AIR-0-GRADE

Air-O-Grade

THE SOLUTION TO HARMFUL AIR QUALITY

By:- Varun, Raghav, Rehan, Uvindu , Jyothiprasad, Saksham ,Amogh

INTRODUCTION

Air-O-Grade

- With deteriorating air quality becoming a serious issue clean air is today very important for our health.
- The solution to finding the concentration of harmful gases in the air so steps can be taken for efficient and reliable air purification.

Acknowledgment and References

- A special thanks to Mr. Liu Shiyu, Mr. Mehul Motani, Mr. Ram Prasad Singh, and Mr. Shantanu for helping us to overcome any problem and guiding us through this project

- https://www.researchgate.net/figure/Dependences-between-criterion-PT08S1CO-and-criteria-COGT-C6H6GT-PT08S2NMHC_fig3_318029588
- skillpipe.com
- youtube.com
- docs.microsoft.com

THE MISSION OF AIR-O-GRADE .

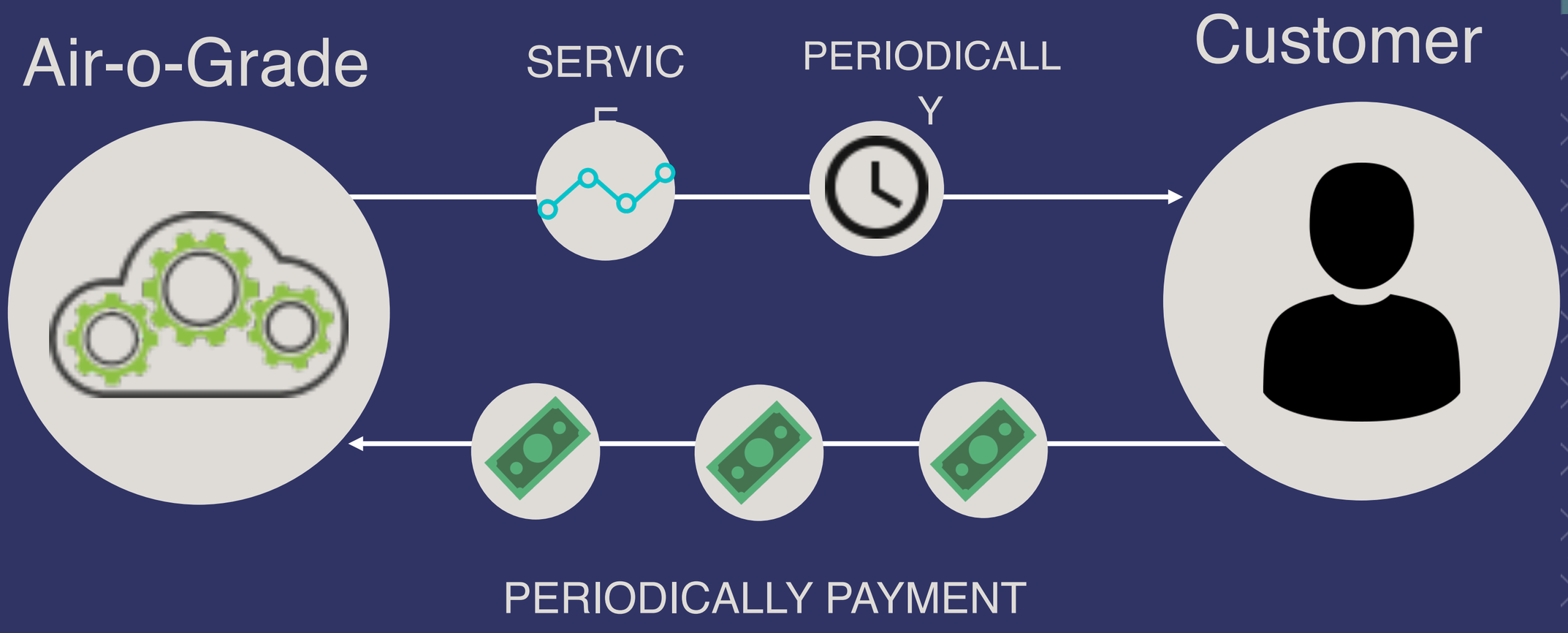
Analyzing the concentration of harmful gases in the air for stakeholders like Ministry of Environment, RWA's, polluting industries so they can take appropriate steps to control and reduce emissions and thereby improve air quality

WHAT IS AIR-O-GRADE

Air-O-Grade

AIR-O-GRADE IS A SUBSCRIPTION-BASED SERVICE THAT USES THE GIVEN DATA TO PREDICT THE CONCENTRATION OF HARMFUL GASES LIKE CO, NO2 SO THAT INDUSTRIES CAN TAKE MEASURES TO CONTROL THE EMISSION OF THESE GASES

