



Automated Incident Routing System

Implementation Details

Problem

The most of the companies incidents are routed manually to respective team using Incident Routing system (IMS). This may get delayed or not routed to appropriate team based on understanding of the incident. So, this could get into not reaching the SLA or not addressing the incident appropriately.

Hence company would like to implement automated incident routing system using Machine learning to avoid such scenarios.

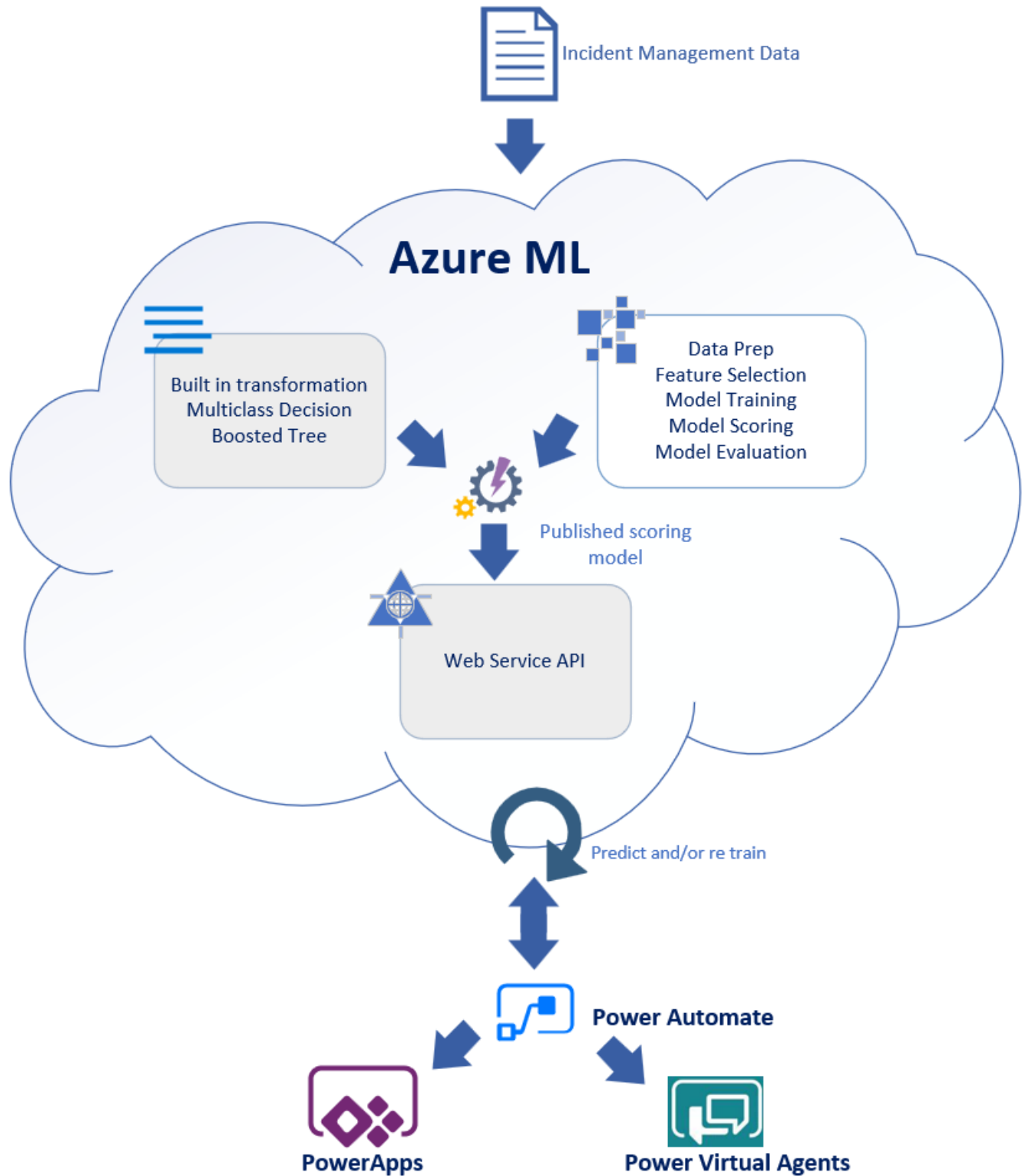
Technology Used

1. Azure Machine Learning
2. Power Automate
3. PowerApps
4. Power Virtual Agents

High Level Architecture

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The following sample files used to analyze the incident and route to appropriate team automatically

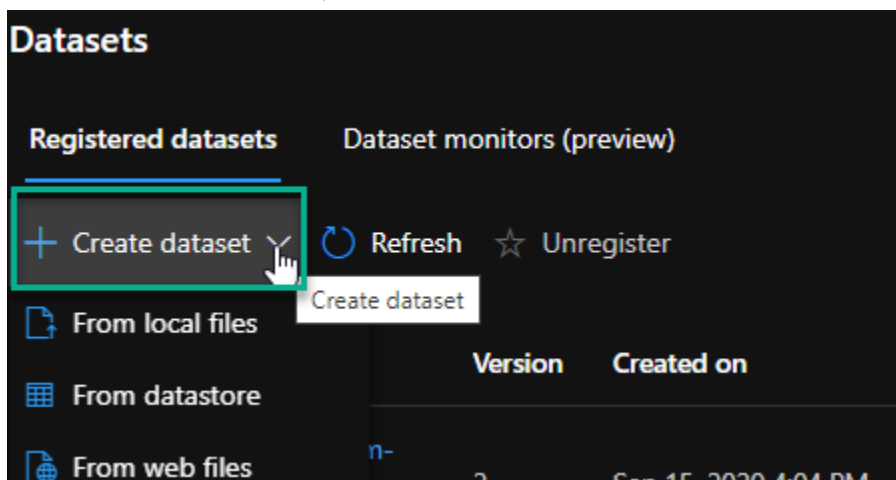
Dataset: Customer Complaint.txt



The customer complaint file imported into Azure ML

Data Import Steps:

