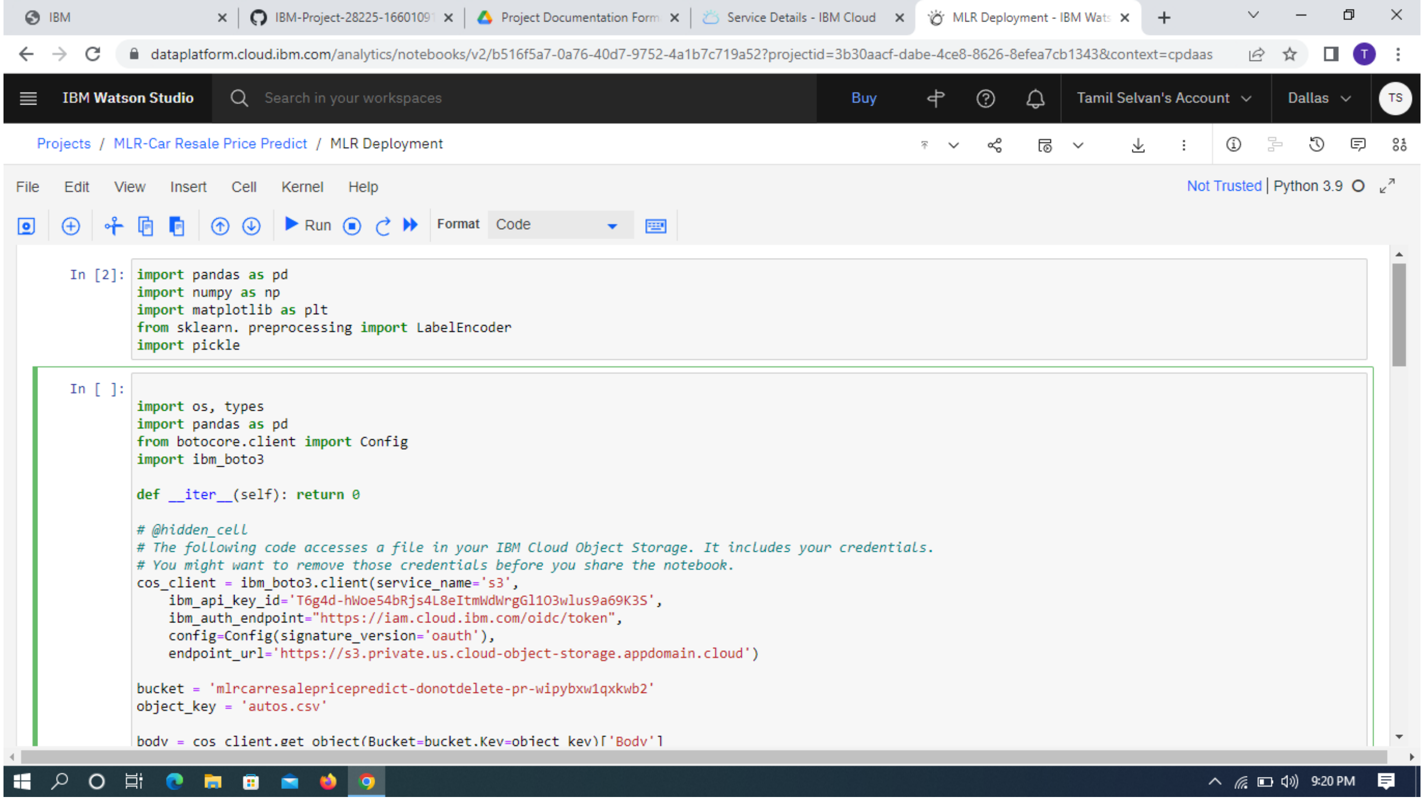
TRAIN THE MODEL ON IBM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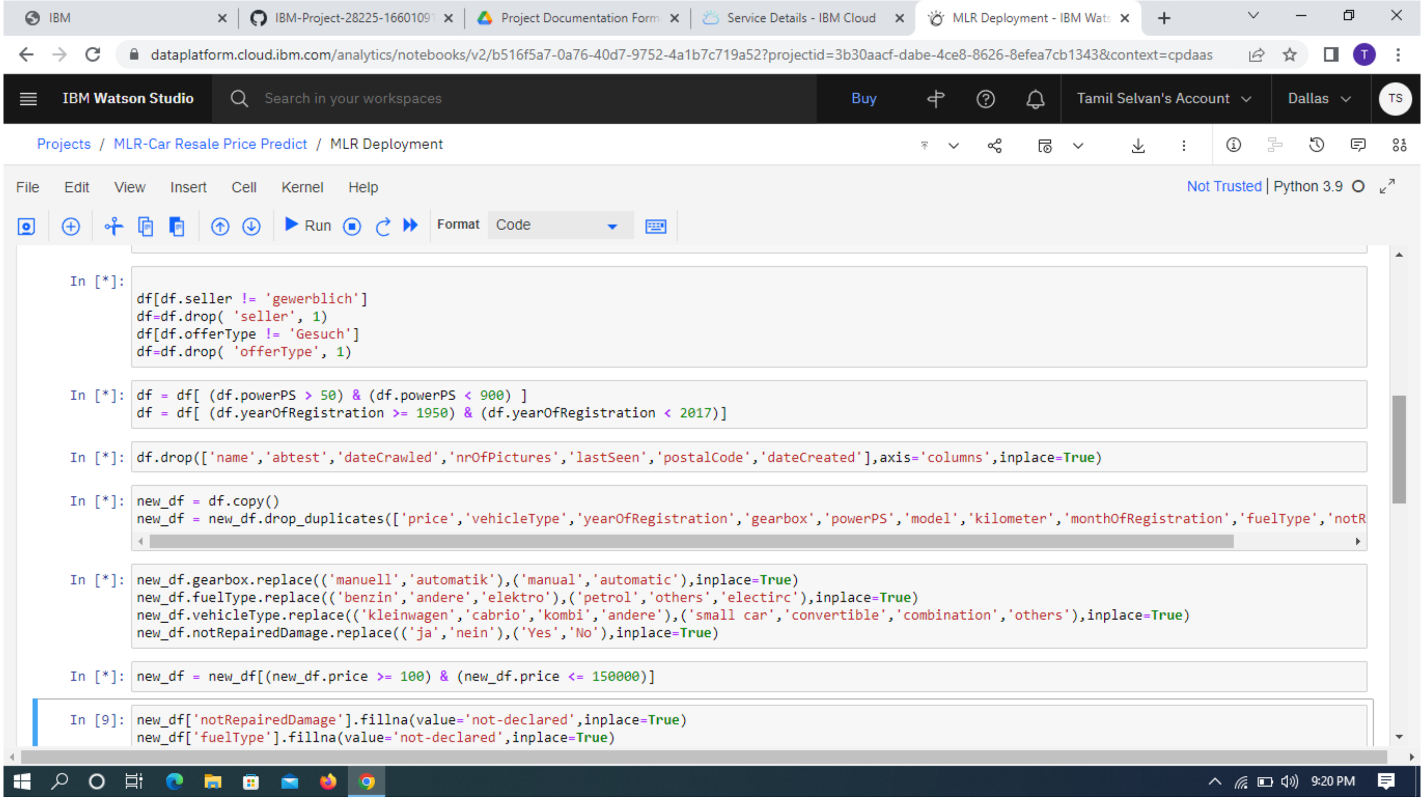
```
In [2]: import pandas as pd
        import numpy as np
        import matplotlib as plt
        from sklearn. preprocessing import LabelEncoder
        import pickle

In [ ]:
        import os, types
        import pandas as pd
        from botocore.client import Config
        import ibm_boto3

        def __iter__(self): return 0

        # @hidden_cell
        # The following code accesses a file in your IBM Cloud Object Storage. It includes your credentials.
        # You might want to remove those credentials before you share the notebook.
        cos_client = ibm_boto3.client(service_name='s3',
            ibm_api_key_id='T6g4d-hWoe54bRjs4L8eItmWdWrgGl1O3wlus9a69K3S',
            ibm_auth_endpoint="https://iam.cloud.ibm.com/oidc/token",
            config=Config(signature_version='oauth'),
            endpoint_url='https://s3.private.us.cloud-object-storage.appdomain.cloud')

        bucket = 'mlrcarresalepricepredict-donotdelete-pr-wipybxw1qxkwb2'
        object_key = 'autos.csv'

        body = cos_client.get_object(Bucket=bucket,Key=object_key)['Body']
```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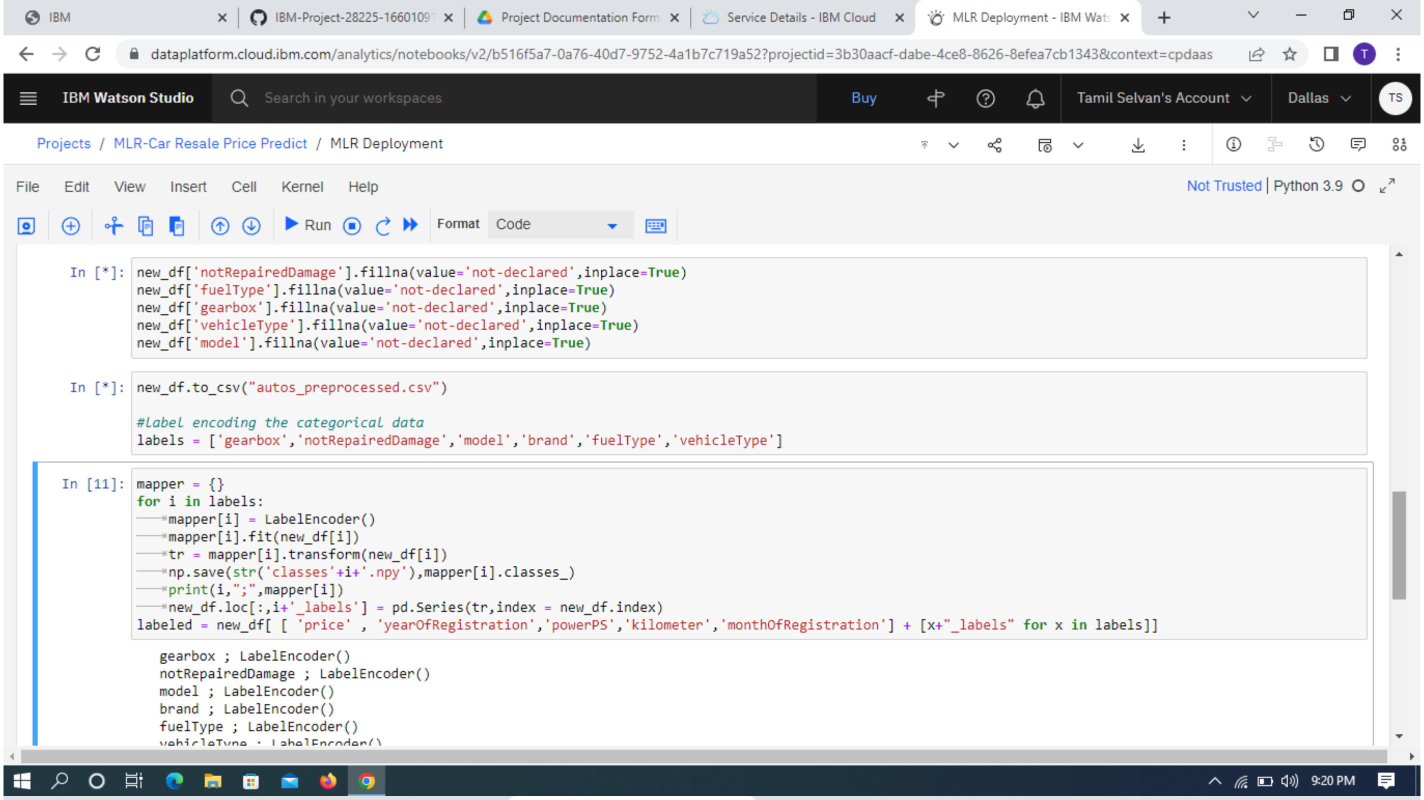
```
In [*]:
        df[df.seller != 'gewerblich']
        df=df.drop( 'seller', 1)
        df[df.offerType != 'Gesuch']
        df=df.drop( 'offerType', 1)

In [*]: df = df[ (df.powerPS > 50) & (df.powerPS < 900) ]
        df = df[ (df.yearOfRegistration >= 1950) & (df.yearOfRegistration < 2017)]