HOW AIR-O-GRADE WORKS

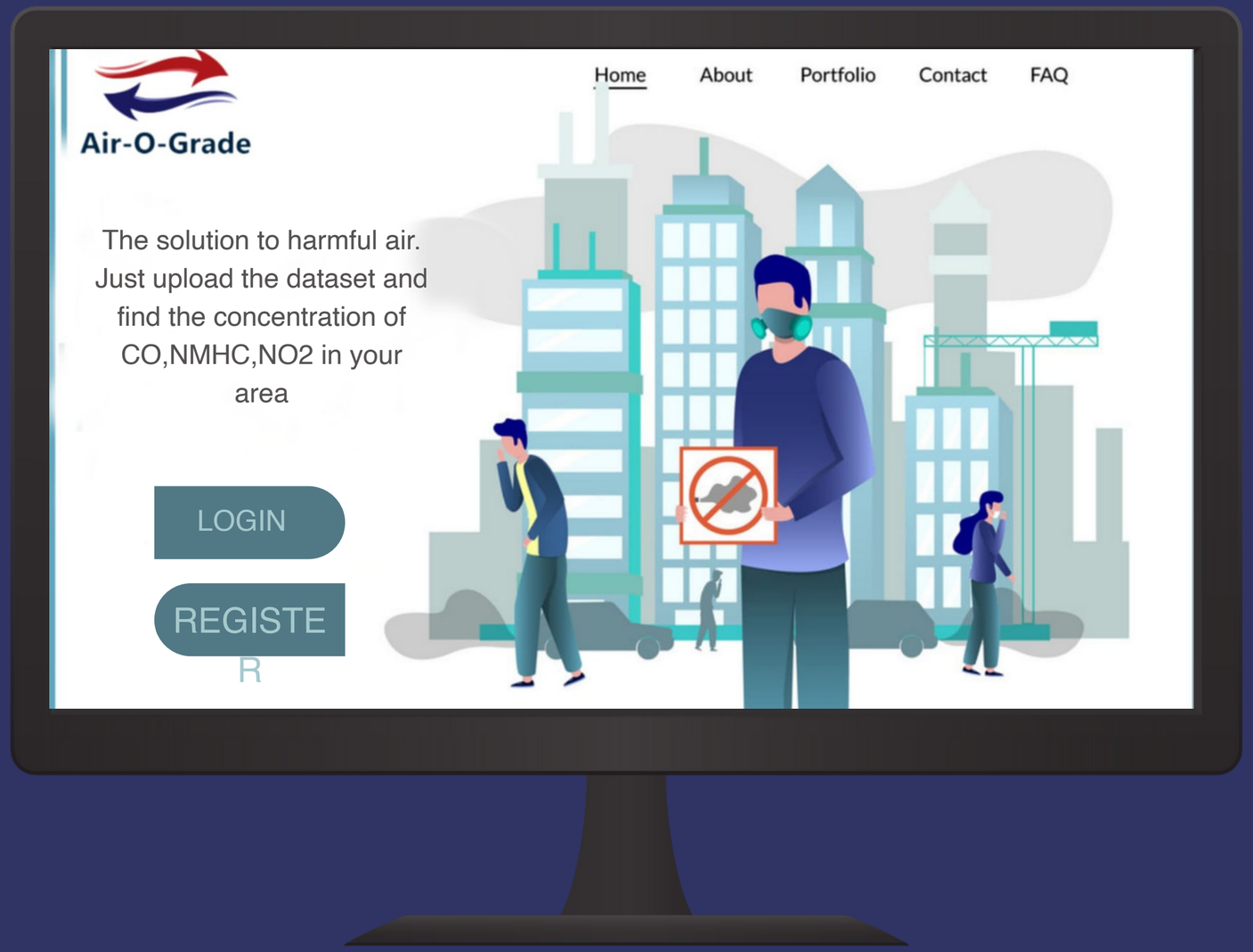


REVENUE MODEL

Air-O-Grade

- Quarterly Subscription Based Web-app for small clients
- Customized Solutions for Larger clients like Government, and big industrial houses.
- Revenue from advertising by various solution providers like manufacturers of Air Purifiers and so on.

PREVIEW



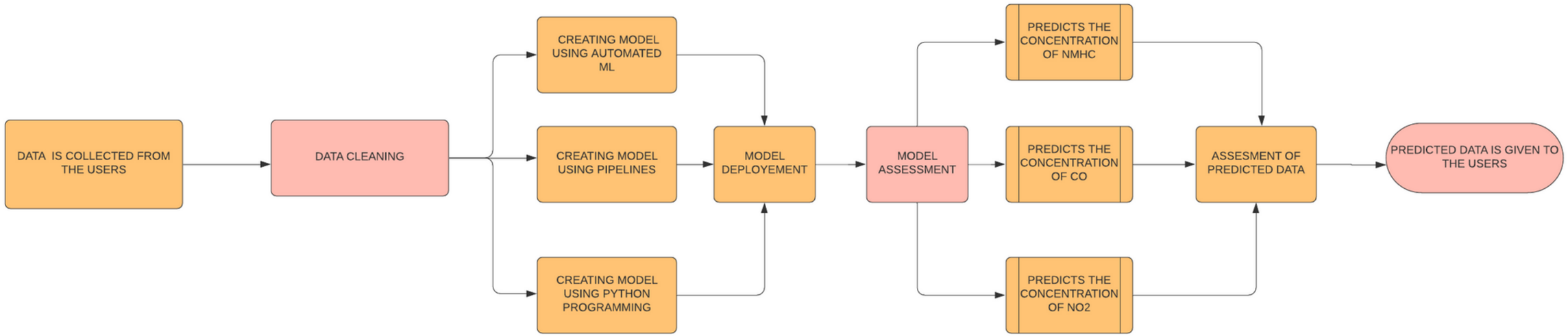
THE WEBSITE FEATURES-

- User-Friendly Interface
- Easy to use and navigate
- Mobile compatible
- Easy to contact

WHY AIR-O-GRADE

- We offer a comprehensive cost-effective solutions-oriented package
- Outsourcing to our team of experienced professionals will not only be cheaper but also hassle-free
- We can customise as per your requirements
- Dedicated customer service for a quick response
- We take our own readings in cities and rural areas and compare them to the readings given by the clients and conduct a detailed analysis and give clients a standard air quality to maintain

FLOWCHART


DATA IS COLLECTED FROM THE USERS
DATA CLEANING
CREATING MODEL USING AUTOMATED ML
CREATING MODEL USING PIPELINES
CREATING MODEL USING PYTHON PROGRAMMING
MODEL DEPLOYEMENT
MODEL ASSESSMENT
PREDICTS THE CONCENTRATION OF NMHC
PREDICTS THE CONCENTRATION OF CO
PREDICTS THE CONCENTRATION OF NO2
ASSESMENT OF PREDICTED DATA
PREDICTED DATA IS GIVEN TO THE USERS

DEPLOYMENT METHOD

- We have used Microsoft Azure for most of our experiments.
- Data cleaning is done using Azure Pipelines
- Created Automated ML model for predicting NMHC(hourly averaged overall Non-Metanic HydroCarbons concentration)
- Created Pipelines to make a Machine Learning Model for predicting CO(hourly averaged concentration of Carbon Monoxide)
- Analyzed and Deployed both the Models
- Used Python Programming to predict NO2(hourly averaged Nitrogen Dioxide concentration)

