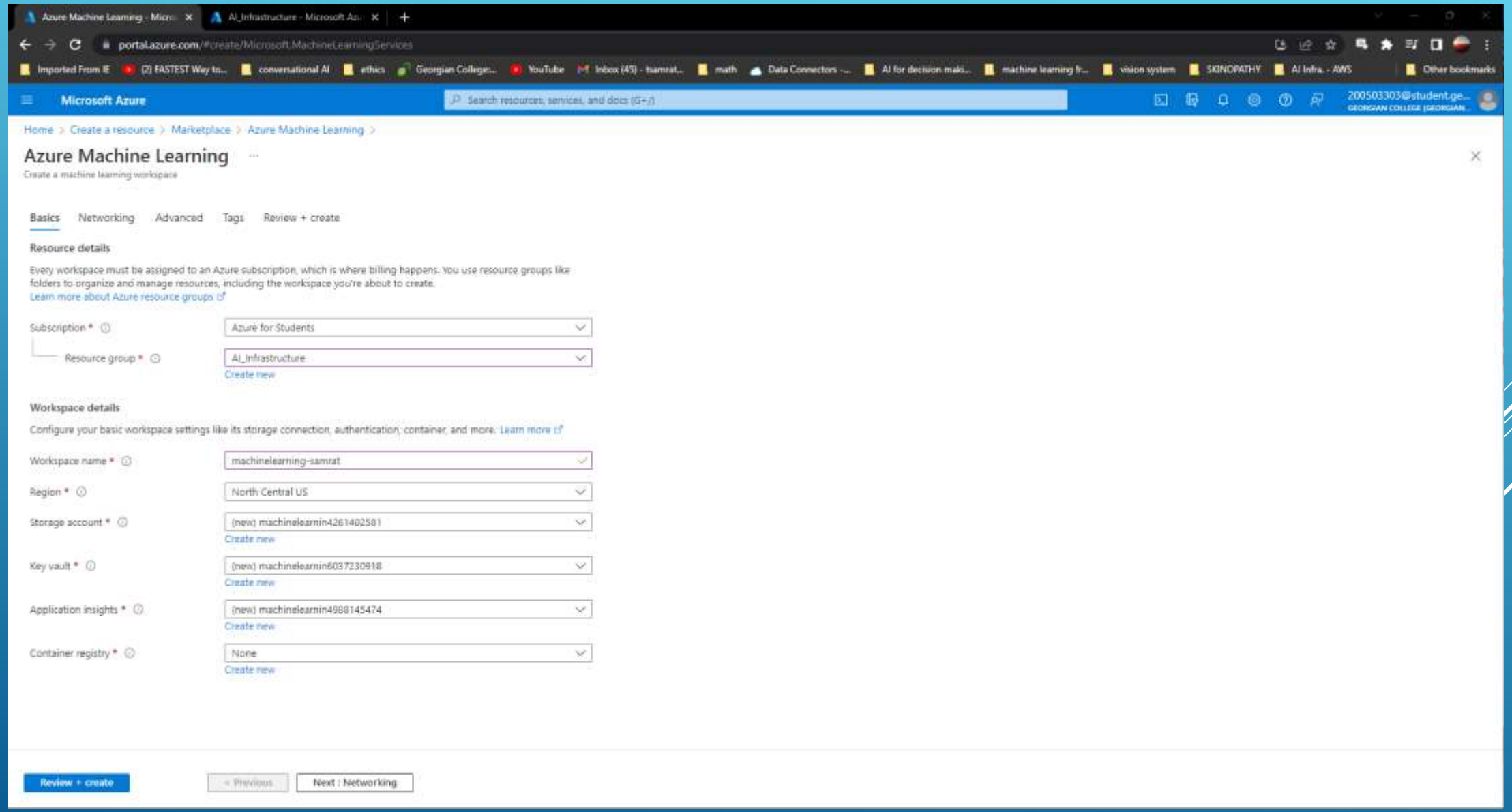
CHALLENGE 3

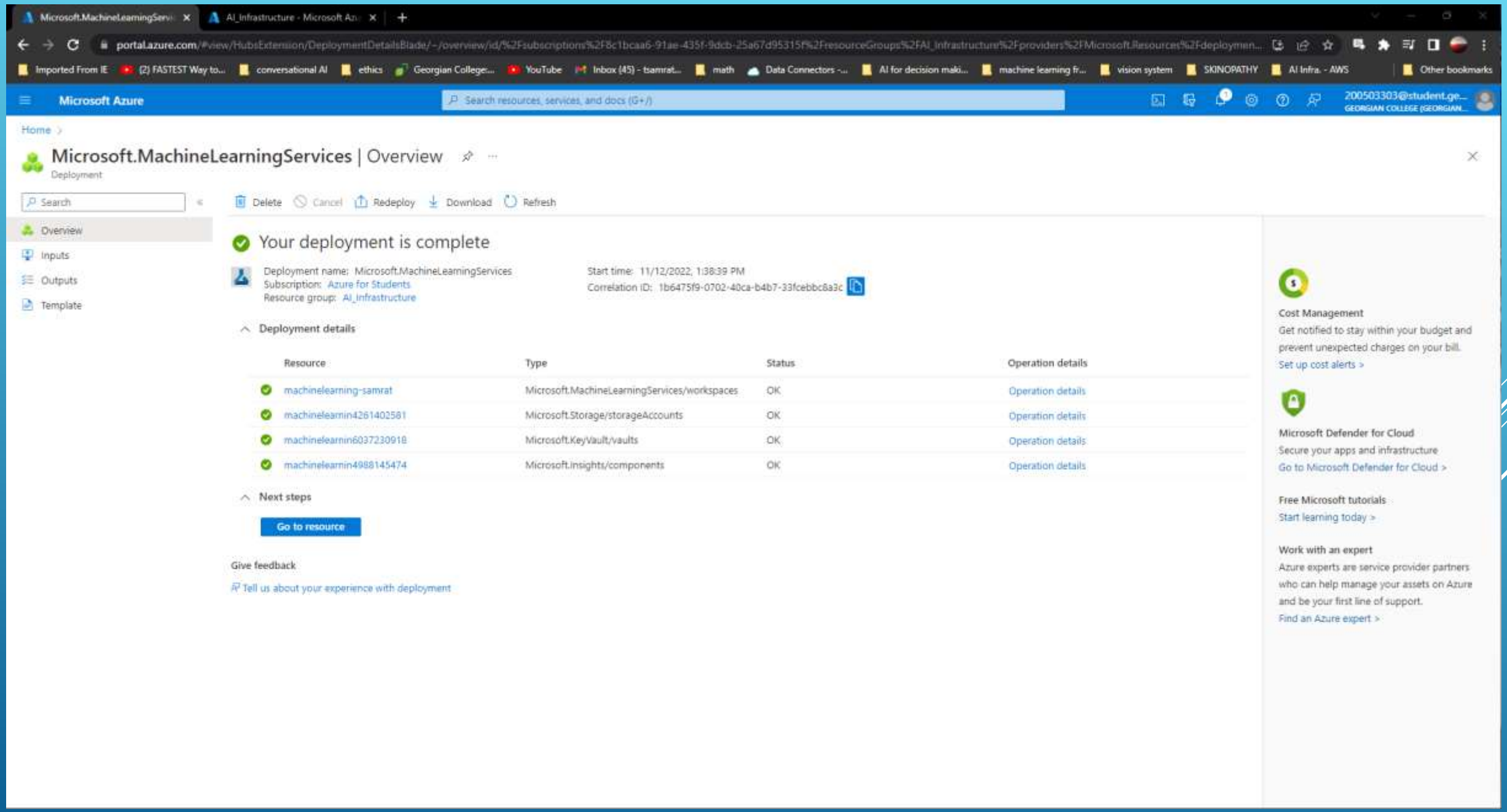
AZURE MACHINE LEARNING

AI INFRASTRUCTURE AND ARCH.