In [*]: df.drop(['name','abtest','dateCrawled','nrOfPictures','lastSeen','postalCode','dateCreated'],axis='columns',inplace=True)

In [*]: new_df = df.copy()
        new_df = new_df.drop_duplicates(['price','vehicleType','yearOfRegistration','gearbox','powerPS','model','kilometer','monthOfRegistration','fuelType','notR

In [*]: new_df.gearbox.replace(('manuell','automatik'),('manual','automatic'),inplace=True)
        new_df.fuelType.replace(('benzin','andere','elektro'),('petrol','others','electirc'),inplace=True)
        new_df.vehicleType.replace(('kleinwagen','cabrio','kombi','andere'),('small car','convertible','combination','others'),inplace=True)
        new_df.notRepairedDamage.replace(('ja','nein'),('Yes','No'),inplace=True)

In [*]: new_df = new_df[(new_df.price >= 100) & (new_df.price <= 150000)]

In [9]: new_df['notRepairedDamage'].fillna(value='not-declared',inplace=True)
        new_df['fuelType'].fillna(value='not-declared',inplace=True)
```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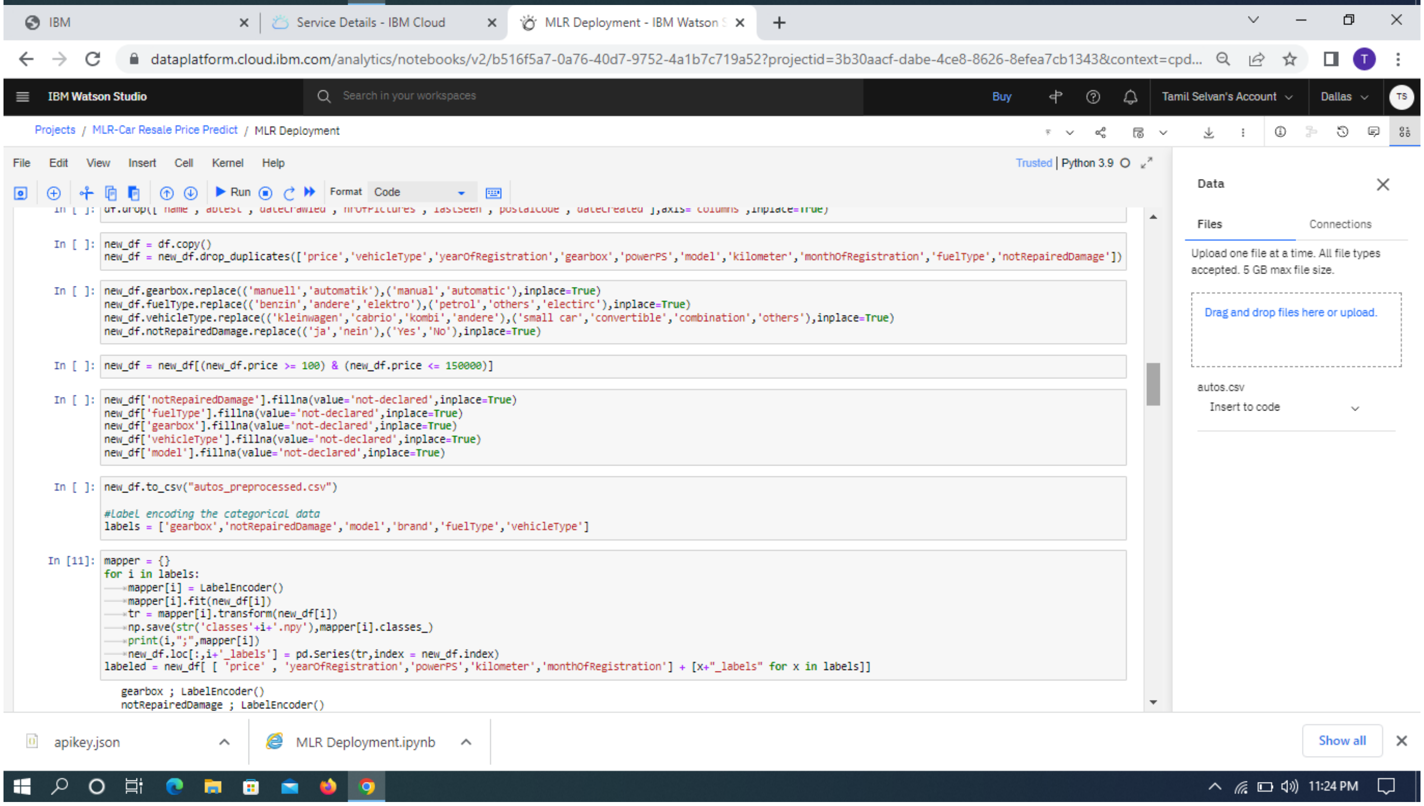
```
In [*]: new_df['notRepairedDamage'].fillna(value='not-declared',inplace=True)
        new_df['fuelType'].fillna(value='not-declared',inplace=True)
        new_df['gearbox'].fillna(value='not-declared',inplace=True)
        new_df['vehicleType'].fillna(value='not-declared',inplace=True)
        new_df['model'].fillna(value='not-declared',inplace=True)

In [*]: new_df.to_csv("autos_preprocessed.csv")

        #label encoding the categorical data