1. Select From local files,



2. Provide the basic information and click next

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Create dataset from local files

- Basic info
- Datastore and file selection
- Settings and preview
- Schema
- Confirm details

Basic info

Name *

Dataset version

Dataset type *

Description

Provide the Dataset name

3. Select Datastore and file selection, after click next

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Datastore and file selection

Select or create a datastore *

☒ Currently selected datastore: workspaceblobstore (Azure Blob Storage) (Default)

☐ Previously created datastore

☐ Create new datastore

Select files for your dataset *

After dataset creation, these files will be uploaded to your default Blob storage and made available in your workspace. Supported file types include: delimited (i.e. csv, tsv), Parquet, JSON Lines, and plain text.

1 files selected. Total size 0.04628 MiB. 0/1 files uploaded

File name	Size (MiB)	Upload %	Status
Customer complaints.txt	0.04628		

Upload path Files will be uploaded to '\$(Upload path)/09-18-2020_021522_UTC'

☐ Skip data validation ⓘ

4. Update settings and preview and select use heading from the first file, after click next

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Create dataset from local files

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Settings and preview

These settings were automatically detected. Please verify that the selections were made correctly.

File format

Delimited

Delimiter: Tab Example: Field1 Field2 Field3

Encoding: UTF-8

Column headers: Use headers from the first file

Skip rows: None

ID	Customer Complaint	Description
1	Pricing and Billing	XXXXX in the Atlanta area has just put into effect an...
2	Pricing and Billing	To whom it may concern: I am a XXXXX customer in...
3	Pricing and Billing	All of a sudden our "bundle discount" dropped \$40,...
4	Internet Availability and Speed	XXXXX recently upgraded my internet speed from 5...
5	Internet Availability and Speed	Every night between 6-8 pm mountain time, the int...
6	Internet Availability and Speed	I suspect my local ISP XXXXX, of throttling my inter...
7	Internet Availability and Speed	Hi there, I would like to submit a formal complaint a...
8	Internet Availability and Speed	XXXXX has had my internet out and they have hung...
9	Internet Availability and Speed	XXXXX is currently charging me for a service called t...
10	Internet Availability and Speed	The speed has drastically decreased to the point th...
11	Pricing and Billing	The limiting of data usage on my internet service an...

Back Next

5. Click Next and create the dataset

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Create dataset from local files

Basic info

Datastore and file selection

Settings and preview

Schema

Confirm details

Confirm details

Basic info

NameAutomatedIncidentRoutingSystem

Dataset version1

Dataset typeTabular

Datastore and file selection

Datastoreworkspaceblobstore

Selected files (1)Customer complaints.txt

PathUI/09-18-2020_021522_UTC/Customer complaints.txt

File settings

File formatDelimited

DelimiterTab

EncodingUTF-8

Column headersUse headers from the first file

Skip rowsNone

☐ Profile this dataset after creation

Back

Create

Once the dataset is created click Designer (Preview), create new pipeline

Azure Machine Learning Model:

The below picture shows the Automated Incident routing model

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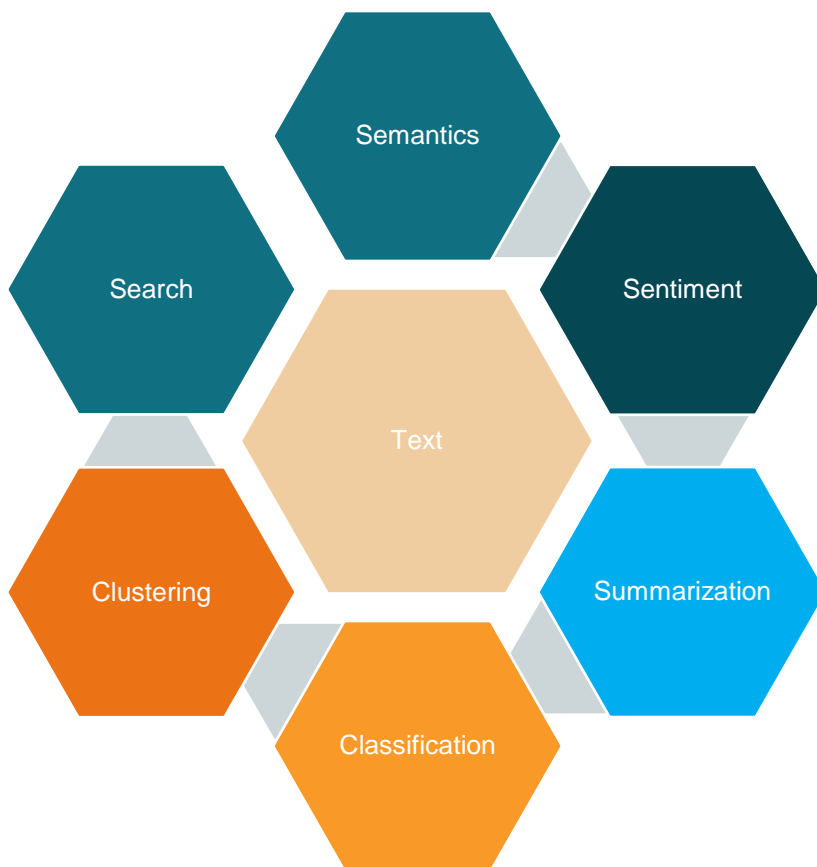


The above model developed using Natural language programing, text analytics feature and Multiclass Boosted Decision Tree algorithm.

