

Lab Guide

CP4Data and Z Integration HOL

Session: NZS66T0304SH

Maggie Lin meichi@us.ibm.com, Watson Machine Learning for z/OS Development

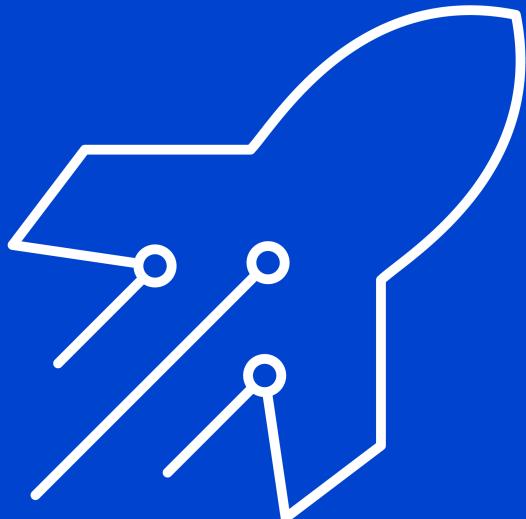


Table of Contents

Legal Disclaimer	4
Introduction.....	5
Lab Overview	5
Lab Instructions	6
CP4D integration with WMLz.....	6
Before you start the lab.....	7
Log in to CP4D.....	9
1. Model Training in CP4D	11
Log in to IBM Watson Machine Learning for z/OS.....	32
2. Model Management and Deployment in WMLz	36
Section 1. Dashboard.....	36
Section 2. Model Management	36
Section 3. Deployment Model to Scoring Server	41
We Value Your Feedback!.....	50

Legal Disclaimer

© IBM Corporation 2020. All Rights Reserved. The information contained in this publication is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this publication, it is provided AS IS without warranty of any kind, express or implied. In addition, this information is based on IBM's current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this publication or any other materials. Nothing contained in this publication is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software. References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in this presentation may change at any time at IBM's sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

Introduction

IBM Watson Machine Learning for z/OS (WMLz) is an enterprise machine learning platform that provides end to end management of the entire machine learning workflow. WMLz helps to simplify and significantly reduce the time to train and deploy machine learning models by:

- Integrating all the tools and functions needed for machine learning and automating the machine learning workflow.
- Providing a platform for better collaboration across different personas including Data Scientist, Data Engineer, Business Analyst and Application Developers, for a successful machine learning project.
- Infusing cognitive capabilities into the machine learning workflow to help determine when model results deteriorate and need to be tuned and provide suggestions for updates or changes.

Lab Overview

For this hands-on lab, you have the opportunity to use CP4Data and Watson Machine Learning for z/OS (WMLz) to experience the full life cycle of predictive model development and management

- Train a model and save it in CP4D environment
- Import the CP4D trained model to WMLz, and deploy the model using the Model Management Dashboard in WMLz
- Test scoring of the deployed model in WMLz

Lab Instructions

Each student should receive a lab worksheet. The worksheet provides information that is specific to each student to use throughout the lab.

Some of the instructions in the lab instruct the student to use a value that is marked with angle brackets (< >). The value the student should use is on their lab worksheet. Make sure to exclude the brackets when using the value for its intended purpose in the lab.

CP4D integration with WMLz

This customer churn model is a simplified customer churn model to determine the likelihood of the customer leaves the phone carrier. Every user has their own profile and information like phone usage, payment method, and annual income. The value of adding Machine Learning to the customer churn is that ML generates a smart score for the customer with the information provided. The phone carrier can define a threshold for this score to help determine if there is additional action they can take to retain the customer. The customer churn is a critical metric because it is much less expensive to retain existing customers than it is to acquire new customers.

In this session, you will go through the process of building the customer churn model with CP4D, experiencing the flow to analyze data, develop model, and then import the model and deploy model with WMLz.

- Model Training with Jupyter notebook
- Model Management and Deployment

Before you start the lab

- Go to this github.com link : <https://github.com/meichilin/IBMWMLz>

The screenshot shows the GitHub repository page for the user 'meichilin' with the repository name 'IBMWMLz'. The page has a light gray header with the repository name and a dark gray sidebar on the left. The main content area displays the following information:

- No description, website, or topics provided.
- Code tab is selected.
- Issues: 0, Pull requests: 0, Actions: 0, Projects: 0, Wiki: 0, Security: 0, Insights: 0, Settings: 0.
- Statistics: 29 commits, 1 branch, 0 packages, 0 releases, 1 contributor.
- Branch: master dropdown, New pull request button.
- File list:
 - meichilin Add files via upload (Latest commit 28dbb28 12 days ago)
 - FastStart_2020 Add files via upload (12 days ago)
 - README.md Update README.md (last month)
- File content preview for README.md: **IBM Watson Machine Learning for z/OS**.