Samrat Thapa -- 200481763

CREATING AZURE MACHINE LEARNING RESOURCE




Microsoft.MachineLearningServi
AI_Infrastructure - Microsoft Az
portalazure.com/#view/HubsExtension/DeploymentDetailsBlade/~/overview/id/%2Fsubscriptions%2F8c1bcaa6-91ae-435f-9dcb-25a67d95315f%2FresourceGroups%2FAI_Infrastructure%2Fproviders%2FMicrosoft.Resources%2Fdeploymen...
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Data Connectors -...
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Outputs
Template
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Cancel
Redeploy
Download
Refresh
Your deployment is complete
Deployment name: Microsoft.MachineLearningServices
Subscription: Azure for Students
Resource group: AI_Infrastructure
Start time: 11/12/2022, 1:38:39 PM
Correlation ID: 1b6475f9-0702-40ca-b4b7-33fcebbc8a3c
Deployment details
Resource
Type
Status
Operation details
machinelearning-samrat
Microsoft.MachineLearningServices/workspaces
OK
Operation details
machinelearnin4261402581
Microsoft.Storage/storageAccounts
OK
Operation details
machinelearnin6037230918
Microsoft.KeyVault/vaults
OK
Operation details
machinelearnin4988145474
Microsoft.Insights/components
OK
Operation details
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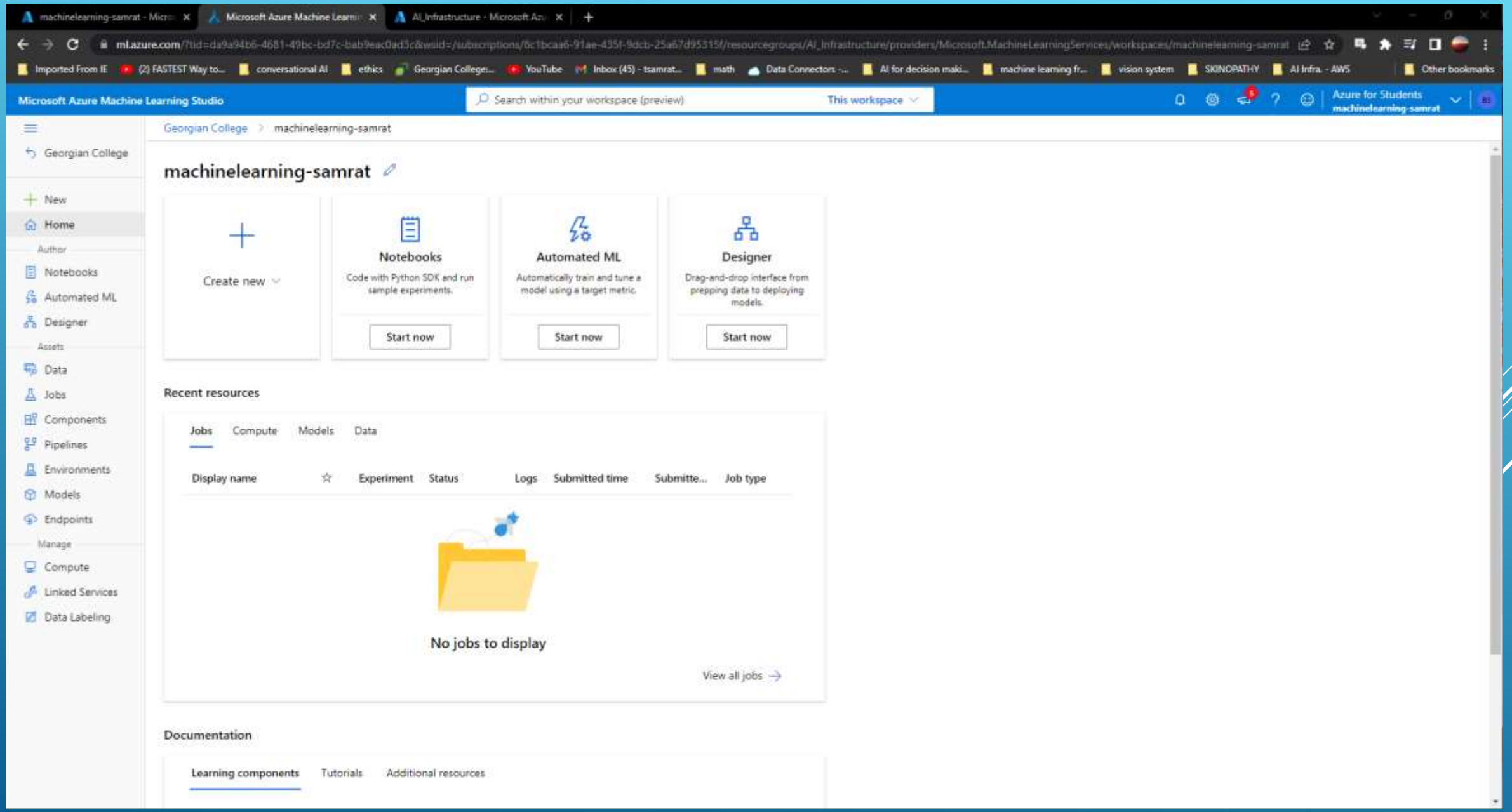
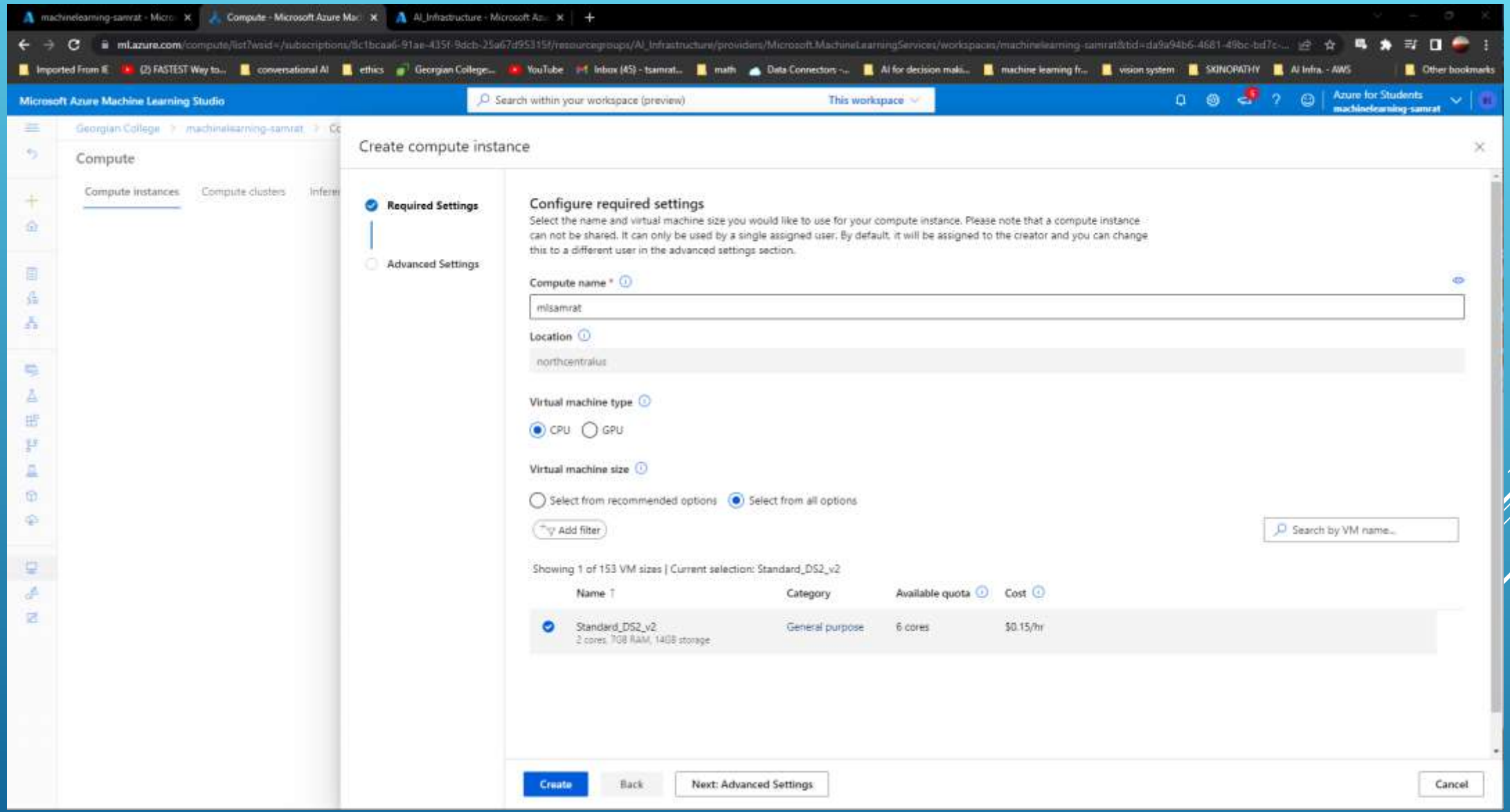
AZURE MACHINE LEARNING PORTAL