        labels = ['gearbox','notRepairedDamage','model','brand','fuelType','vehicleType']

In [11]: mapper = {}
         for i in labels:
             mapper[i] = LabelEncoder()
             mapper[i].fit(new_df[i])
             tr = mapper[i].transform(new_df[i])
             np.save(str('classes'+i+'.npy'),mapper[i].classes_)
             print(i,":",mapper[i])
             new_df.loc[:,i+'_labels'] = pd.Series(tr,index = new_df.index)
         labeled = new_df[ [ 'price' , 'yearOfRegistration','powerPS','kilometer','monthOfRegistration'] + [x+"_labels" for x in labels]]

           gearbox : LabelEncoder()
           notRepairedDamage : LabelEncoder()
           model : LabelEncoder()
           brand : LabelEncoder()
           fuelType : LabelEncoder()
           vehicleType : LabelEncoder()
```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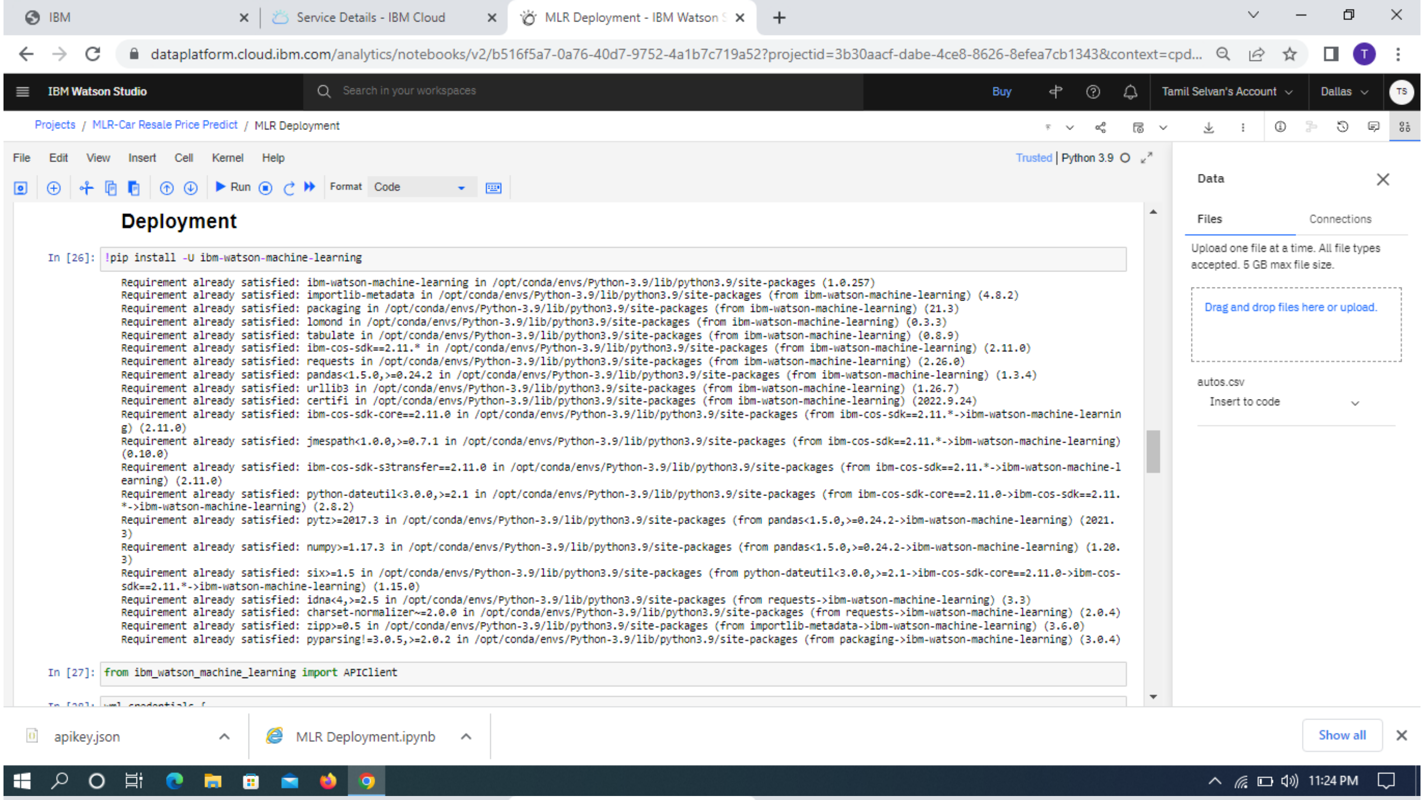
```
In [ ]: df.drop(['name','abtest','dateCrawled','nrOfPictures','lastSeen','postalCode','dateCreated'],axis='columns',inplace=True)

In [ ]: new_df = df.copy()
        new_df = new_df.drop_duplicates(['price','vehicleType','yearOfRegistration','gearbox','powerPS','model','kilometer','monthOfRegistration','fuelType','notRepairedDamage'])

In [ ]: new_df.gearbox.replace(('manuell','automatik'),('manual','automatic'),inplace=True)
        new_df.fuelType.replace(('benzin','andere','elektro'),('petrol','others','electirc'),inplace=True)
        new_df.vehicleType.replace(('kleinwagen','cabrio','kombi','andere'),('small car','convertible','combination','others'),inplace=True)
        new_df.notRepairedDamage.replace(('ja','nein'),('Yes','No'),inplace=True)

