below it says: "In order to test your model, you will need to deploy it first." A link to the "Pricing guide" is provided.

The screenshot shows the Google Cloud Platform Vertex AI interface. On the left, a sidebar lists options like Dashboard, Datasets, Features, Labeling tasks, Workbench, Pipelines, Training, Experiments, Models (which is selected), Endpoints, Batch predictions, and Metadata. The main content area shows a model named 'titanic_202112744834'. Below it are tabs for DEPLOY & TEST, BATCH PREDICTIONS, and MODEL PROPERTIES. A 'Deploy your model' section contains a 'DEPLOY TO ENDPOINT' button. A modal dialog titled 'Deploy to endpoint' is open, showing three steps: 1. Define your endpoint (with 'Create new endpoint' selected and 'Endpoint name' set to 'titanic-endpoint'), 2. Model settings, and 3. Model monitoring. Buttons for 'DEPLOY' and 'CANCEL' are at the bottom.

Deploy to endpoint

Create new endpoint Add to existing endpoint
Endpoint name * **titanic-endpoint**

Location
Region us-central1 (Iowa)

Access
Determines how your endpoint can be accessed. By default, endpoints are available for prediction serving through a REST API. Endpoint access can't be changed after the endpoint is created.

Standard Makes the endpoint available for prediction serving through a REST API. AutoML and custom-trained models can be added to standard endpoints.
 Private Create a private connection to this endpoint using a VPC network and private services access. Only custom-trained and tabular models can be added to private endpoints.
[Learn more](#)

ADVANCED OPTIONS
CONTINUE

The screenshot shows the same Vertex AI interface and model details as the first one. The 'Deploy to endpoint' dialog is still open. In addition to the previous steps, it now includes a 'Compute resources' section. It shows a 'Traffic split' field set to '100'. Under 'Compute resources', it says 'Choose how compute resources will serve prediction traffic to your model'. It lists two options: 'Autoscaling' (if set a minimum and maximum, compute nodes will scale to meet traffic demand within those boundaries) and 'No scaling' (if you only set a minimum, then that number of compute nodes will always run regardless of traffic demand (the maximum will be set to minimum)). It notes that once scaling settings are set, they can't be changed unless you redeploy the model. Below this are fields for 'Minimum number of compute nodes' (set to 1) and 'Maximum number of compute nodes (optional)' (set to 2). A note says 'Default is 1. If set to 1 or more, then compute resources will continuously run even without traffic demand. This can increase cost but avoid dropped requests due to node initialization.' A 'Machine type' dropdown is set to 'n1-standard-4, 4 vCPUs, 15 GiB memory'. A 'Service account' dropdown is also present.

Deploy to endpoint

Define your endpoint
 Model settings
 Model monitoring

DEPLOY **CANCEL**

titanic_202112744834
Traffic split * **100**

Compute resources
Choose how compute resources will serve prediction traffic to your model

- Autoscaling: If you set a minimum and maximum, compute nodes will scale to meet traffic demand within those boundaries
- No scaling: If you only set a minimum, then that number of compute nodes will always run regardless of traffic demand (the maximum will be set to minimum)

Once scaling settings are set, they can't be changed unless you redeploy the model. [Pricing guide](#)

Minimum number of compute nodes * **1**
Default is 1. If set to 1 or more, then compute resources will continuously run even without traffic demand. This can increase cost but avoid dropped requests due to node initialization.

Maximum number of compute nodes (optional) **2**
Enter a number equal to or greater than the minimum nodes. Can reduce costs but may cause reliability issues for high traffic.

ADVANCED SCALING OPTIONS

Machine type * **n1-standard-4, 4 vCPUs, 15 GiB memory**

Service account

A service account determines what Google Cloud resources your service code can

Continue and Deploy

The following screenshots show the progression of deploying a model to an endpoint in Google Cloud Platform's Vertex AI interface.

Screenshot 1: Model Deployment Progress

Screenshot 2: Model Deployment Success

Screenshot 3: Model Prediction Response

```

{
  "instances": [
    {
      "sample_key": "sample_value"
    }
  ]
}

```

```

{
  "predictions": [
    {
      "0,
      1
    },
    {
      "deployedModelId": "5003605527765319600",
      "model": "projects/10637551126/locations/us-central1/models/4405534534816",
      "modelDisplayName": "titanic_202112744834"
    }
  ]
}

```