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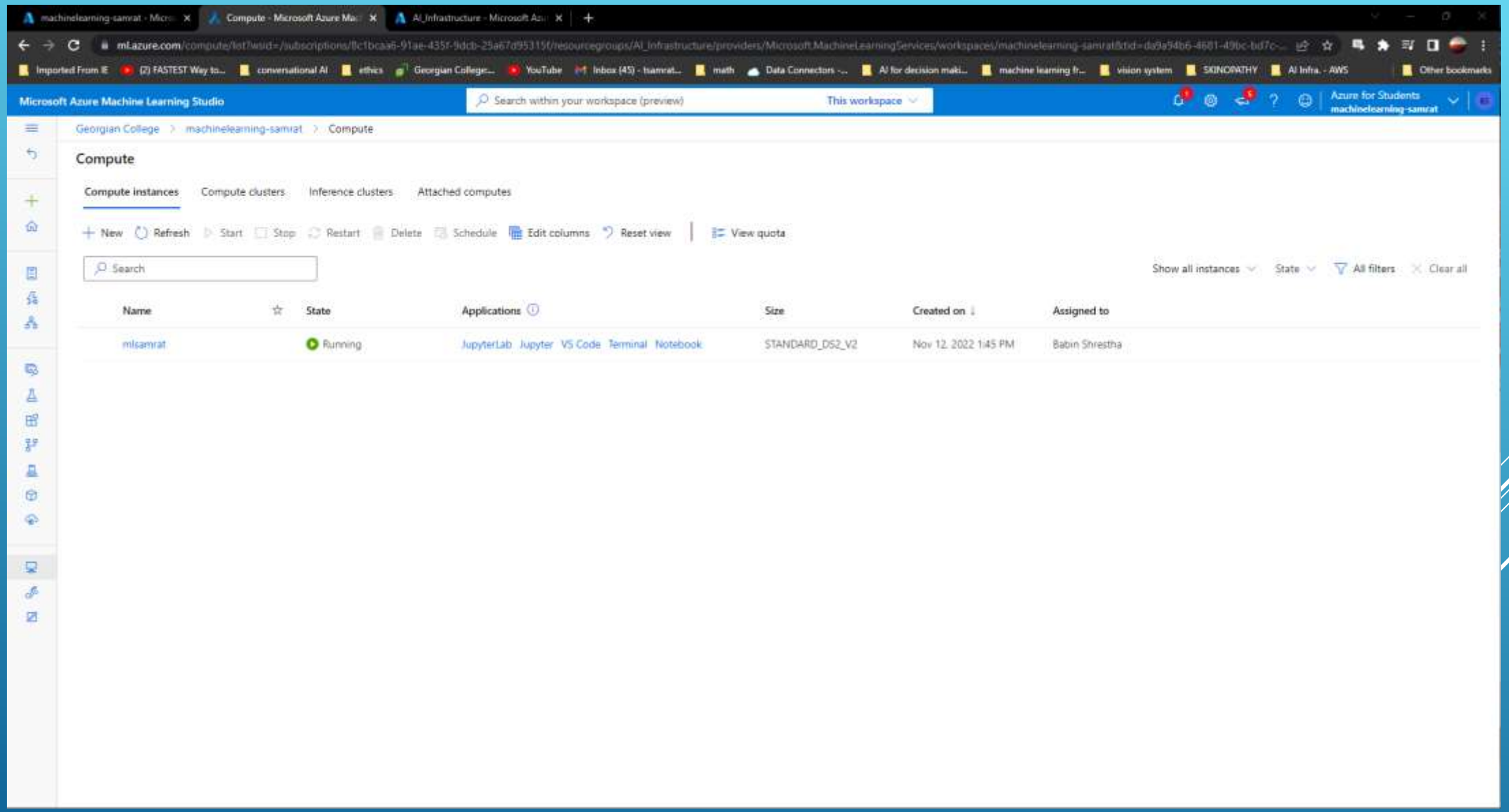
Compute
Compute instances
Compute clusters
Create compute instance
Required Settings
Advanced Settings
Configure required settings
Select the name and virtual machine size you would like to use for your compute instance. Please note that a compute instance can not be shared. It can only be used by a single assigned user. By default, it will be assigned to the creator and you can change this to a different user in the advanced settings section.
Compute name *
mlsamrat
Location
northcentralus
Virtual machine type
CPU
GPU
Virtual machine size
Select from recommended options
Select from all options
Add filter
Search by VM name...
Showing 1 of 153 VM sizes | Current selection: Standard_DS2_v2
Name
Category
Available quota
Cost
Standard_DS2_v2
2 cores, 7GB RAM, 14GB storage
General purpose
6 cores
$0.15/hr
Create
Back
Next: Advanced Settings
Cancel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Reset view
View quota
Search
Show all instances
State
All filters
Clear all
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State
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Assigned to
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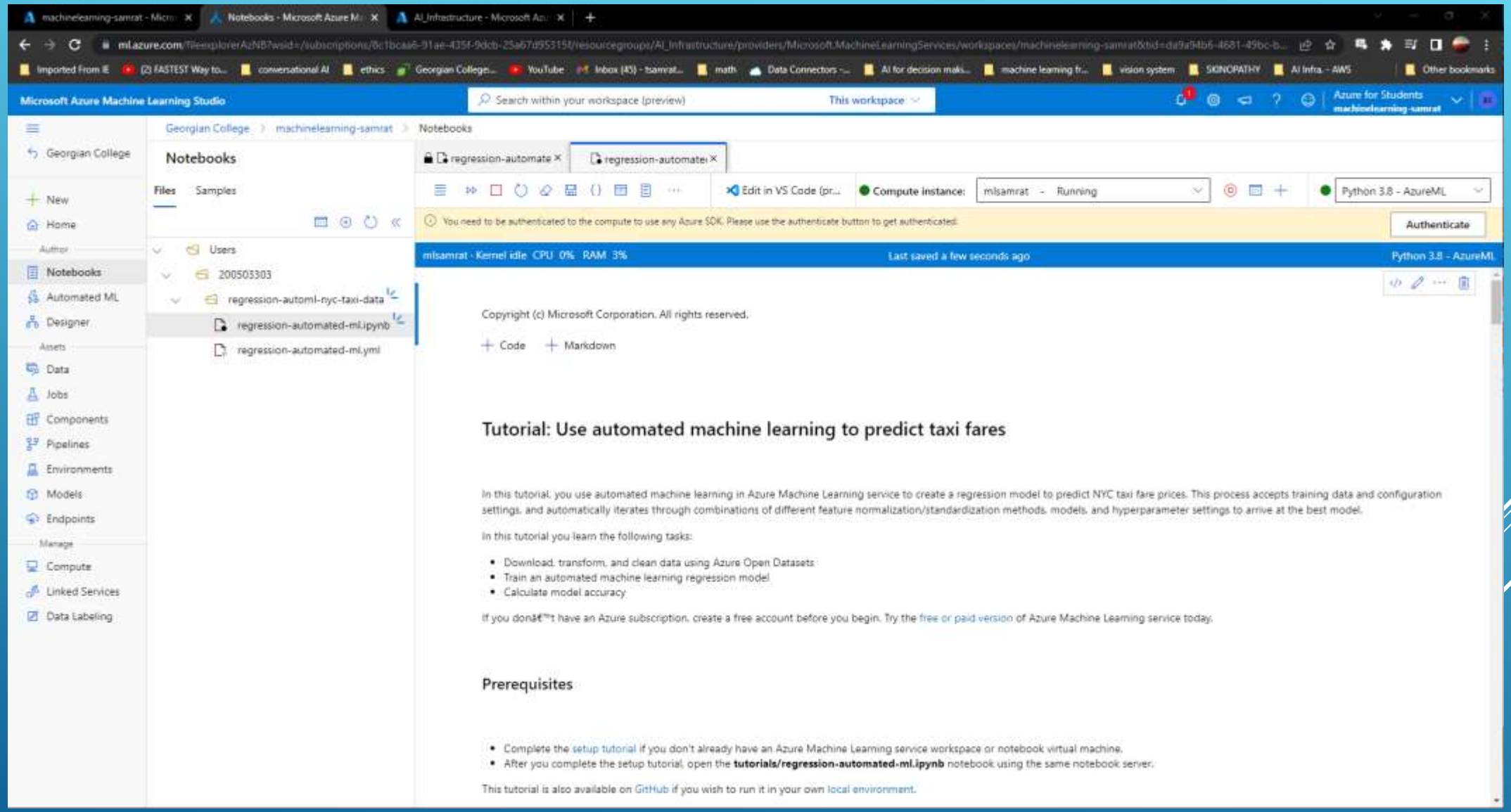
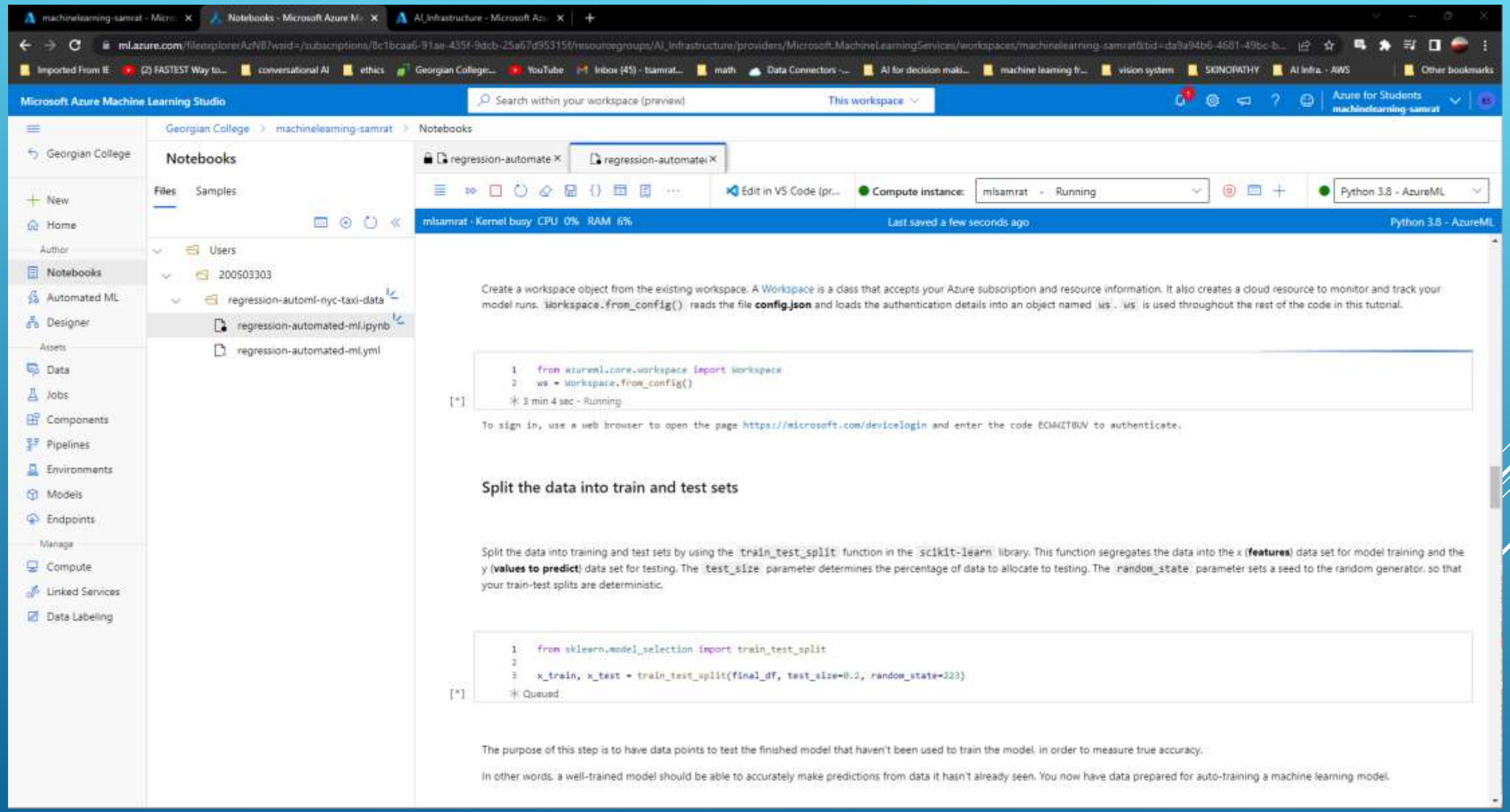
JupyterLab Jupyter VS Code Terminal Notebook
STANDARD_DS2_V2
Nov 12, 2022 1:45 PM
Babin Shrestha