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The Text analytics is providing following feature



The model using following Asset libraries are used to process the incidents

1. Process Text:

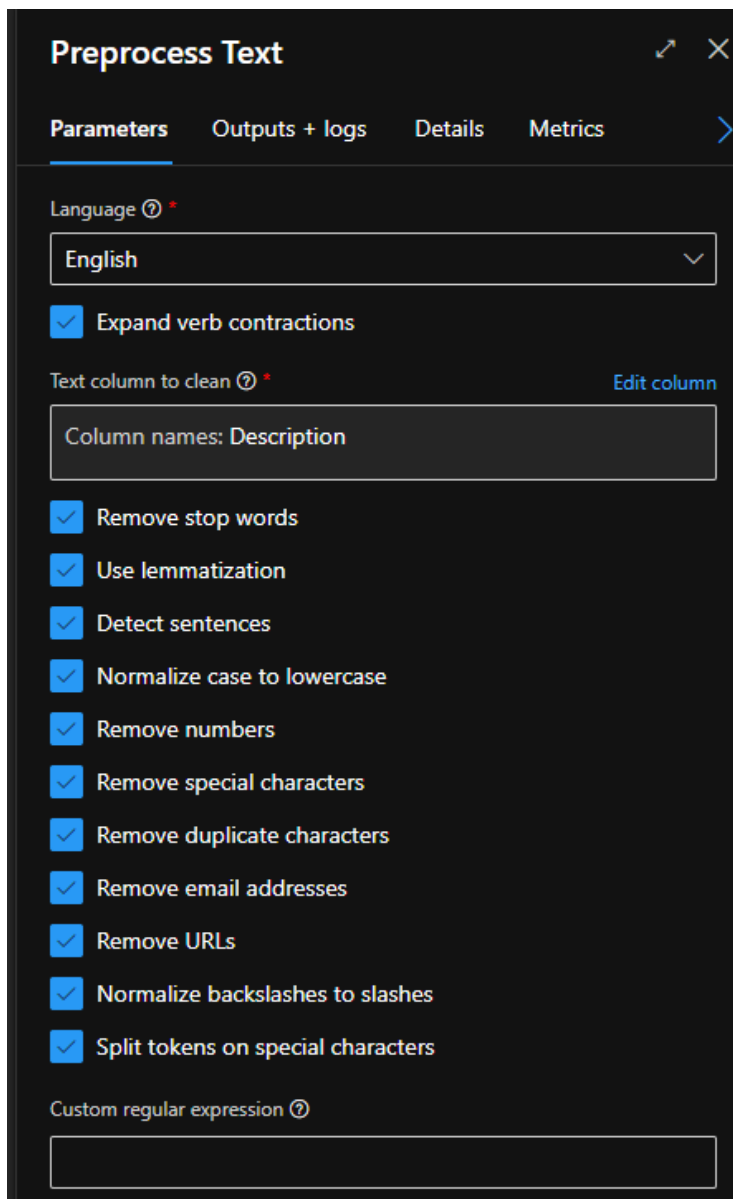
The **Preprocess Text** module to clean and simplify text. It supports these common text processing operations:

1. Removal of stop-words
2. Using regular expressions to search for and replace specific target strings
3. Lemmatization, which converts multiple related words to a single canonical form
4. Case normalization
5. Removal of certain classes of characters, such as numbers, special characters, and sequences of repeated characters such as "aaaa"
6. Identification and removal of emails and URLs

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Settings configured:



The screenshot shows a 'Preprocess Text' configuration window with a dark theme. It has four tabs: 'Parameters' (selected), 'Outputs + logs', 'Details', and 'Metrics'. Under 'Parameters', the 'Language' is set to 'English'. The 'Expand verb contractions' checkbox is checked. The 'Text column to clean' is set to 'Column names: Description'. A list of 13 preprocessing options is shown, all with checked checkboxes: 'Remove stop words', 'Use lemmatization', 'Detect sentences', 'Normalize case to lowercase', 'Remove numbers', 'Remove special characters', 'Remove duplicate characters', 'Remove email addresses', 'Remove URLs', 'Normalize backslashes to slashes', and 'Split tokens on special characters'. There is also a 'Custom regular expression' field at the bottom.