DATA CLEANING

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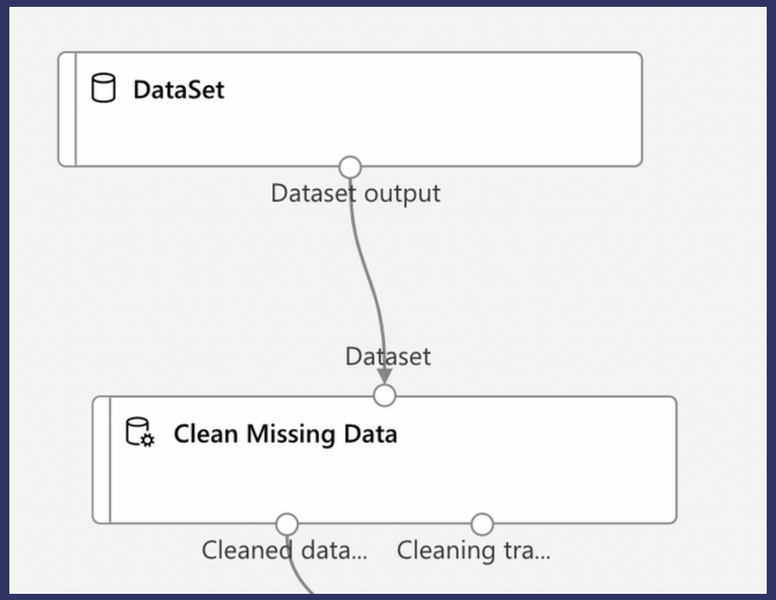
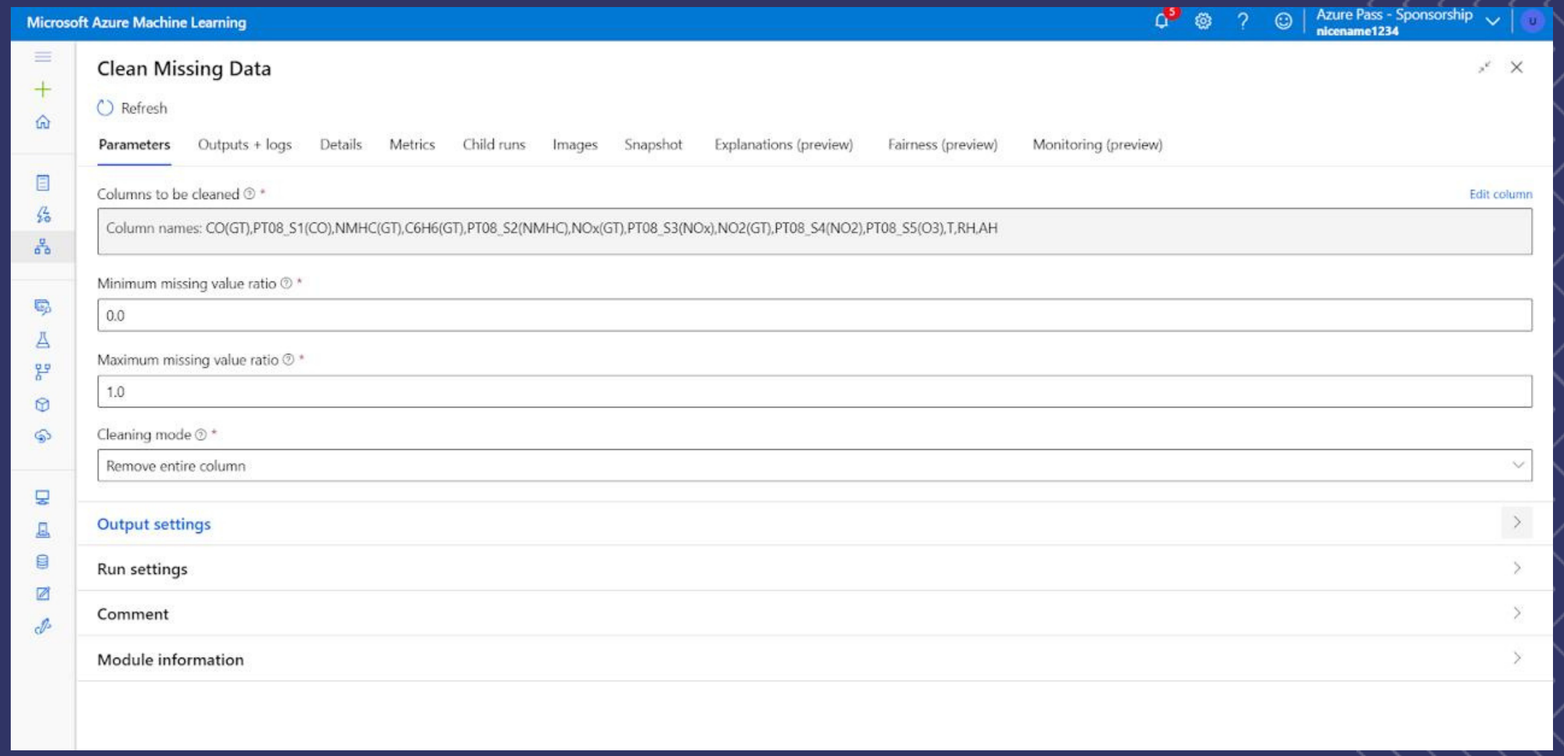
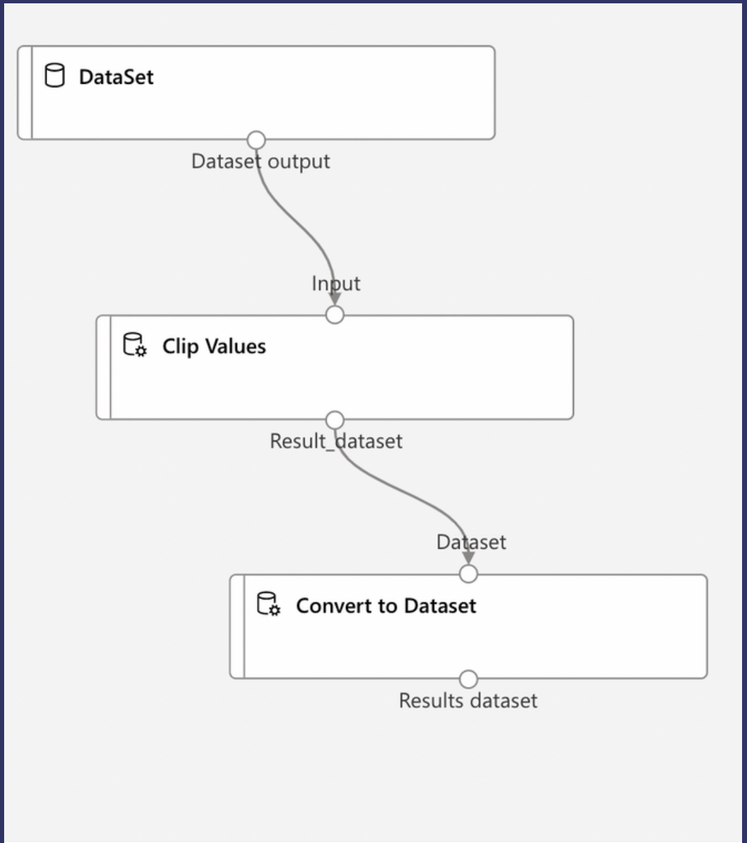
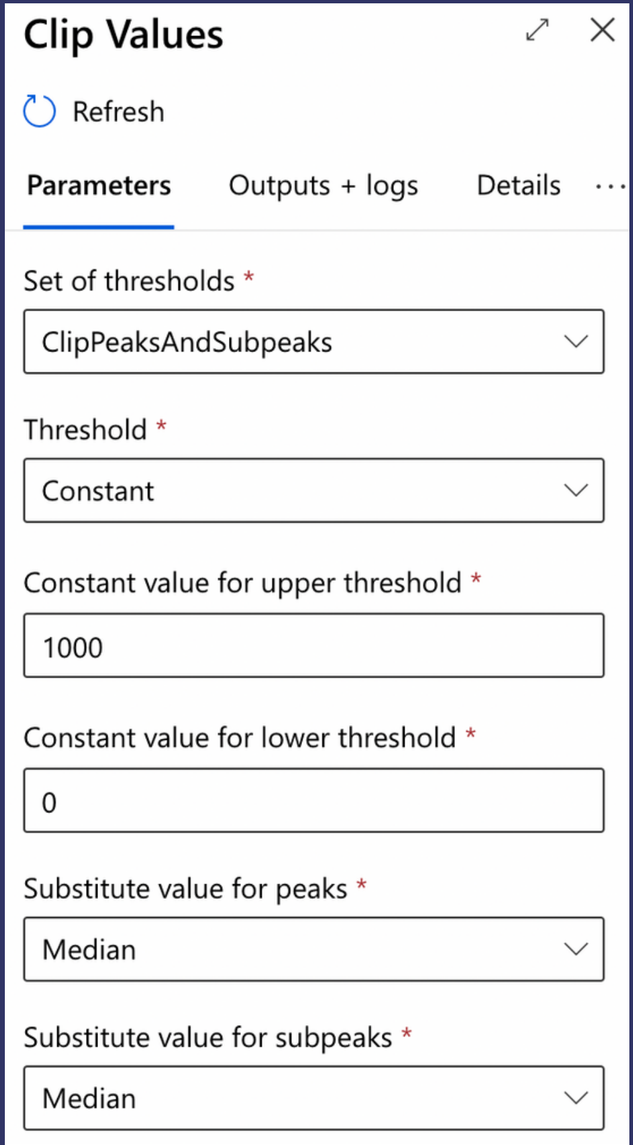




First, we clean missing data using azure pipelines

DATA CLEANING





Then, we use Clip Values function in azure to detect and remove outliers in the dataset