In [ ]: new_df = new_df[(new_df.price >= 100) & (new_df.price <= 150000)]

In [ ]: new_df['notRepairedDamage'].fillna(value='not-declared',inplace=True)
        new_df['fuelType'].fillna(value='not-declared',inplace=True)
        new_df['gearbox'].fillna(value='not-declared',inplace=True)
        new_df['vehicleType'].fillna(value='not-declared',inplace=True)
        new_df['model'].fillna(value='not-declared',inplace=True)

In [ ]: new_df.to_csv("autos_preprocessed.csv")

        #label encoding the categorical data
        labels = ['gearbox','notRepairedDamage','model','brand','fuelType','vehicleType']

In [11]: mapper = {}
         for i in labels:
             mapper[i] = LabelEncoder()
             mapper[i].fit(new_df[i])
             tr = mapper[i].transform(new_df[i])
             np.save(str('classes'+i+'.npy'),mapper[i].classes_)
             print(i,":",mapper[i])
             new_df.loc[:,i+'_labels'] = pd.Series(tr,index = new_df.index)
         labeled = new_df[ [ 'price' , 'yearOfRegistration','powerPS','kilometer','monthOfRegistration'] + [x+"_labels" for x in labels]]

           gearbox : LabelEncoder()
           notRepairedDamage : LabelEncoder()
```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Insert to code
apikey.json
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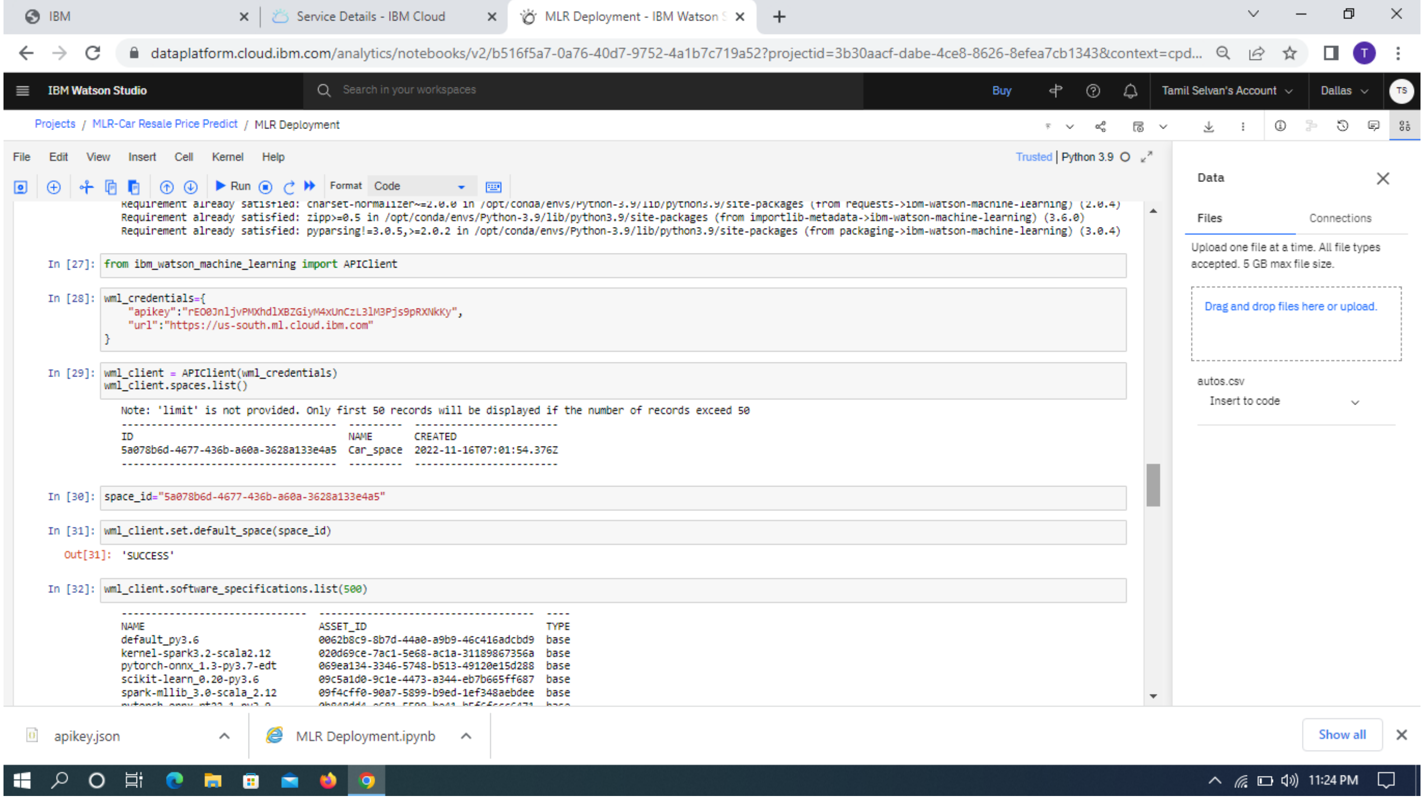
Deployment

```
In [26]: !pip install -U ibm-watson-machine-learning

         Requirement already satisfied: ibm-watson-machine-learning in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (1.0.257)
         Requirement already satisfied: importlib-metadata in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (4.8.2)
         Requirement already satisfied: packaging in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (21.3)
         Requirement already satisfied: lomond in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (0.3.3)
         Requirement already satisfied: tabulate in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (0.8.9)
         Requirement already satisfied: ibm-cos-sdk==2.11.* in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (2.11.0)
         Requirement already satisfied: requests in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (2.26.0)
         Requirement already satisfied: pandas<1.5.0,>=0.24.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (1.3.4)
         Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (1.26.7)
         Requirement already satisfied: certifi in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-watson-machine-learning) (2022.9.24)
         Requirement already satisfied: ibm-cos-sdk-core==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk==2.11.*->ibm-watson-machine-learnin
         g) (2.11.0)
         Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk==2.11.*->ibm-watson-machine-learning)
         (0.10.0)
         Requirement already satisfied: ibm-cos-sdk-s3transfer==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk==2.11.*->ibm-watson-machine-l
         earning) (2.11.0)
         Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk-core==2.11.0->ibm-cos-sdk==2.11.