Training Regression Problem

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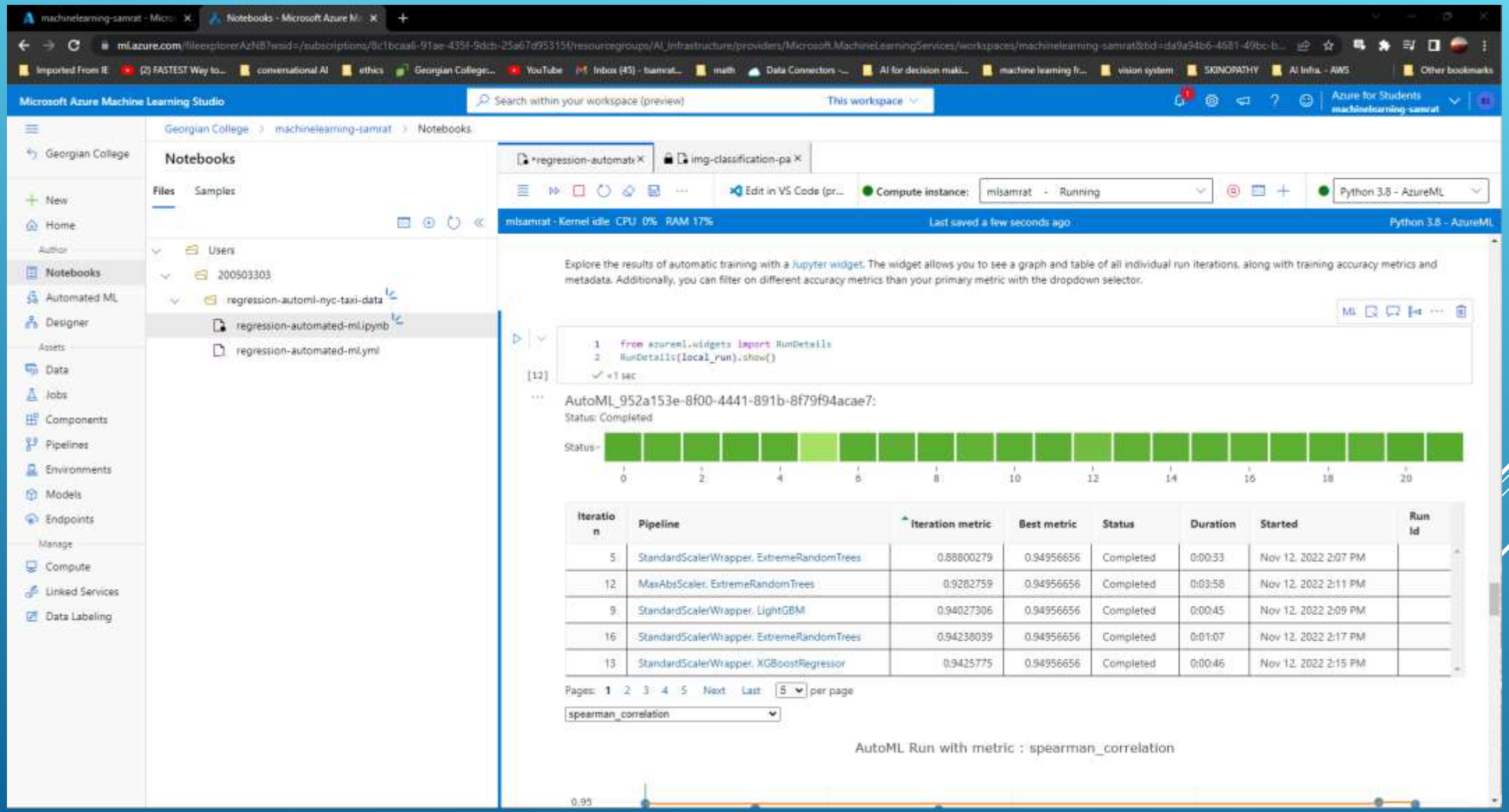
regression-automl-nyc-taxi-data
regression-automated-ml.ipynb
regression-automated-ml.yml
regression-automate
Edit in VS Code (pr...
Compute instance:
mlsamrat - Running
Python 3.8 - AzureML
mlsamrat · Kernel busy CPU 0% RAM 6%
Last saved a few seconds ago
Python 3.8 - AzureML
Create a workspace object from the existing workspace. A Workspace is a class that accepts your Azure subscription and resource information. It also creates a cloud resource to monitor and track your model runs. workspace.from_config() reads the file config.json and loads the authentication details into an object named ws. ws is used throughout the rest of the code in this tutorial.
from azureml.core.workspace import Workspace
ws = Workspace.from_config()
[*]
3 min 4 sec - Running
To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code EC4WZT8UV to authenticate.
Split the data into train and test sets
Split the data into training and test sets by using the train_test_split function in the scikit-learn library. This function segregates the data into the x (features) data set for model training and the y (values to predict) data set for testing. The test_size parameter determines the percentage of data to allocate to testing. The random_state parameter sets a seed to the random generator, so that your train-test splits are deterministic.
from sklearn.model_selection import train_test_split
x_train, x_test = train_test_split(final_df, test_size=0.2, random_state=223)
[*]
Queued
The purpose of this step is to have data points to test the finished model that haven't been used to train the model, in order to measure true accuracy.
In other words, a well-trained model should be able to accurately make predictions from data it hasn't already seen. You now have data prepared for auto-training a machine learning model.

TRAINING RESULT



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ml.azure.com/runs?wsid=/subscriptions/8c1bcaa6-91ae-435f-9dcb-25a67d95315f/resourcegroups/AI_Infrastructure/providers/Microsoft.MachineLearningServices/workspaces/machinelearning-samrat&tid=da9a94b6-4681-49bc-bd7c-bab9eac...

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Jobs

All experiments | **All jobs**

Initial chart load: Charts displayed are rendered from the first five jobs, until you make selection of the charts you'd like to see.

Create job (preview) | Add chart | Refresh | Compare (preview) | Edit columns | Cancel | Delete | Current view: default | Save view | Edit view | Share view

Search | Status | Created by | Include child jobs | View only my jobs | All filters | Clear all

Running: 0 | Completed: 1 | Failed: 0 | Canceled: 0 | Queued: 0 | Other: 0

Add a new chart

Show only selected rows (0 selected) | Page Size: 25

Display name	Experiment	Status	Created on	Duration	Created by	Compute target	Job type	Tags
teal_bell_mdgn3fk4	Tutorial-NYCTaxi	Completed	Nov 12, 2022 2:02 PM	21m 14s	Babin Shrestha	local	Automate...	best_pipeline : VotingEnsemble	best_score : 0.9499491180

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ml.azure.com/experiments/id/2a90e24f-91cf-4239-8833-a9a9f79f9807/runs/AutoML_952a153e-8f00-4441-891b-8f79f94acae7?wsid=/subscriptions/8c1bcaa6-91ae-435f-9dcb-25a67d95315f/resourcegroups/AI_Infrastructure/providers/Micros...