AUTOMATED ML MODEL

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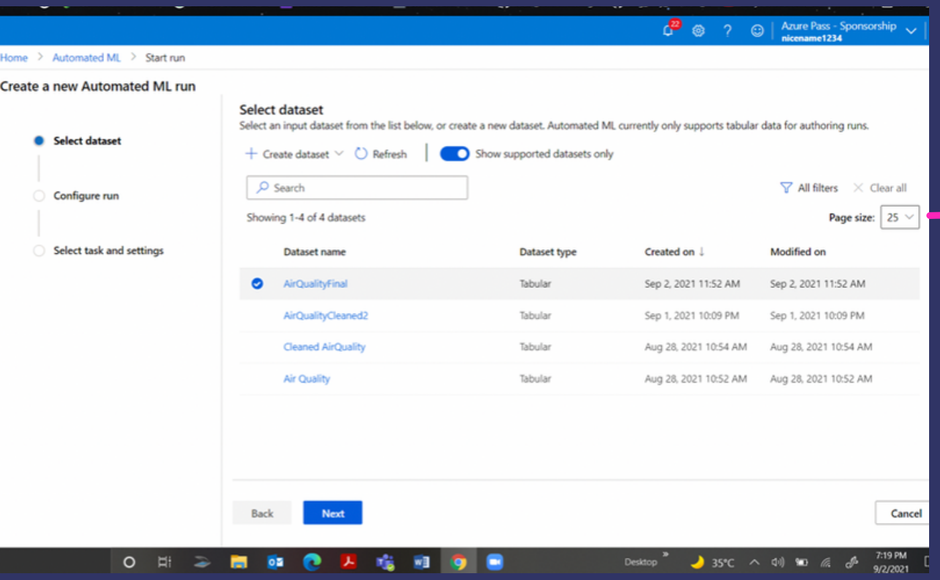