Preprocess Text

Parameters Outputs + logs Details Metrics

Language *
English

☒ Expand verb contractions

Text column to clean *
Column names: Description

☒ Remove stop words

☒ Use lemmatization

☒ Detect sentences

☒ Normalize case to lowercase

☒ Remove numbers

☒ Remove special characters

☒ Remove duplicate characters

☒ Remove email addresses

☒ Remove URLs

☒ Normalize backslashes to slashes

☒ Split tokens on special characters

Custom regular expression

2. Feature Hashing:

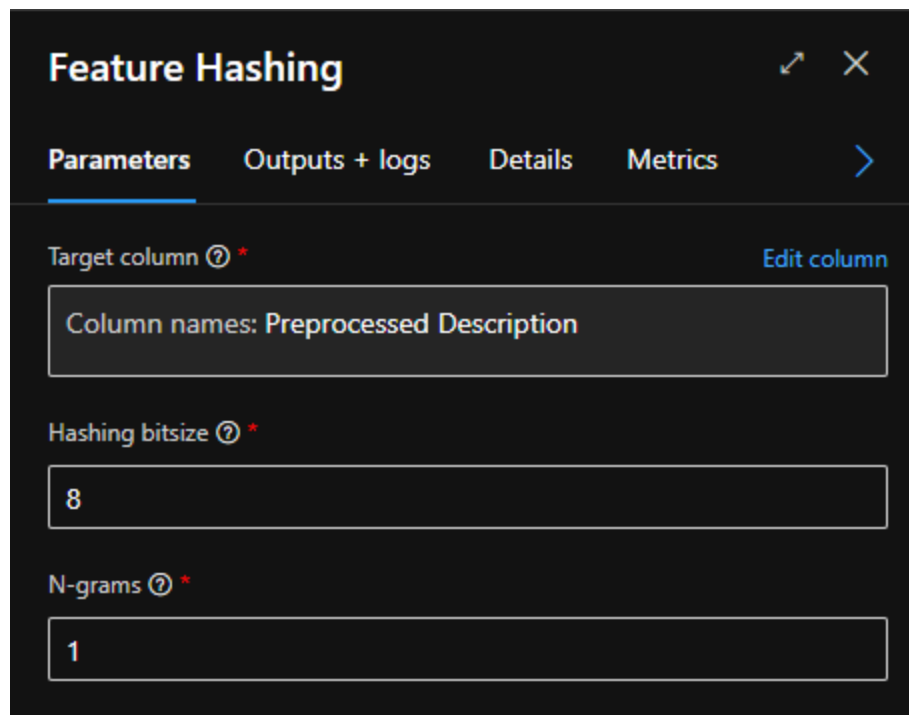
Use the Feature Hashing module to transform a stream of English text into a set of integer features. The feature hashing functionality provided based on the **nimbusml framework**.

The feature hashing works by converting unique tokens into integers. It operates on the exact strings that you provide as input and does not perform any linguistic analysis or preprocessing.

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Settings configured:



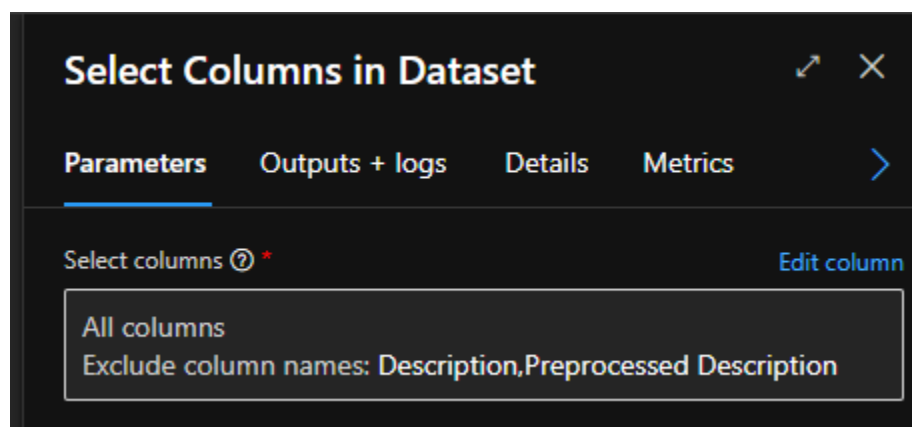
The image shows a configuration window titled "Feature Hashing" with a dark theme. It has a header bar with a close button (X) and a share icon. Below the header is a tabbed interface with four tabs: "Parameters" (selected), "Outputs + logs", "Details", and "Metrics". The "Parameters" tab contains three input fields. The first is labeled "Target column" with a question mark icon and an asterisk, and an "Edit column" link to its right. The input field contains the text "Column names: Preprocessed Description". The second is labeled "Hashing bitsize" with a question mark icon and an asterisk, and the input field contains the number "8". The third is labeled "N-grams" with a question mark icon and an asterisk, and the input field contains the number "1".

Hashing bitsize: Specify the number of bits to use when you're creating the hash table. We need to provide more space to avoid collisions, depending on the size of the n-grams vocabulary in the training text

N-grams: Defines the maximum length of the n-grams to add to the training dictionary.

Select Columns in Dataset: Choose a subset of columns to use in downstream operations

Settings configured:



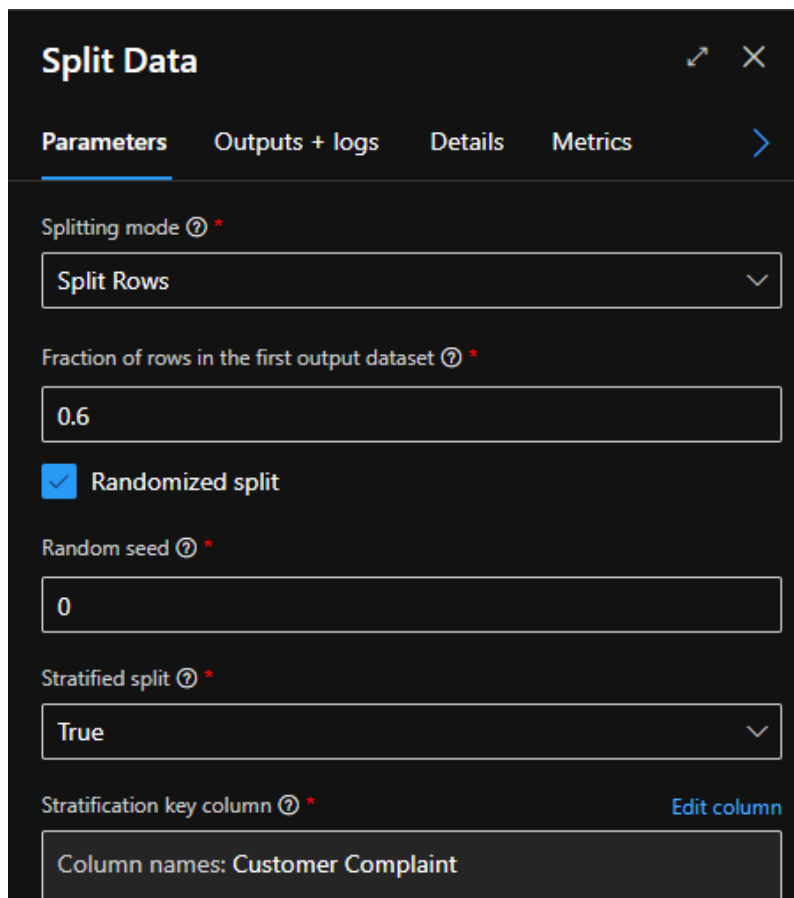
The image shows a configuration window titled "Select Columns in Dataset" with a dark theme. It has a header bar with a close button (X) and a share icon. Below the header is a tabbed interface with four tabs: "Parameters" (selected), "Outputs + logs", "Details", and "Metrics". The "Parameters" tab contains one input field. It is labeled "Select columns" with a question mark icon and an asterisk, and an "Edit column" link to its right. The input field contains the text "All columns" and "Exclude column names: Description,Preprocessed Description".