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teal_bell_mdgn3fk4

Completed

Overview | Data guardrails | Models | Outputs + logs | Child jobs

Refresh | Edit and submit (preview) | Register model | Cancel | Delete | Compare (preview)

Properties

Status
Completed

Warning: Experiment timeout reached, hence experiment stopped. Current experiment timeout: 0 hour(s) 18 minute(s)

See more details

Created on
Nov 12, 2022 2:02 PM

Start time
Nov 12, 2022 2:02 PM

Duration
21m 14.09s

Compute duration
21m 14.09s

Compute target
local

Name
AutoML_952a153e-8f00-4441-891b-8f79f94acae7

Script name
--

Created by
Babin Shrestha

Job type
Automated ML

Experiment
Tutorial-NYCTaxi

Arguments
None

See all properties
Raw JSON

See YAML job definition
Job YAML

Tags

best_pipeline : VotingEnsemble | best_score : 0.9499491180839128

Best model summary

Algorithm name
VotingEnsemble

Ensemble details
View ensemble details

Spearman correlation
0.94995 View all other metrics

Sampling
100.00 %

Registered models
No registration yet

Deploy status
No deployment yet

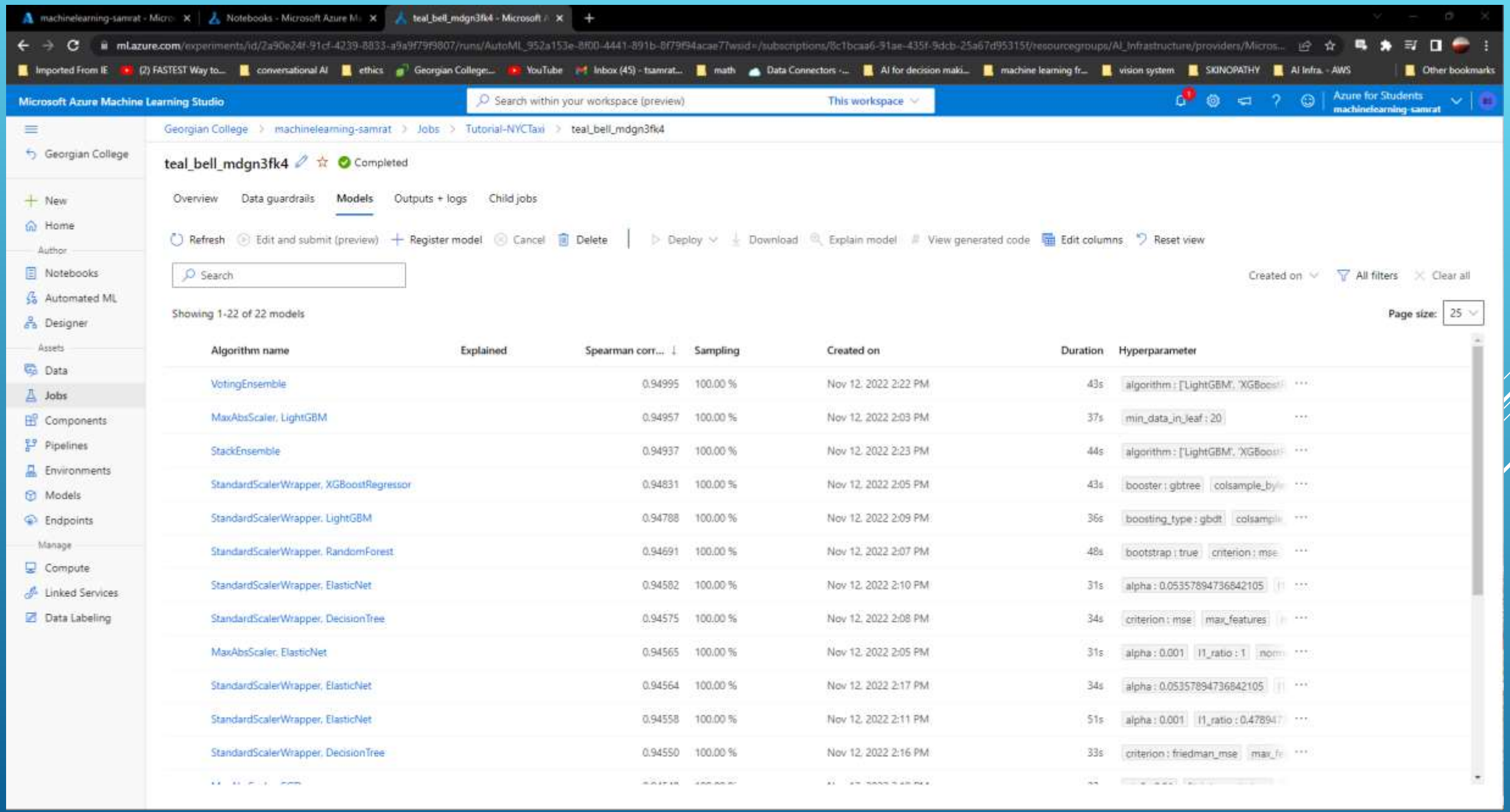
Run summary

Task type
Regression View configuration settings

Featurization
Auto

Primary metric
Spearman correlation

Experiment name
Tutorial-NYCTaxi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Outputs + logs
Child jobs
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Register model
Cancel
Delete
Deploy
Download
Explain model
View generated code
Edit columns
Reset view
Search
Created on
All filters
Clear all
Showing 1-22 of 22 models
Page size: 25
Algorithm name
Explained
Spearman corr...
Sampling
Created on
Duration
Hyperparameter
VotingEnsemble 0.94995 100.00 % Nov 12, 2022 2:22 PM 43s
MaxAbsScaler, LightGBM 0.94957 100.00 % Nov 12, 2022 2:03 PM 37s min_data_in_leaf : 20
StackEnsemble 0.94937 100.00 % Nov 12, 2022 2:23 PM 44s
StandardScalerWrapper, XGBoostRegressor 0.94831 100.00 % Nov 12, 2022 2:05 PM 43s booster : gbtree
StandardScalerWrapper, LightGBM 0.94788 100.00 % Nov 12, 2022 2:09 PM 36s boosting_type : gbdt
StandardScalerWrapper, RandomForest 0.94691 100.00 % Nov 12, 2022 2:07 PM 48s bootstrap : true
StandardScalerWrapper, ElasticNet 0.94582 100.00 % Nov 12, 2022 2:10 PM 31s alpha : 0.05357894736842105
StandardScalerWrapper, DecisionTree 0.94575 100.00 % Nov 12, 2022 2:08 PM 34s criterion : mse
MaxAbsScaler, ElasticNet 0.94565 100.00 % Nov 12, 2022 2:05 PM 31s alpha : 0.001 l1_ratio : 1
StandardScalerWrapper, ElasticNet 0.94564 100.00 % Nov 12, 2022 2:17 PM 34s alpha : 0.05357894736842105
StandardScalerWrapper, ElasticNet 0.94558 100.00 % Nov 12, 2022 2:11 PM 51s alpha : 0.001 l1_ratio : 0.47894
StandardScalerWrapper, DecisionTree 0.94550 100.00 % Nov 12, 2022 2:16 PM 33s criterion : friedman_mse
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silver_curtain_dpwygf99

Completed

Overview | Model | Explanations (preview) | **Metrics** | Data transformation (preview) | Test results (preview) | Outputs + logs | Images | Child jobs | Code | Monitoring (preview)

Refresh | Deploy | Download | Explain model | View generated code | Test model (preview) | Register model | Cancel | Delete