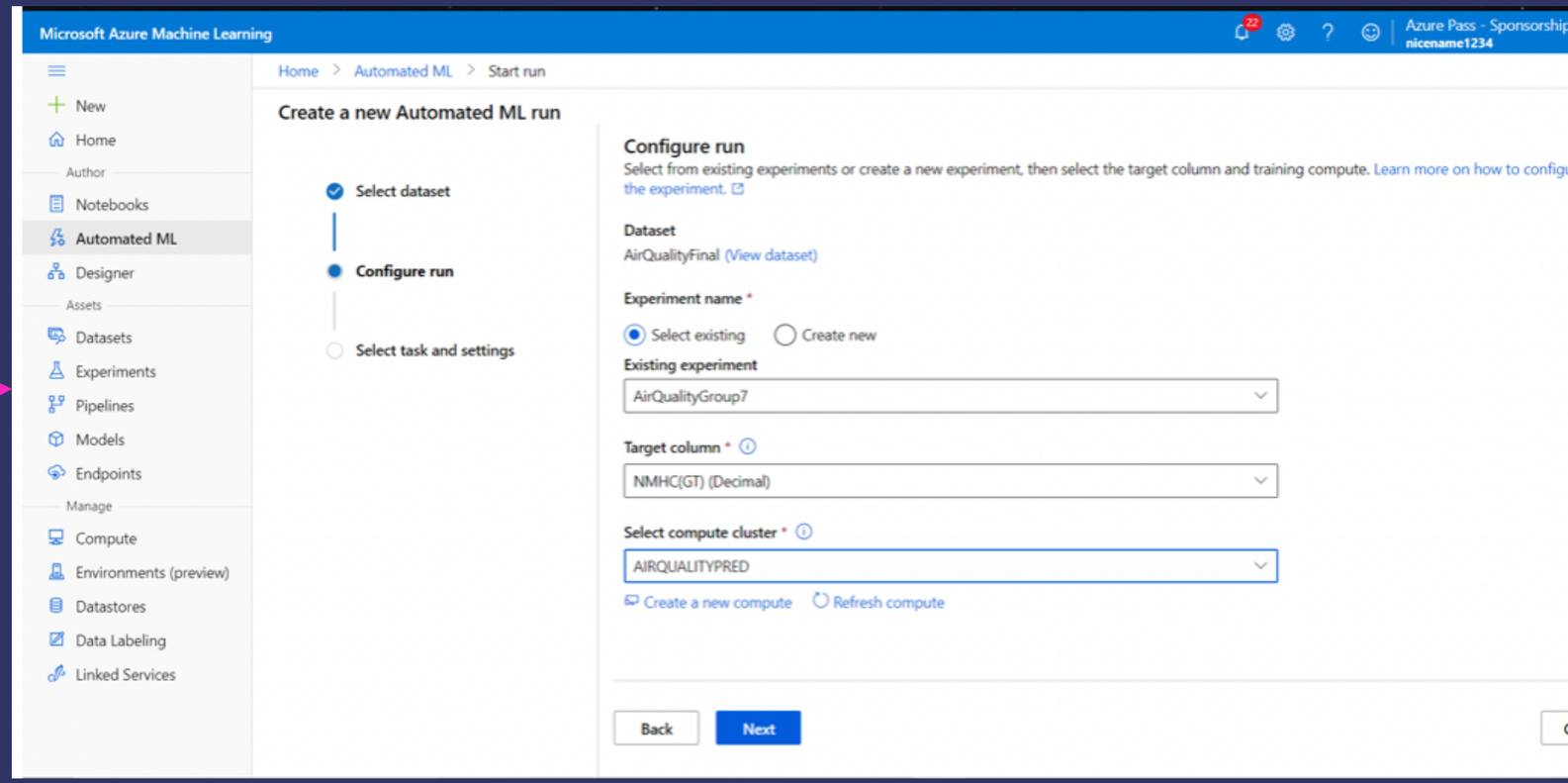

Selecting the clean dataset

Design the model by selecting the target variable and other parameters

AUTOMATED ML MODEL

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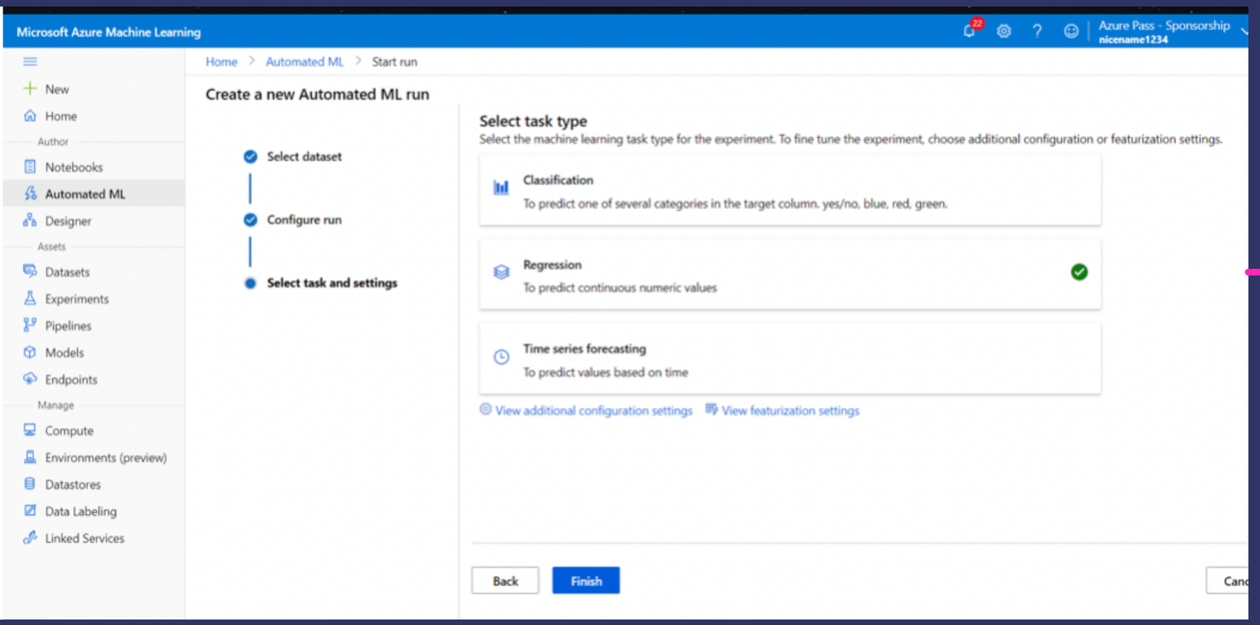
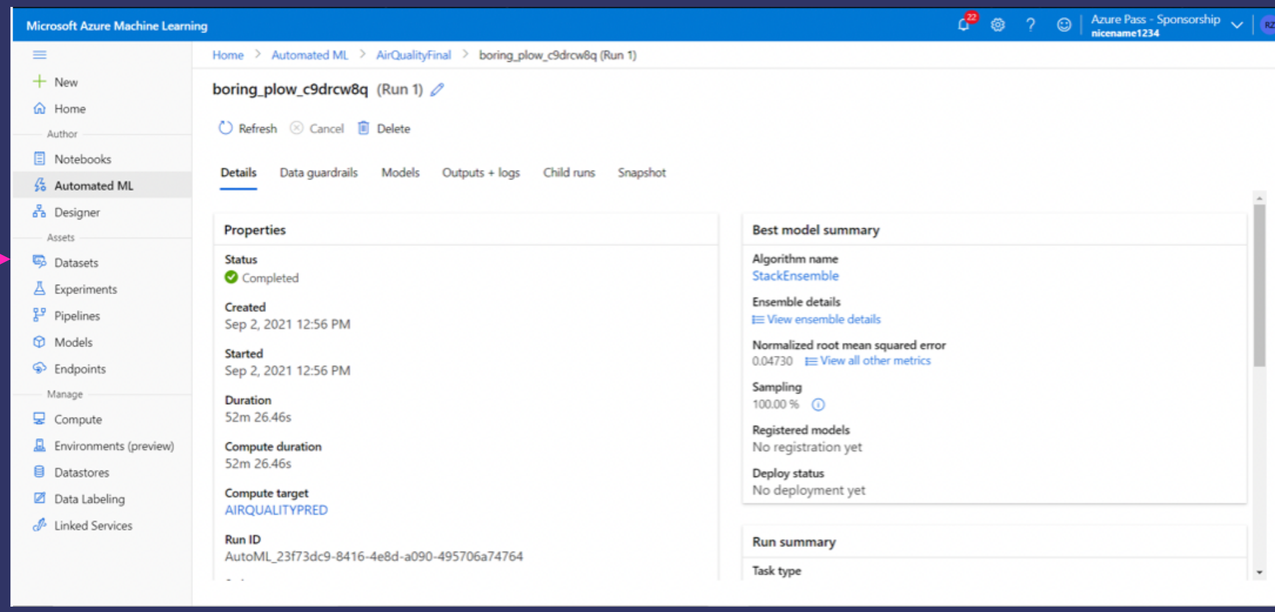
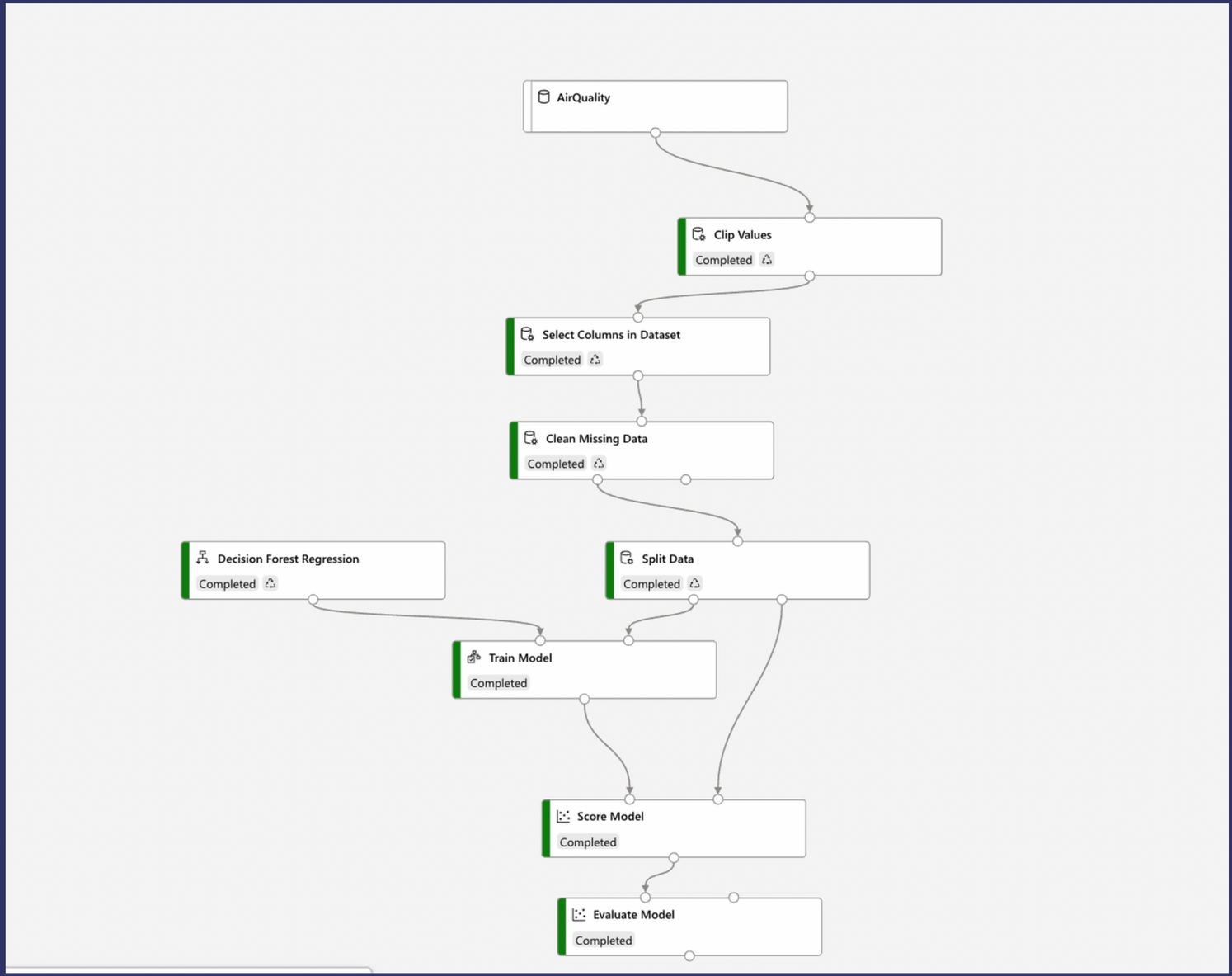




Selecting the type of task - regression

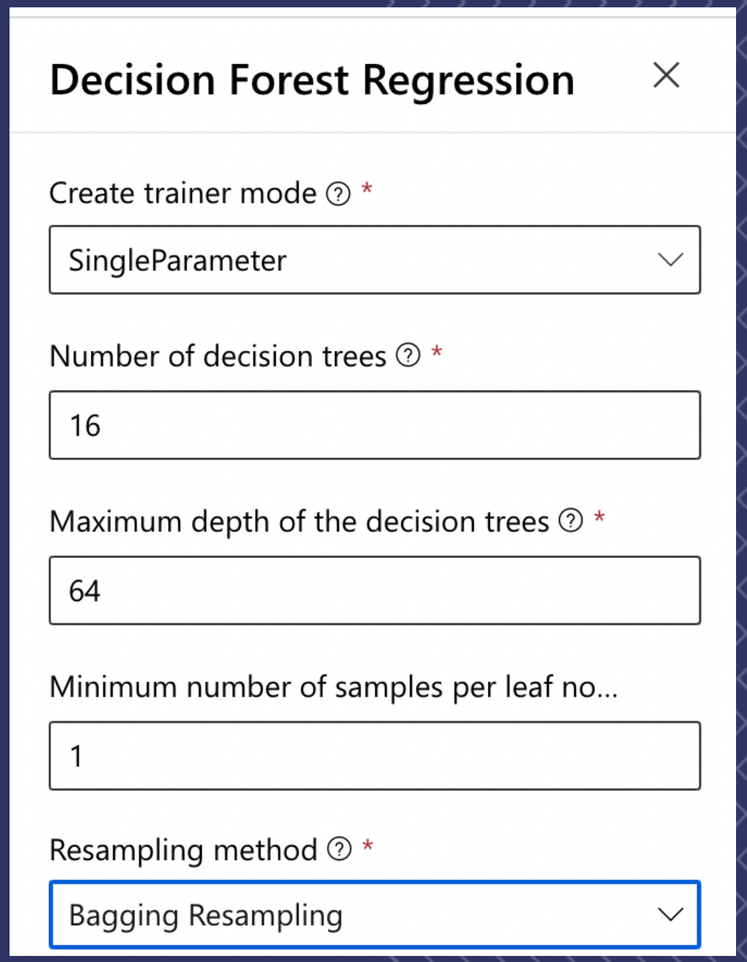
Model Evaluation to see which algorithm gives best results