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Split Data: Split Data module to divide a dataset into two distinct sets.

Settings configured:



The screenshot shows the 'Split Data' configuration window with the following settings:

- Splitting mode:** Split Rows
- Fraction of rows in the first output dataset:** 0.6
- Randomized split:** ☒
- Random seed:** 0
- Stratified split:** True
- Stratification key column:** Column names: Customer Complaint

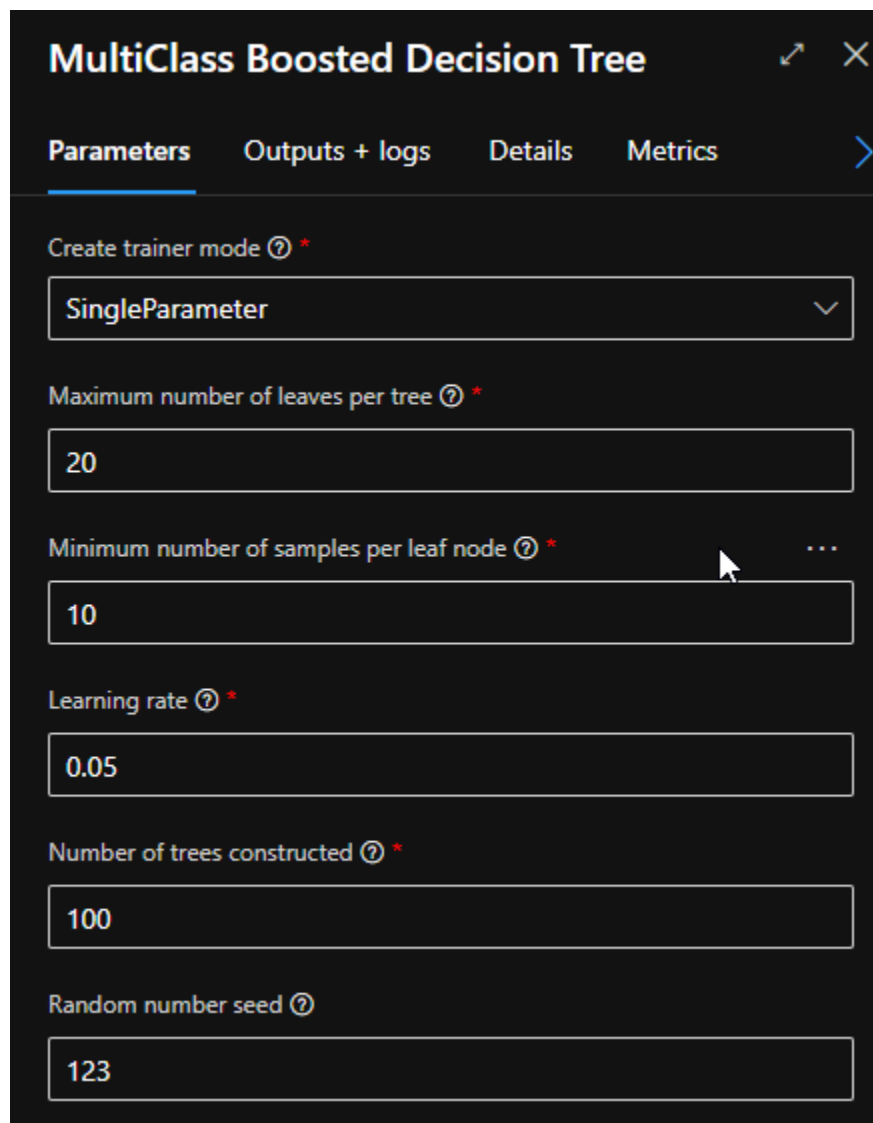
Multiclass Boosted Decision Tree:

A boosted decision tree is an ensemble learning method in which the second tree corrects for the errors of the first tree, the third tree corrects for the errors of the first and second trees, and so forth. Predictions are based on the ensemble of trees together.

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Settings configured:



The screenshot shows a configuration window titled "MultiClass Boosted Decision Tree". It has four tabs: "Parameters", "Outputs + logs", "Details", and "Metrics". The "Parameters" tab is selected. The configuration includes the following settings:

- Create trainer mode**: Set to "SingleParameter".
- Maximum number of leaves per tree**: Set to 20.
- Minimum number of samples per leaf node**: Set to 10.
- Learning rate**: Set to 0.05.
- Number of trees constructed**: Set to 100.
- Random number seed**: Set to 123.

Maximum number of leaves per tree: limits the maximum number of terminal nodes (leaves) that can be created in any tree.