         *->ibm-watson-machine-learning) (2.8.2)
         Requirement already satisfied: pytz>=2017.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas<1.5.0,>=0.24.2->ibm-watson-machine-learning) (2021.
         3)
         Requirement already satisfied: numpy>=1.17.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas<1.5.0,>=0.24.2->ibm-watson-machine-learning) (1.20.
         3)
         Requirement already satisfied: six>=1.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from python-dateutil<3.0.0,>=2.1->ibm-cos-sdk-core==2.11.0->ibm-cos-
         sdk==2.11.*->ibm-watson-machine-learning) (1.15.0)
         Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->ibm-watson-machine-learning) (3.3)
         Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->ibm-watson-machine-learning) (2.0.4)
         Requirement already satisfied: zipp>=0.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from importlib-metadata->ibm-watson-machine-learning) (3.6.0)
         Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from packaging->ibm-watson-machine-learning) (3.0.4)

In [27]: from ibm_watson_machine_learning import APIClient
```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         Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->ibm-watson-machine-learning) (2.0.4)
         Requirement already satisfied: zipp>=0.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from importlib-metadata->ibm-watson-machine-learning) (3.6.0)
         Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from packaging->ibm-watson-machine-learning) (3.0.4)

In [27]: from ibm_watson_machine_learning import APIClient

In [28]: wml_credentials={
             "apikey":"rEO0JnljvPMXhdlXBZGiyM4xUnCzL3lM3Pjs9pRXNkKy",
             "url":"https://us-south.ml.cloud.ibm.com"
         }

In [29]: wml_client = APIClient(wml_credentials)
         wml_client.spaces.list()

         Note: 'limit' is not provided. Only first 50 records will be displayed if the number of records exceed 50
         ------------------------------------  ---------  ------------------------
         ID                                    NAME       CREATED
         5a078b6d-4677-436b-a60a-3628a133e4a5  Car_space  2022-11-16T07:01:54.376Z
         ------------------------------------  ---------  ------------------------

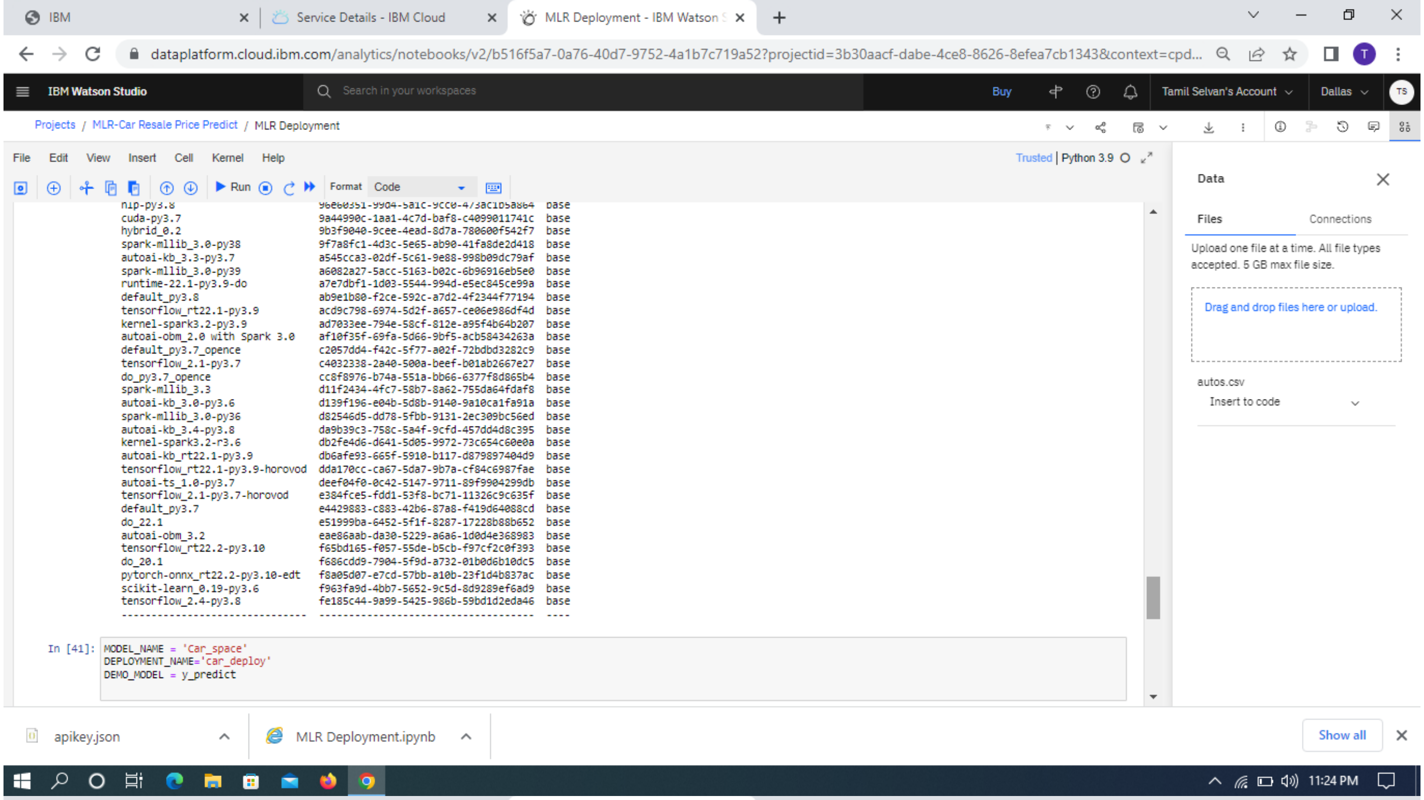
In [30]: space_id="5a078b6d-4677-436b-a60a-3628a133e4a5"

In [31]: wml_client.set.default_space(space_id)