PIPELINES MODEL



PIPELINE EXPLAINED

- Select Columns in Dataset: Drop any Columns that will not help in the prediction
- Clean Missing Data: Remove any columns containing null values
- Split Data: Split the data into training and testing
- Decision Forest Regression: Specify the parameters for regression
- Train Model: Set the target column and begin the training
- Score Model: Scores Prediction for the trained regression model
- Evaluate Model: Evaluate the results of the training using MSE and other parameters



MODEL DEPLOYMENT

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1) Auto ML Model

Deploy a model

Name *
automlmodel2

Description
final automated ml model deployment

Compute type *
Azure Container Instance

Models: AutoML23f73dc9847

Enable authentication

This model supports no-code deployment. You may **optionally** override the default environment and driver file.

Use custom deployment assets

Use custom deployment assets

Advanced

AutoML23f73dc9847:1

Details | Versions | Artifacts | Endpoints | Explanations (preview) | Fairness (preview)

Refresh | Deploy | Download all

Attributes

Version
1

ID
AutoML23f73dc9847:1

Date registered
03/09/2021, 20:02:20

Framework
AutoML

Framework version
--

Experiment name
AirQualityFinal

Run ID
AutoML_23f73dc9-8416-4e8d-a090-495706a74764_47

airqualitymodel2

Details | Deployment logs

Attributes

Service ID
airqualitymodel2

Description
--

Deployment state
Transitioning

Compute type
Container instance

Created by
Raghav

Model ID
AutoML23f73dc9847:1

Created on
9/3/2021 8:02:20 PM

Last updated on
9/3/2021 8:02:20 PM

Image ID
--

REST endpoint
null

Key-based authentication enabled
false

MODEL DEPLOYMENT

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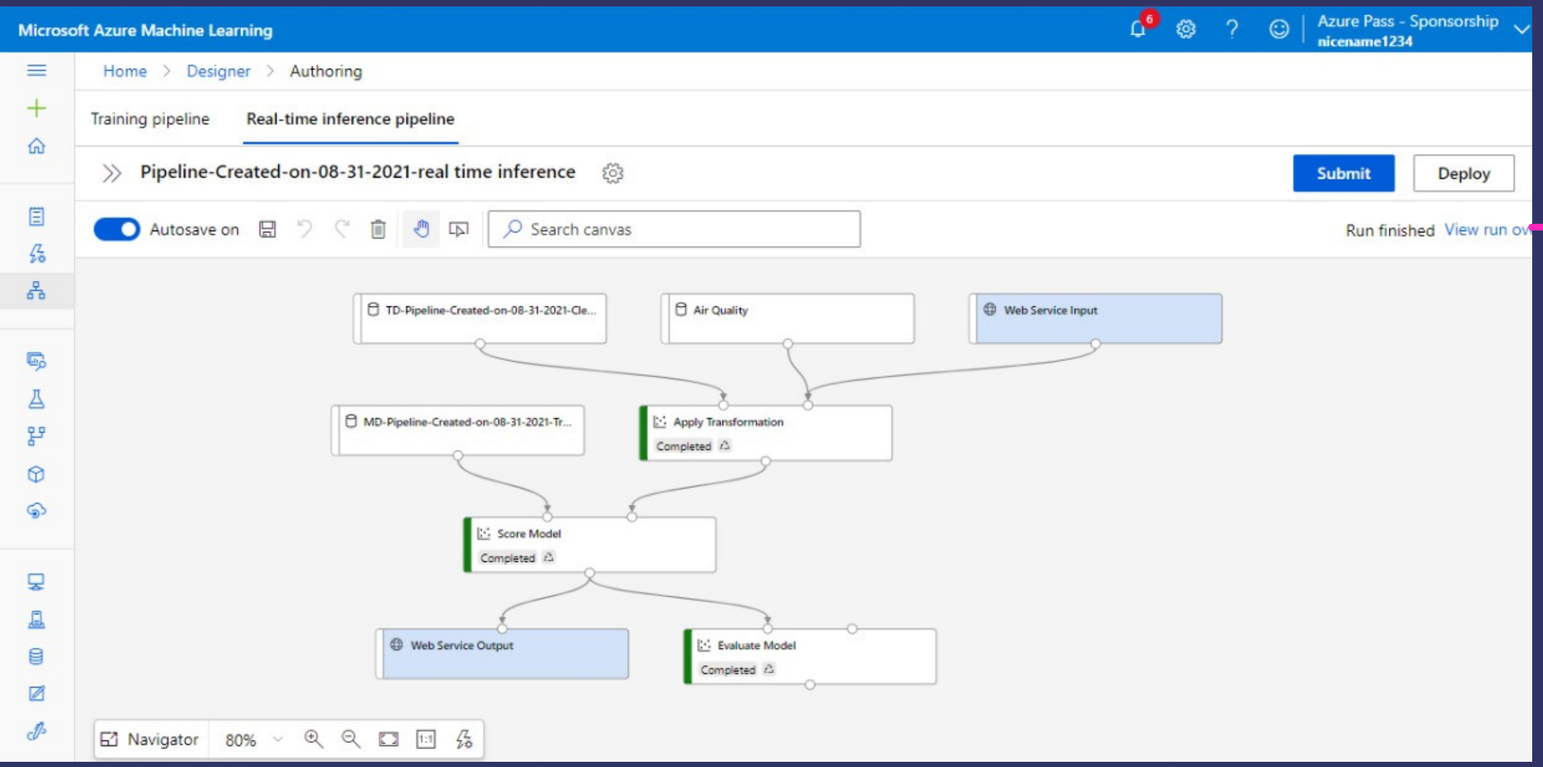
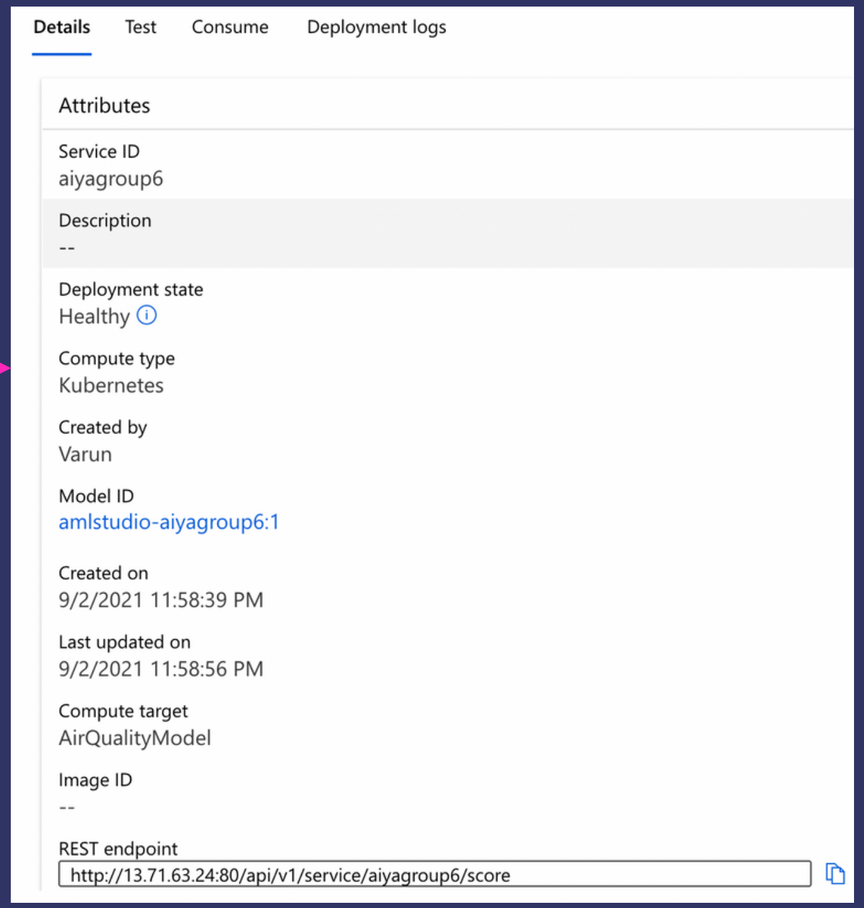
2) Pipelines Model