Minimum number of samples per leaf node: indicates the number of cases required to create any terminal node (leaf) in a tree.

Learning rate: defines the step size while learning. Enter a number between 0 and 1.

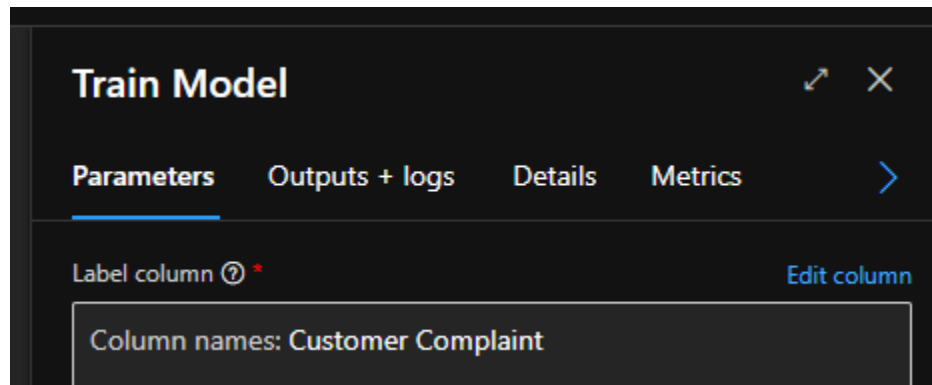
Number of trees constructed indicates the total number of decision trees to create in the ensemble.

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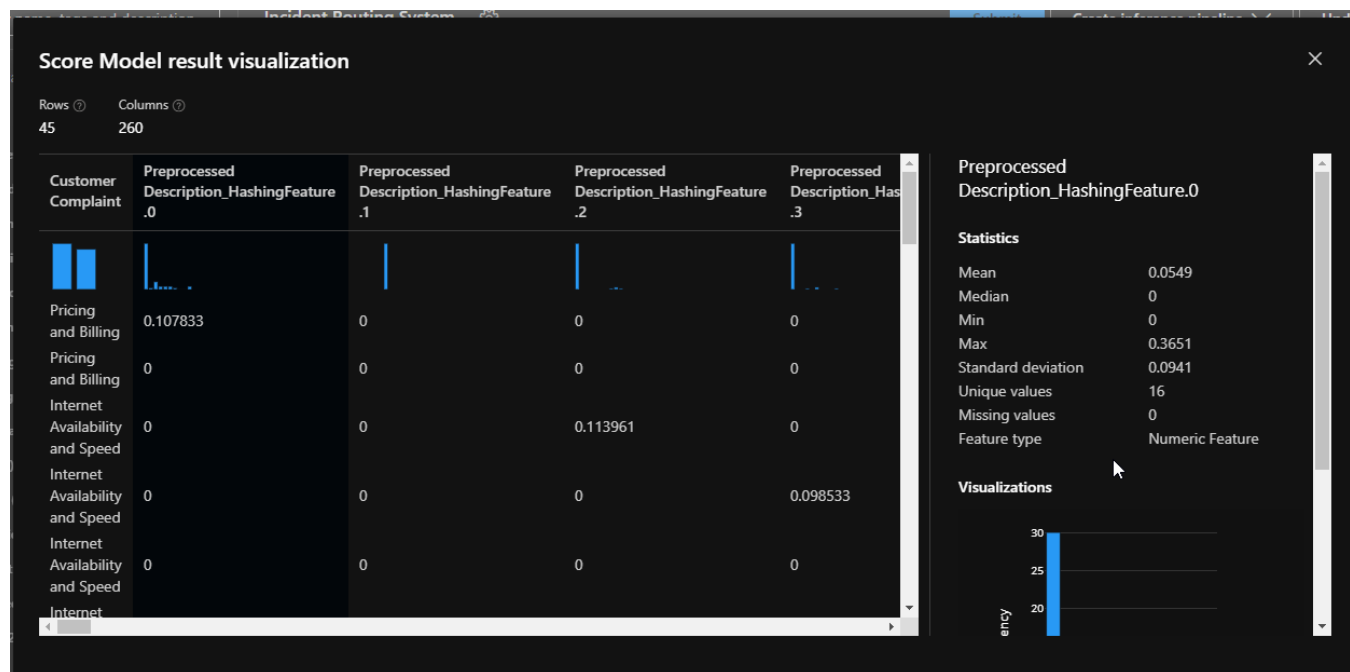
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Train Model: Train the module to train a classification or regression model.

Settings configured:



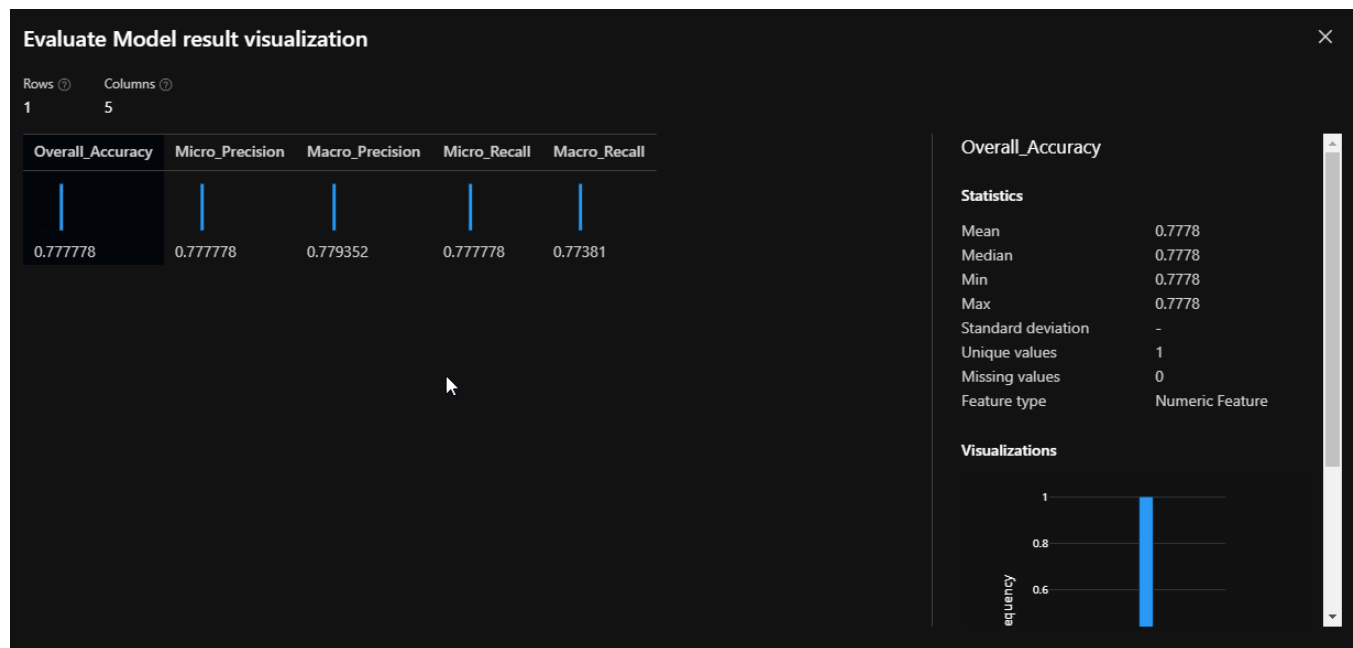
Once model is scored here is output



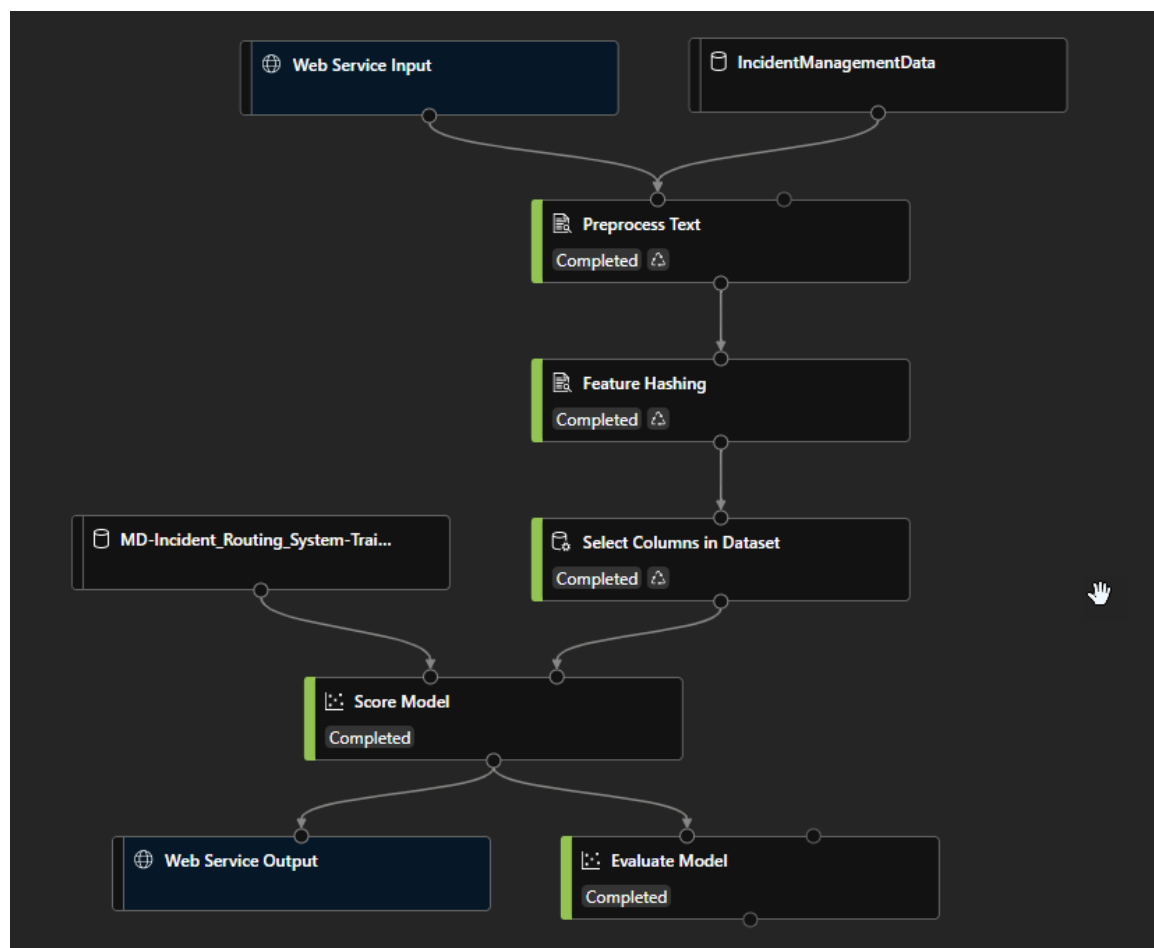
Evaluate Model:

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Once the model is developed after created Real-Time inference pipeline to get the data.