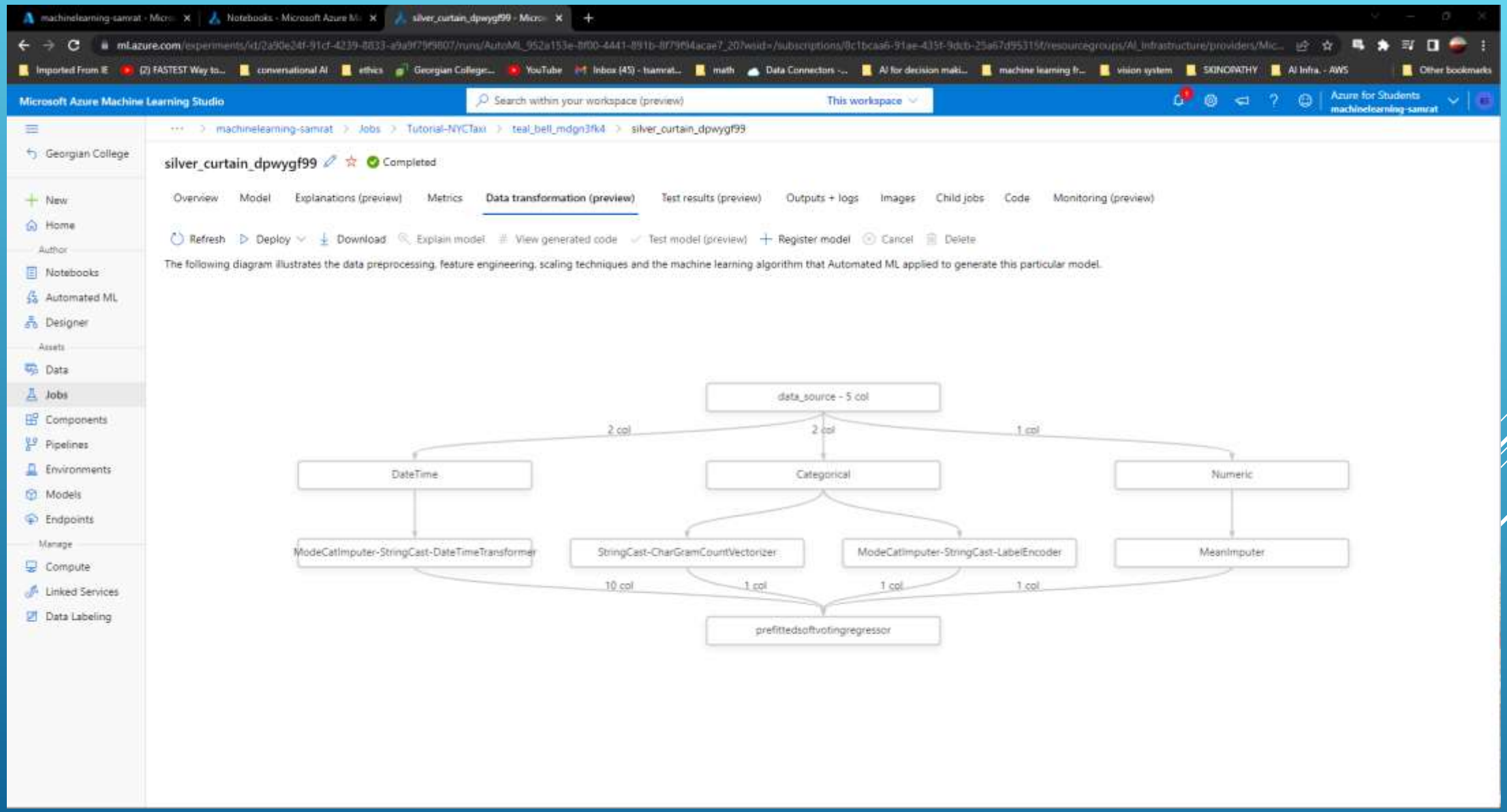
Select a metric to see a visualization or table of the data.

Search

- [x] explained_variance
- [x] mean_absolute_error
- [x] mean_absolute_percentage_error
- [x] median_absolute_error
- [x] normalized_mean_absolute_error
- [ ] normalized_median_absolute_error
- [ ] normalized_root_mean_squared_err...
- [ ] normalized_root_mean_squared_lo...
- [ ] predicted_true
- [x] r2_score
- [ ] residuals
- [ ] root_mean_squared_error
- [ ] root_mean_squared_log_error
- [ ] spearman_correlation

View as: (•) Chart ( ) Table

explained_variance	mean_absolute_error	mean_absolute_percentage_e...	median_absolute_error	normalized_mean_absolute_e...	r2_score
0.8635231	1.995536	65.26391	1.165227	0.01041022	0.8623919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Completed
Overview
Model
Explanations (preview)
Metrics
Data transformation (preview)
Test results (preview)
Outputs + logs
Images
Child jobs
Code
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Refresh
Deploy
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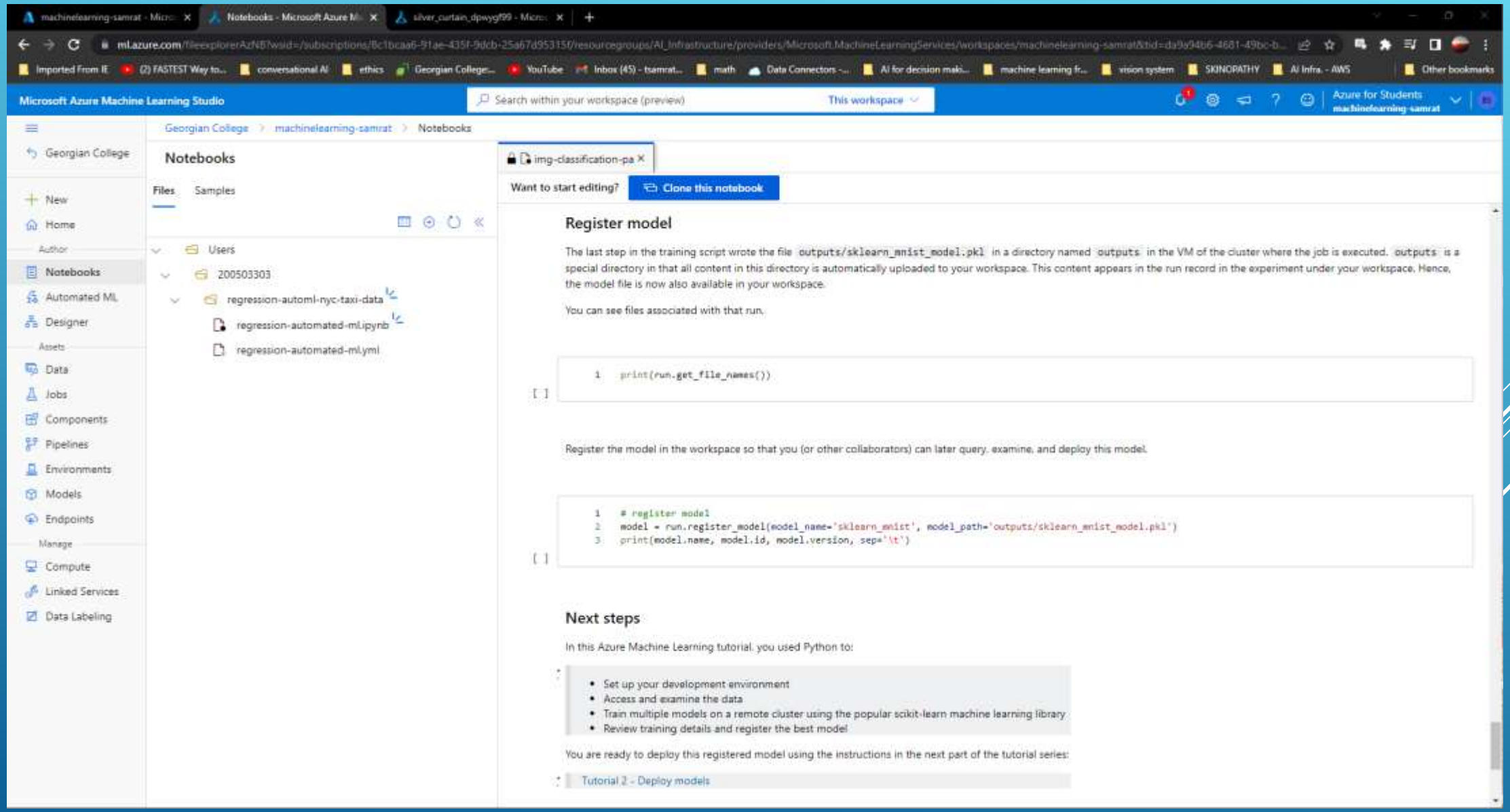
Explain model
View generated code
Test model (preview)
Register model
Cancel
Delete
The following diagram illustrates the data preprocessing, feature engineering, scaling techniques and the machine learning algorithm that Automated ML applied to generate this particular model.
data_source - 5 col
2 col
2 col
1 col
DateTime
Categorical
Numeric
ModeCatImputer-StringCast-DateTimeTransformer
StringCast-CharGramCountVectorizer
ModeCatImputer-StringCast-LabelEncoder
MeanImputer
10 col
1 col
1 col
1 col
prefittedsoftvotingregressor

CHALLENGE 3.6 → TRAINING IMAGE CLASSIFIER



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Files | Samples

- Users
  - 200503303
    - image-classification-mnist-data
      - img-classification-part1-training.ipynb
      - img-classification-part1-training.yml
      - img-classification-part2-deploy.ipynb
      - img-classification-part2-deploy.yml
      - img-classification-part3-deploy-encrypted.ipynb
      - img-classification-part3-deploy-encrypted.yml
      - sklearn_mnist_model.pkl
      - utils.py
    - regression-automl-nyc-taxi-data

*img-classification-p

Edit in VS Code (pr... | Compute instance: mlsamrat - Running | Python 3.8 - AzureML

mlsamrat · Kernel busy CPU 0% RAM 35% | Last saved a minute ago | Python 3.8 - AzureML