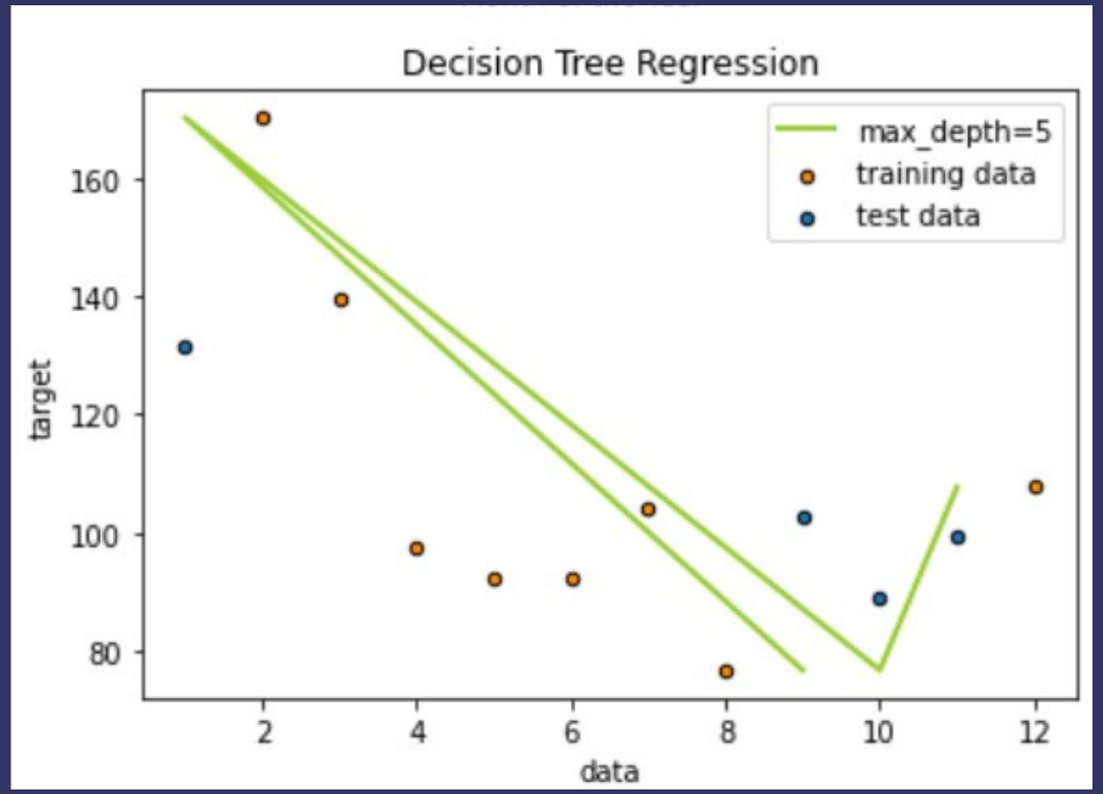


CREATE INFERENCE PIPELINE

DEPLOYMENT

PYTHON PROGRAMMING

Decision Tree Regression




```
Decision Tree Regression 2 (depth = 5)
R-squared: -1.423432100905118
Average of scores:  -46.74236738411391
Cross validation scores:  [  -8.74404694 -203.29537495   -1.05748038   -7.29054339  -13.32439126]
```

PYTHON PROGRAMMING

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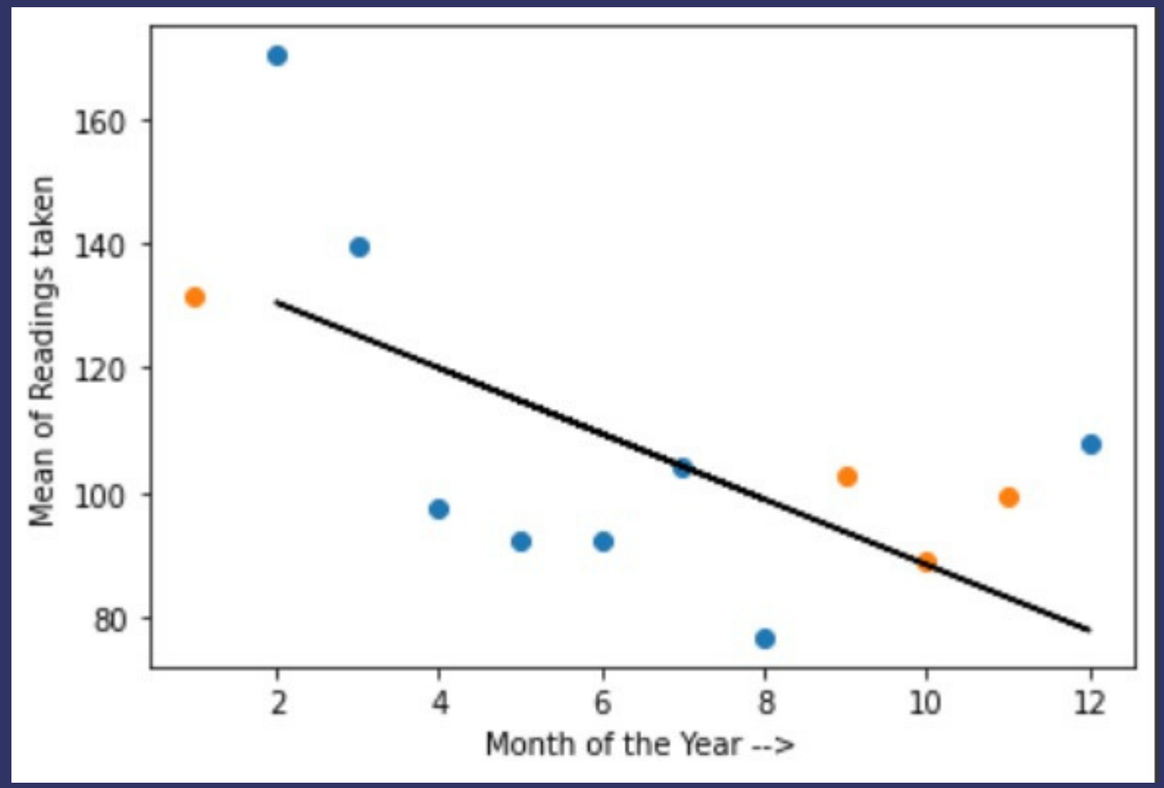
Linear Regression




```
Linear Regression
R-squared: 0.6195095133782325
Average of scores:  -45.75736224173342
Cross validation scores:  [ -11.51254545 -134.99219367   -1.2056773    0.52933338  -81.60572817]
```