 Out[31]: 'SUCCESS'

In [32]: wml_client.software_specifications.list(500)

         -----------------------------  ------------------------------------  ----
         NAME                           ASSET_ID                              TYPE
         default_py3.6                  0062b8c9-8b7d-44a0-a9b9-46c416adcbd9  base
         kernel-spark3.2-scala2.12      020d69ce-7ac1-5e68-ac1a-31189867356a  base
         pytorch-onnx_1.3-py3.7-edt     069ea134-3346-5748-b513-49120e15d288  base
         scikit-learn_0.20-py3.6        09c5a1d0-9c1e-4473-a344-eb7b665ff687  base
         spark-mllib_3.0-scala_2.12     09f4cff0-90a7-5899-b9ed-1ef348aebdee  base
```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        nlp-py3.8                      96e60351-99d4-5a1c-9cc0-473ac1b5a864  base
        cuda-py3.7                     9a44990c-1aa1-4c7d-baf8-c4099011741c  base
        hybrid_0.2                     9b3f9040-9cee-4ead-8d7a-780600f542f7  base
        spark-mllib_3.0-py38           9f7a8fc1-4d3c-5e65-ab90-41fa8de2d418  base
        autoai-kb_3.3-py3.7            a545cca3-02df-5c61-9e88-998b09dc79af  base
        spark-mllib_3.0-py39           a6082a27-5acc-5163-b02c-6b96916eb5e0  base
        runtime-22.1-py3.9-do          a7e7dbf1-1d03-5544-994d-e5ec845ce99a  base
        default_py3.8                  ab9e1b80-f2ce-592c-a7d2-4f2344f77194  base
        tensorflow_rt22.1-py3.9        acd9c798-6974-5d2f-a657-ce06e986df4d  base
        kernel-spark3.2-py3.9          ad7033ee-794e-58cf-812e-a95f4b64b207  base
        autoai-obm_2.0 with Spark 3.0  af10f35f-69fa-5d66-9bf5-acb58434263a  base
        default_py3.7_opence           c2057dd4-f42c-5f77-a02f-72bdbd3282c9  base
        tensorflow_2.1-py3.7           c4032338-2a40-500a-beef-b01ab2667e27  base
        do_py3.7_opence                cc8f8976-b74a-551a-bb66-6377f8d865b4  base
        spark-mllib_3.3                d11f2434-4fc7-58b7-8a62-755da64fdaf8  base
        autoai-kb_3.0-py3.6            d139f196-e04b-5d8b-9140-9a10ca1fa91a  base
        spark-mllib_3.0-py36           d82546d5-dd78-5fbb-9131-2ec309bc56ed  base
        autoai-kb_3.4-py3.8            da9b39c3-758c-5a4f-9cfd-457dd4d8c395  base
        kernel-spark3.2-r3.6           db2fe4d6-d641-5d05-9972-73c654c60e0a  base
        autoai-kb_rt22.1-py3.9         db6afe93-665f-5910-b117-d879897404d9  base
        tensorflow_rt22.1-py3.9-horovod dda170cc-ca67-5da7-9b7a-cf84c6987fae  base
        autoai-ts_1.0-py3.7            deef04f0-0c42-5147-9711-89f9904299db  base