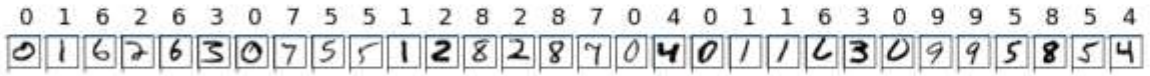
parses the compresse files into numpy arrays.

```
# make sure utils.py is in the same directory as this code
from utils import load_data
import glob


# note we also shrink the intensity values (X) from 0-255 to 0-1. This helps the model converge faster.
X_train = load_data(glob.glob(os.path.join(data_folder,"**/train-images-idx3-ubyte.gz"), recursive=True)[0], False) / 255.0
X_test = load_data(glob.glob(os.path.join(data_folder,"**/t10k-images-idx3-ubyte.gz"), recursive=True)[0], False) / 255.0
y_train = load_data(glob.glob(os.path.join(data_folder,"**/train-labels-idx1-ubyte.gz"), recursive=True)[0], True).reshape(-1)
y_test = load_data(glob.glob(os.path.join(data_folder,"**/t10k-labels-idx1-ubyte.gz"), recursive=True)[0], True).reshape(-1)


# now let's show some randomly chosen images from the traininng set.
count = 0
sample_size = 30
plt.figure(figsize = (16, 6))
for i in np.random.permutation(X_train.shape[0])[:sample_size]:
    count = count + 1
    plt.subplot(1, sample_size, count)
    plt.axhline('')
    plt.axvline('')
    plt.text(x=10, y=-10, s=y_train[i], fontsize=18)
    plt.imshow(X_train[i].reshape(28, 28), cmap=plt.cm.Greys)
plt.show()
```

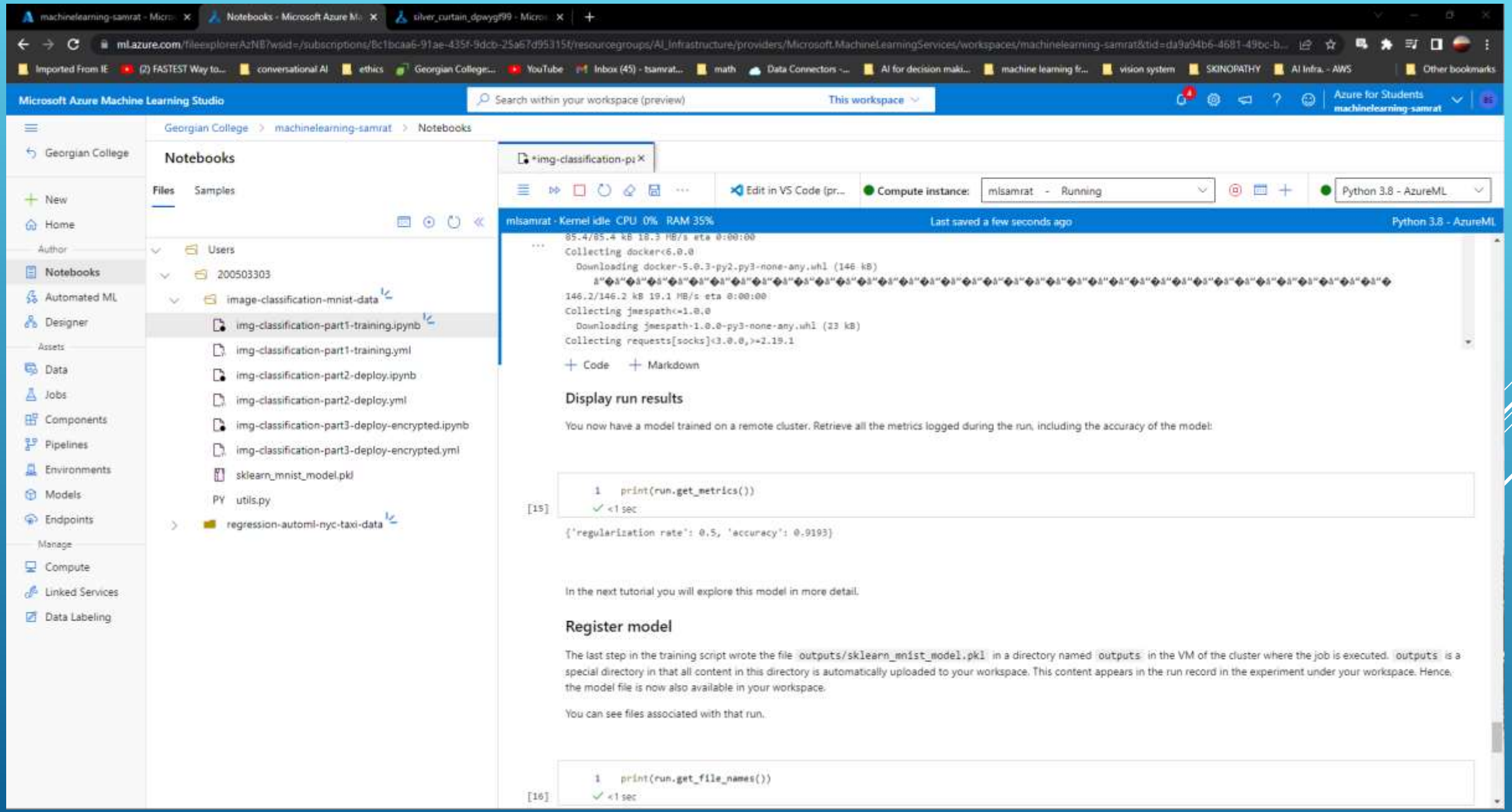
[6] ✓ 3 sec



Train on a remote cluster

For this task, you submit the job to run on the remote training cluster you set up earlier. To submit a job you:

- Create a directory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ml.azure.com/fileexplorerAzNB?wsid=/subscriptions/8c1bcaa6-91ae-435f-9dcb-25a67d95315f/resourcegroups/AI_Infrastructure/providers/Microsoft.MachineLearningServices/workspaces/machinelearning-samrat&tid=da9a94b6-4681-49bc-b...
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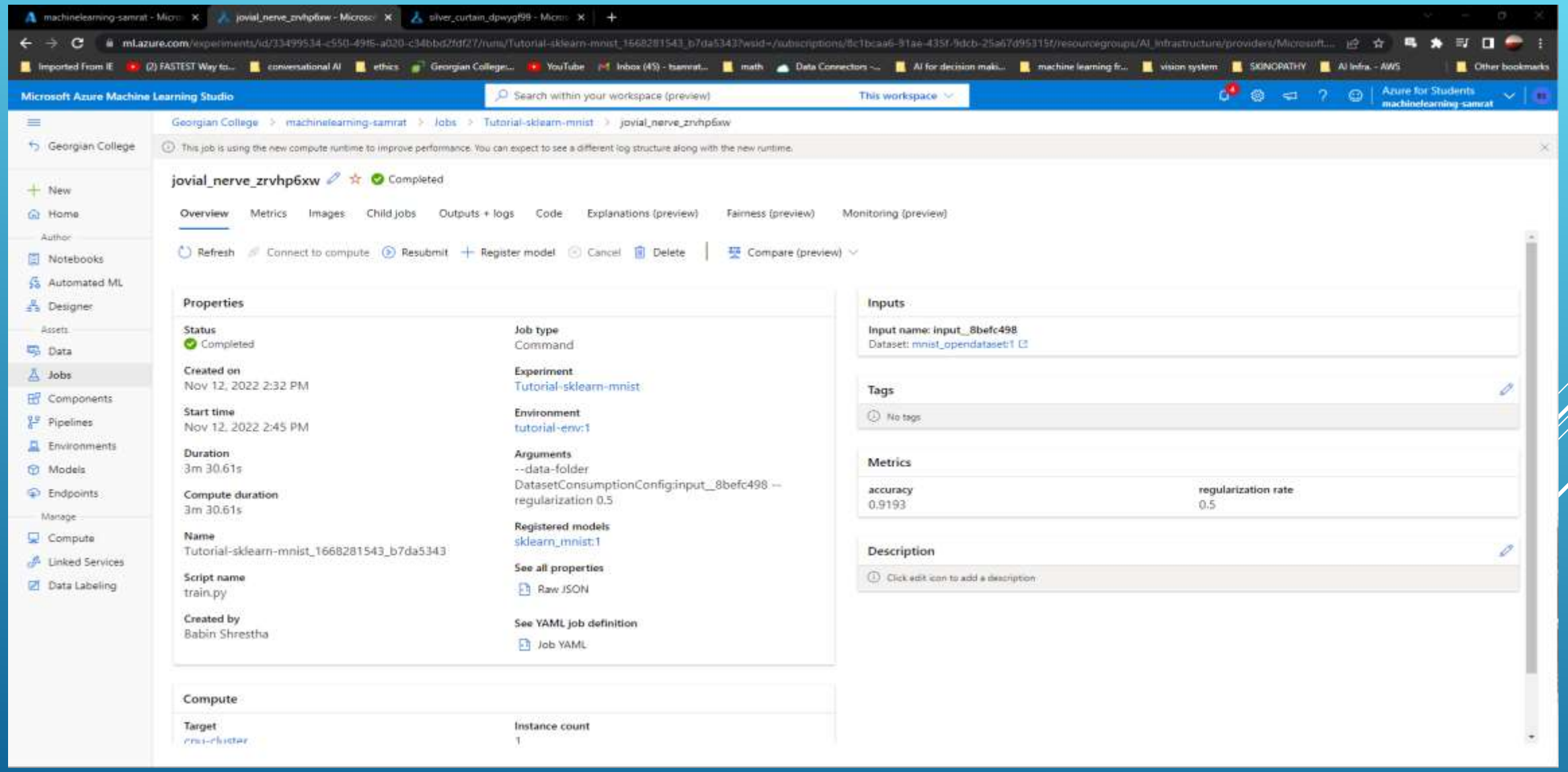
200503303
image-classification-mnist-data
img-classification-part1-training.ipynb
img-classification-part1-training.yml
img-classification-part2-deploy.ipynb
img-classification-part2-deploy.yml
img-classification-part3-deploy-encrypted.ipynb
img-classification-part3-deploy-encrypted.yml
sklearn_mnist_model.pkl
utils.py
regression-automl-nyc-taxi-data
*img-classification-pi
Edit in VS Code (pr...
Compute instance:
mlsamrat - Running
Python 3.8 - AzureML
mlsamrat - Kernel idle CPU 0% RAM 35%
Last saved a few seconds ago
Python 3.8 - AzureML
85.4/85.4 kB 18.3 MB/s eta 0:00:00
Collecting docker<6.0.0
Downloading docker-5.0.3-py2.py3-none-any.whl (146 kB)
146.2/146.2 kB 19.1 MB/s eta 0:00:00
Collecting jmespath<=1.0.0
Downloading jmespath-1.0.0-py3-none-any.whl (23 kB)
Collecting requests[socks]<3.0.0,>=2.19.1
Code
Markdown
Display run results
You now have a model trained on a remote cluster. Retrieve all the metrics logged during the run, including the accuracy of the model:
[15]
1 print(run.get_metrics())
<1 sec
{'regularization rate': 0.5, 'accuracy': 0.9193}
In the next tutorial you will explore this model in more detail.
Register model
The last step in the training script wrote the file outputs/sklearn_mnist_model.pkl in a directory named outputs in the VM of the cluster where the job is executed. outputs is a special directory in that all content in this directory is automatically uploaded to your workspace. This content appears in the run record in the experiment under your workspace. Hence, the model file is now also available in your workspace.
You can see files associated with that run.
[16]
1 print(run.get_file_names())
<1 sec