PYTHON PROGRAMMING

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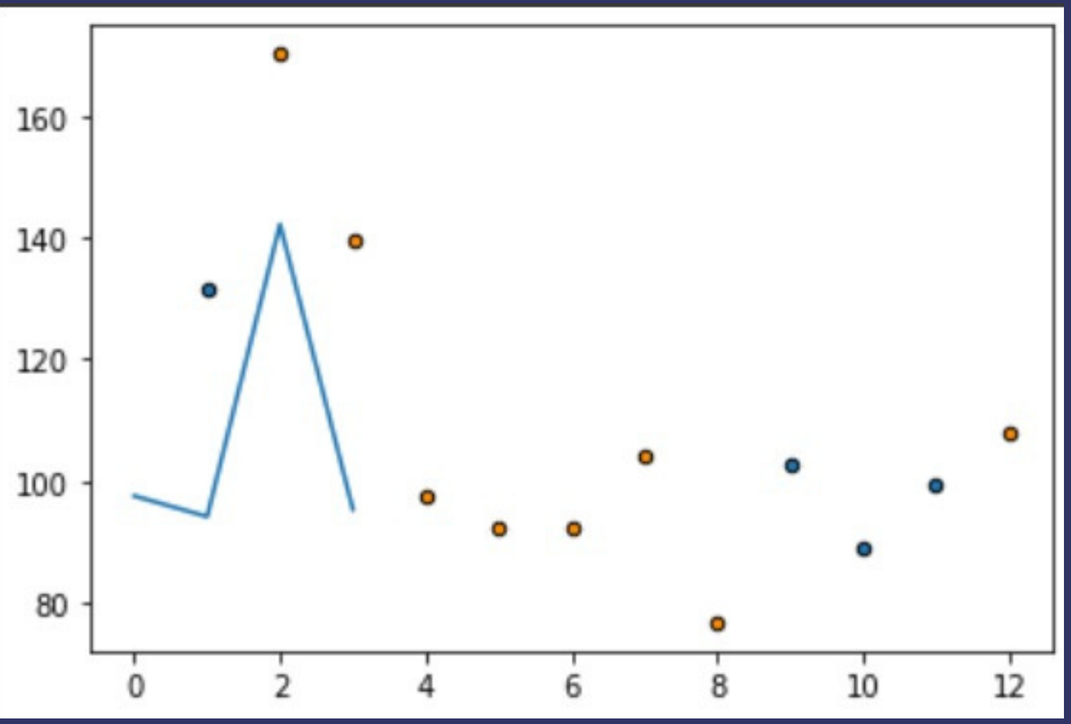
Random Forest Regression




```
Random Forest Regression
R-squared: 0.7948528209714896
/usr/local/lib/python3.7/dist-packages/sklearn/model_selection/_validation.py:515: DataConversionWar
  estimator.fit(X_train, y_train, **fit_params)
/usr/local/lib/python3.7/dist-packages/sklearn/model_selection/_validation.py:515: DataConversionWar
  estimator.fit(X_train, y_train, **fit_params)
/usr/local/lib/python3.7/dist-packages/sklearn/model_selection/_validation.py:515: DataConversionWar
  estimator.fit(X_train, y_train, **fit_params)
/usr/local/lib/python3.7/dist-packages/sklearn/model_selection/_validation.py:515: DataConversionWar
  estimator.fit(X_train, y_train, **fit_params)
Average of scores:  -44.347945619267094
Cross validation scores:  [  -9.37308024 -201.2812479    -0.66392996   -2.44352827   -7.97794172]
```

SOME MEASURES INDUSTRIES CAN TAKE TO IMPROVE AIR QUALITY

- Companies can optimize different parts of their operation to save energy, thus reducing the facility's overall emissions
- Factory operators can also employ abatement mechanisms that help destroy VOCs, HAPs, and other pollutants before they enter the environment.
- Known as RTOs, regenerative thermal oxidizers employ high temperatures to destroy pollutants before they are released into the environment.
- Rotary concentrators combined with oxidizers are ideal for chemical processing, surface coating, and wood finishing facilities, just to name a few.

FUTURE ENHANCEMENTS

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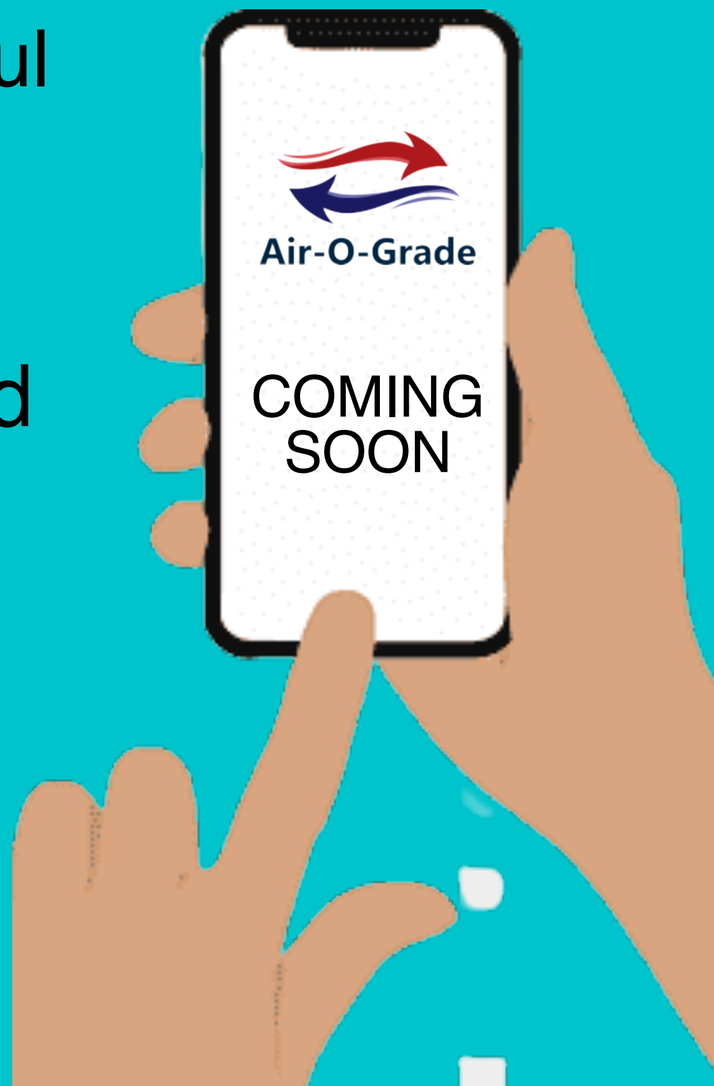
- Create more ML models to predict more harmful gases like lead, ozone, etc.
- Create a mobile application for easier access
- Using other models like Deep Learning and Neural Networks to classify the unknown gases



MEET THE TEAM:-

- Raghav Bhasin
- Rehan
- Uvindu Salgado
- Varun Mathur
- Jyothiprasad
- Saksham Gupta
- Amogh

THANK YOU

By:- AIYA Batch 1 Group-7