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After inference pipeline deployed as microservice in the **Azure Kubernetes services** by using compute instances

Instance:

Virtual machine size
STANDARD_DS3_V2 (4 Cores, 14 GB RAM, 28 GB Disk)


Cluster:

Virtual machine size
STANDARD_D12_V2 (4 Cores, 28 GB RAM, 200 GB Disk)

Interface:

Azure Kubernetes services

Once model deployed as microservice, it provides REST end points to connect service from external system.

REST endpoint
 

So, microservice is consumed using key based authentication from the Power Automate.

The Power Automate connects microservice to get the data based on user inputs and pass the details to PowerApps and Power Virtual Agents

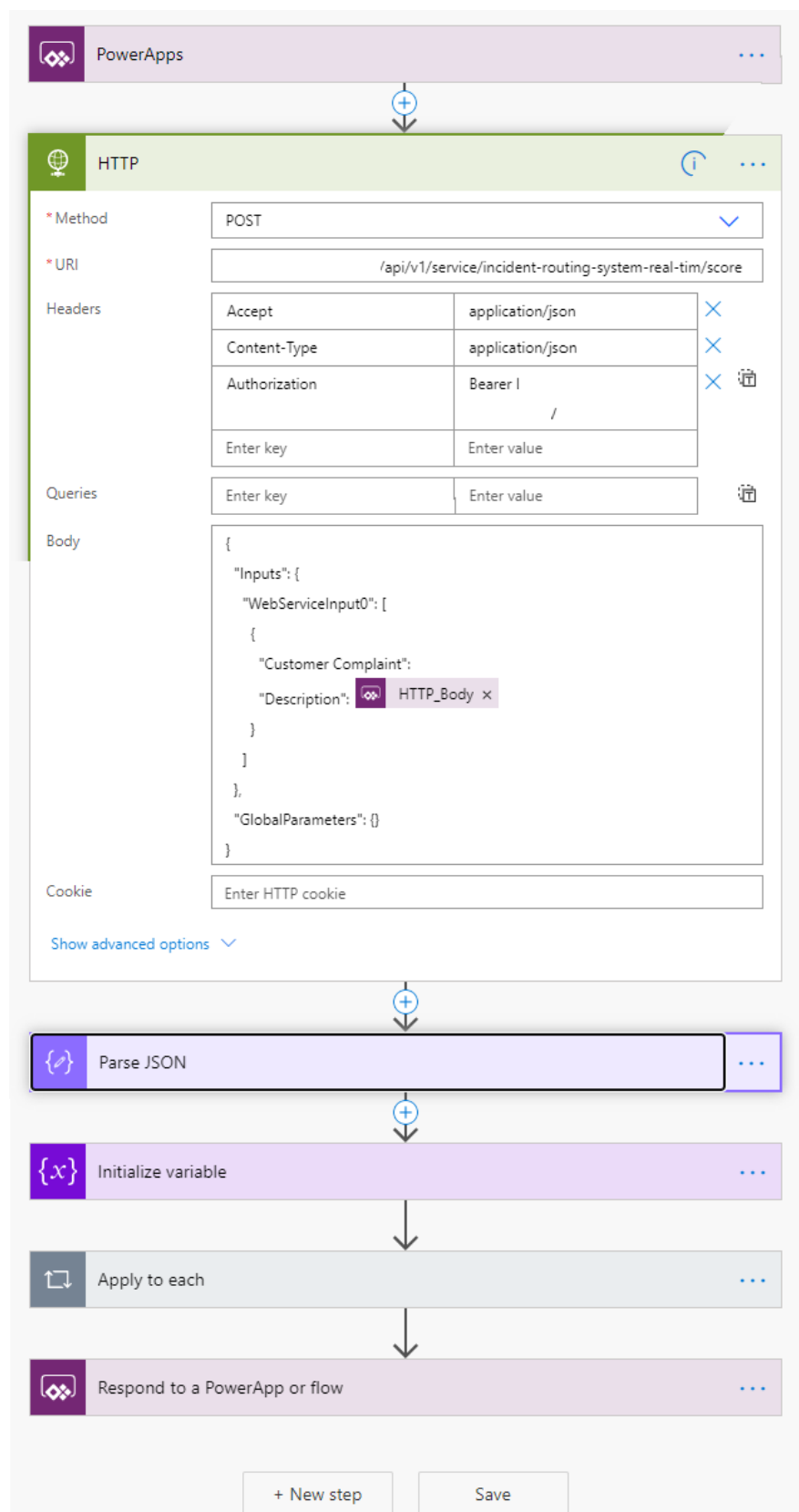
Here are the sample screenshots from each system

Power Automate:

The Power Automate consume Incident Management service from Azure ML by passing the incident description. The service processes the request and response score labels.

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PowerApps:

Create Incident

TICKET ID: 3
STATUS: NOT STARTED

TITLE*
Internet not working

PRIORITY
HIGH

DESCRIPTION*
My internet speed is very slow. When I browse the site, it takes ages to display

Incident category:
Internet Availability and Speed

Incident assigned group:
COMP_MSP_Desktop

TO SUBMIT A HELP DESK INCIDENT

Login as a Help Desk User

CANCEL CREATE

Your help desk ticket has been submitted.

Power Virtual Agents:

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Chat

Just now

Yes

Just now

provide the incident description

Just now

The speed has drastically decreased to the point that I cannot load youtube videos and it started acting up after the day when FCC fined AT&T 100 million dollars. After reading the news, I was very happy for the FCC taking actions against unfair behavior but FCC still has a long way to go as my internet is still being throttled by XXXXX. Please do something about their monopoly over the internet speed, I cannot bear this anymore.

Just now

Your incident belongs to following category

- Internet Availability and Speed

Assigned to : COMP_MSP_Desktop

Did that answer your question?

Just now

Yes

No

Type your message