        tensorflow_2.1-py3.7-horovod   e384fce5-fdd1-53f8-bc71-11326c9c635f  base
        default_py3.7                  e4429883-c883-42b6-87a8-f419d64088cd  base
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        pytorch-onnx_rt22.2-py3.10-edt f8a05d07-e7cd-57bb-a10b-23f1d4b837ac  base
        scikit-learn_0.19-py3.6        f963fa9d-4bb7-5652-9c5d-8d9289ef6ad9  base
        tensorflow_2.4-py3.8           fe185c44-9a99-5425-986b-59bd1d2eda46  base
        ------------------------------ ------------------------------------  ----

In [41]: MODEL_NAME = 'Car_space'
         DEPLOYMENT_NAME='car_deploy'
         DEMO_MODEL = y_predict
```

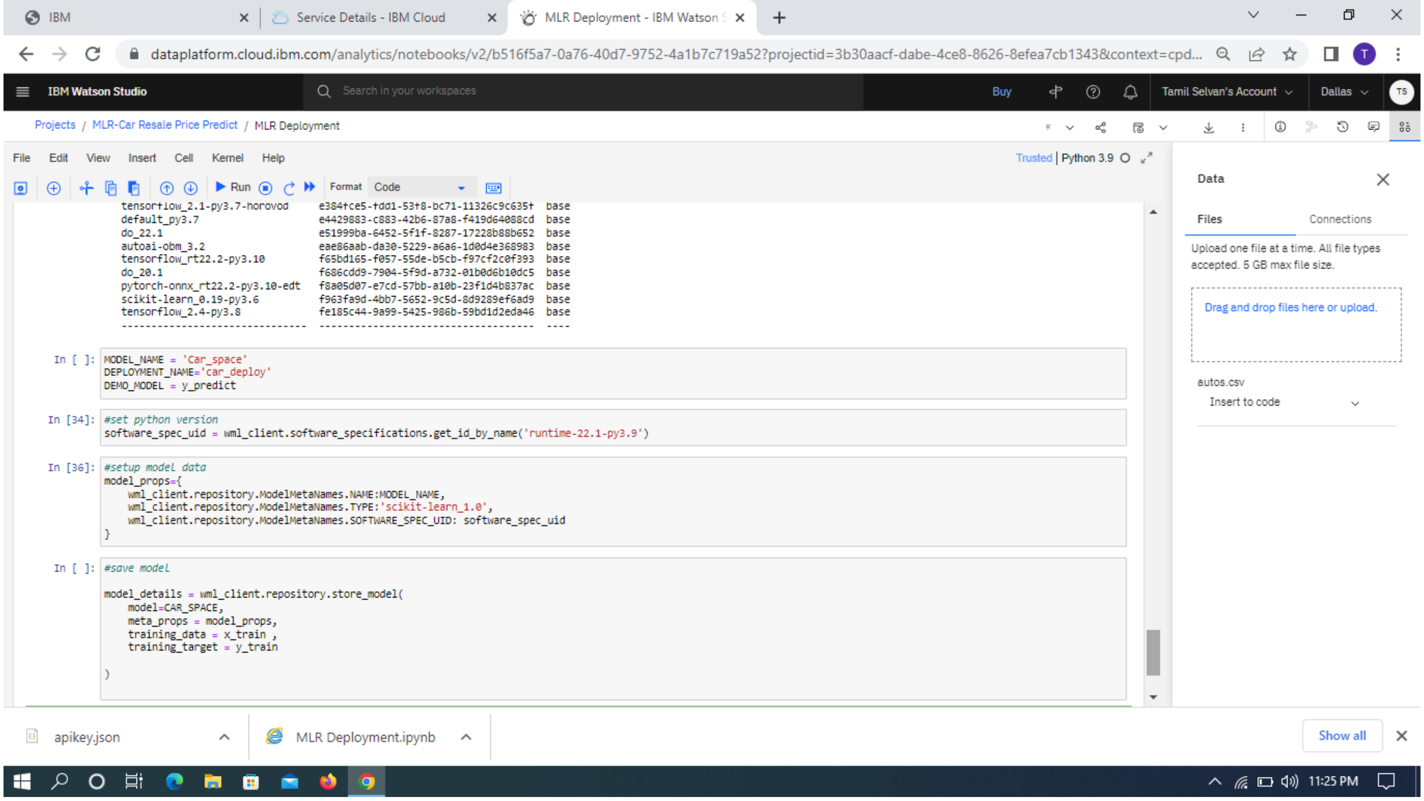
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Drag and drop files here or upload.
autos.csv
Insert to code
apikey.json
MLR Deployment.ipynb
Show all
11:25 PM

```
        tensorflow_2.1-py3.7-horovod   e384fce5-fdd1-53f8-bc71-11326c9c635f  base
        default_py3.7                  e4429883-c883-42b6-87a8-f419d64088cd  base
        do_22.1                        e51999ba-6452-5f1f-8287-17228b88b652  base
        autoai-obm_3.2                 eae86aab-da30-5229-a6a6-1d0d4e368983  base
        tensorflow_rt22.2-py3.10       f65bd165-f057-55de-b5cb-f97cf2c0f393  base
        do_20.1                        f686cdd9-7904-5f9d-a732-01b0d6b10dc5  base
        pytorch-onnx_rt22.2-py3.10-edt f8a05d07-e7cd-57bb-a10b-23f1d4b837ac  base
        scikit-learn_0.19-py3.6        f963fa9d-4bb7-5652-9c5d-8d9289ef6ad9  base
        tensorflow_2.4-py3.8           fe185c44-9a99-5425-986b-59bd1d2eda46  base
        ------------------------------ ------------------------------------  ----

In [ ]: MODEL_NAME = 'Car_space'
        DEPLOYMENT_NAME='car_deploy'
        DEMO_MODEL = y_predict

In [34]: #set python version
         software_spec_uid = wml_client.software_specifications.get_id_by_name('runtime-22.1-py3.9')

In [36]: #setup model data
         model_props={
             wml_client.repository.ModelMetaNames.NAME:MODEL_NAME,
             wml_client.repository.ModelMetaNames.TYPE:'scikit-learn_1.0',
             wml_client.repository.ModelMetaNames.SOFTWARE_SPEC_UID: software_spec_uid
         }

In [ ]: #save model

        model_details = wml_client.repository.store_model(
            model=CAR_SPACE,
            meta_props = model_props,
            training_data = x_train ,
            training_target = y_train

        )
```