Microsoft Azure Machine Learning Studio
Search within your workspace (preview)
This workspace
Georgian College > machinelearning-samrat > Jobs > Tutorial-sklearn-mnist > jovial_nerve_zrvhp6xw
This job is using the new compute runtime to improve performance. You can expect to see a different log structure along with the new runtime.
jovial_nerve_zrvhp6xw
Completed
Overview
Metrics
Images
Child jobs
Outputs + logs
Code
Explanations (preview)
Fairness (preview)
Monitoring (preview)
Refresh
Connect to compute
Resubmit
Register model
Cancel
Delete
Compare (preview)
Properties
Status
Completed
Job type
Command
Created on
Nov 12, 2022 2:32 PM
Experiment
Tutorial-sklearn-mnist
Start time
Nov 12, 2022 2:45 PM
Environment
tutorial-env:1
Duration
3m 30.61s
Arguments
--data-folder DatasetConsumptionConfig:input_8befc498 --regularization 0.5
Compute duration
3m 30.61s
Registered models
sklearn_mnist:1
Name
Tutorial-sklearn-mnist_1668281543_b7da5343
See all properties
Raw JSON
Script name
train.py
See YAML job definition
Job YAML
Created by
Babin Shrestha
Compute
Target
Instance count
1
Inputs
Input name: input_8befc498
Dataset: mnist_opendataset:1
Tags
No tags
Metrics
accuracy
0.9193
regularization rate
0.5
Description
Click edit icon to add a description

machinelearning-samrat - Micros | jovial_nerve_zrvhp6xw - Microsof | silver_curtain_dpwygf99 - Micros

ml.azure.com/experiments/id/33499534-c550-49f6-a020-c34bbd2fdf27/runs/Tutorial-sklearn-mnist_1668281543_b7da5343?wsid=/subscriptions/8c1bcaa6-91ae-435f-9dcb-25a67d95315f/resourcegroups/AI_Infrastructure/providers/Microsoft....

Imported From IE | (2) FASTEST Way to... | conversational AI | ethics | Georgian College:... | YouTube | Inbox (45) - tsamrat... | math | Data Connectors -... | AI for decision maki... | machine learning fr... | vision system | SKINOPATHY | AI Infra. - AWS | Other bookmarks

Microsoft Azure Machine Learning Studio

Search within your workspace (preview) This workspace

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machinelearning-samrat

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Georgian College > machinelearning-samrat > Jobs > Tutorial-sklearn-mnist > jovial_nerve_zrvhp6xw

This job is using the new compute runtime to improve performance. You can expect to see a different log structure along with the new runtime.

jovial_nerve_zrvhp6xw

Completed

Overview | Metrics | Images | Child jobs | Outputs + logs | Code | Explanations (preview) | Fairness (preview) | Monitoring (preview)

Refresh | Connect to compute | Resubmit | Register model | Cancel | Delete

Select a metric to see a visualization or table of the data.

Search

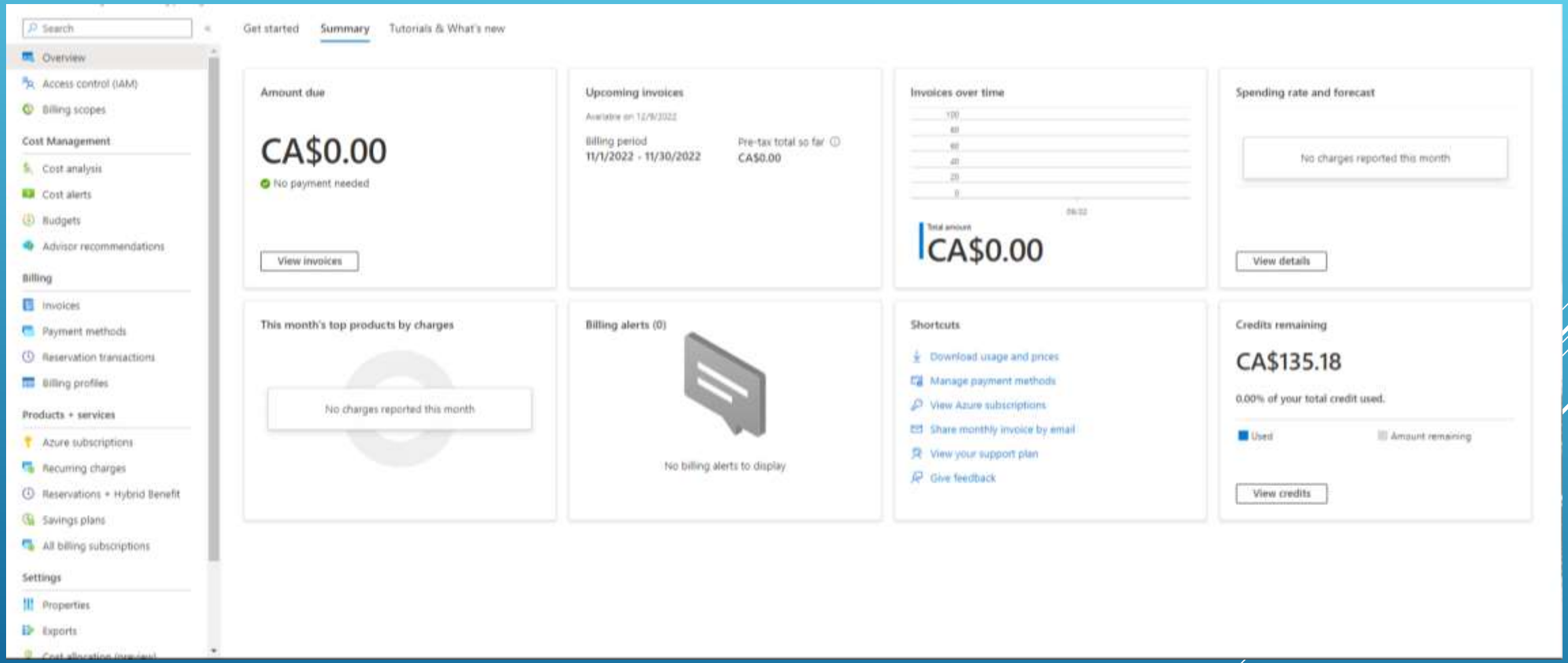
- [x] accuracy
- [x] regularization rate

View as: (•) Chart ( ) Table

accuracy	regularization rate
0.9193	0.5

- After running the image classifier model, we got an accuracy of 91% which is really good for a image classifier.

CHECKING SUBSCRIPTION



THANK YOU