- Download the lab material on your laptop

The screenshot shows the same GitHub repository page as above, but with a callout box highlighting the 'Clone with HTTPS' button. The callout box contains the following text:

Clone with HTTPS ⓘ Use SSH
Use Git or checkout with SVN using the web URL.
<https://github.com/meichilin/IBMWMLz>

The 'Download ZIP' button is also highlighted with a blue border.

- Unzip the zip file, you should see these files in the FastStart_2020 folder

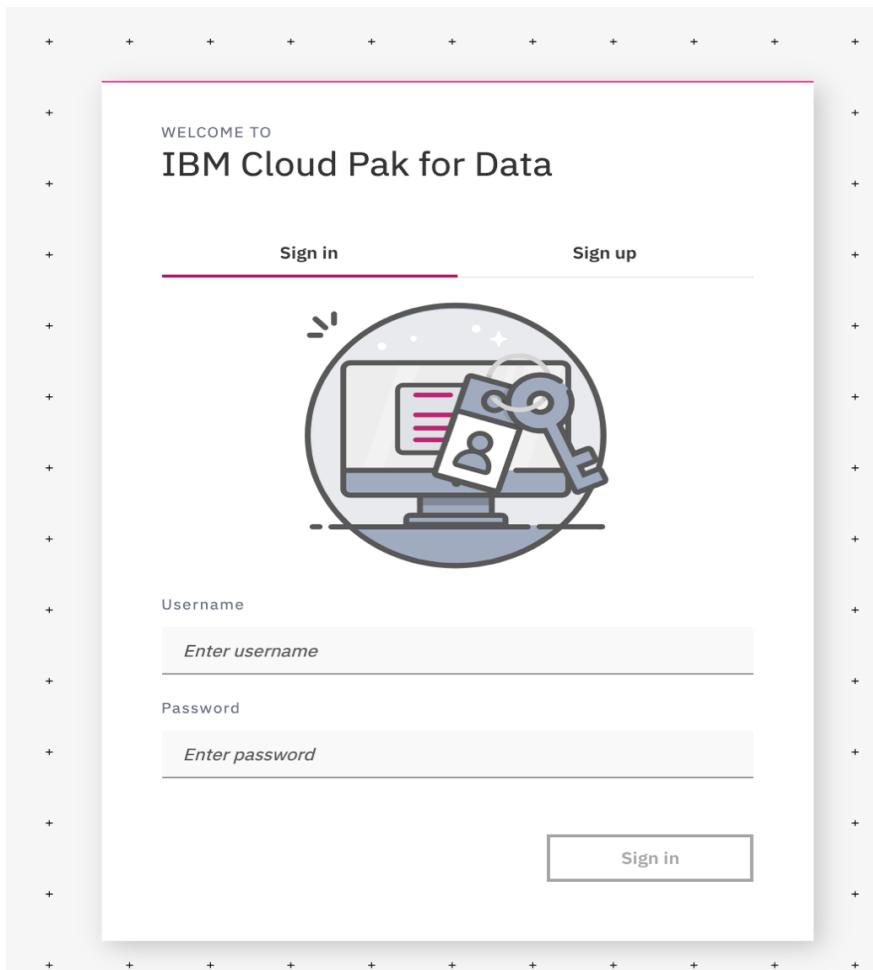
▼	IBMWMLz-master	--	Folder
	README.md	39 bytes	Markdo...ument
▼	FastStart_2020	--	Folder
	workshop Worksheet.pdf	53 KB	PDF Document
	customers.csv	97 KB	CSV Document
	MyLabelEncoder-1...2002061325.tar.gz	1 KB	gzip co...archive
	HOL_WMLz+CP4D integration.pdf	6 MB	PDF Document
	HOL_WMLz+CP4D integration.docx	20 MB	Micros...(docx)
	ChurnScikit_CP4D_WMLz.ipynb	34 KB	Document

- You open HOL_WMLz+CP4D integration.pdf to start the lab

Log in to CP4D

The URL and authentication credentials for the CP4D Web UI are provided on a separate worksheet. Contact the lab instructor if you did not receive a worksheet.

- 1. Start the Chrome or Firefox browser, and enter the URL assigned to you, e.g. <cp4d_login_url>.
- 2. Enter the <cp4d_login_userid> and <cp4d_login_password> credentials from your lab worksheet.



You should be presented with the CP4D Lets get started main page

IBM Cloud Pak for Data

All

Search

WELCOME, ctp!



Let's get started!

Use these resources to make the most of your IBM Cloud Pak for Data experience.

Collect and organize

IBM Cloud Pak for Data:
Collect and organize



0:00 / 17:44

Build your enterprise data catalog and ensure that your policies and rules.

- Explore business terms
- Explore policies
- Discover assets
- Explore catalogs

DATA JOURNEY



From data to insight

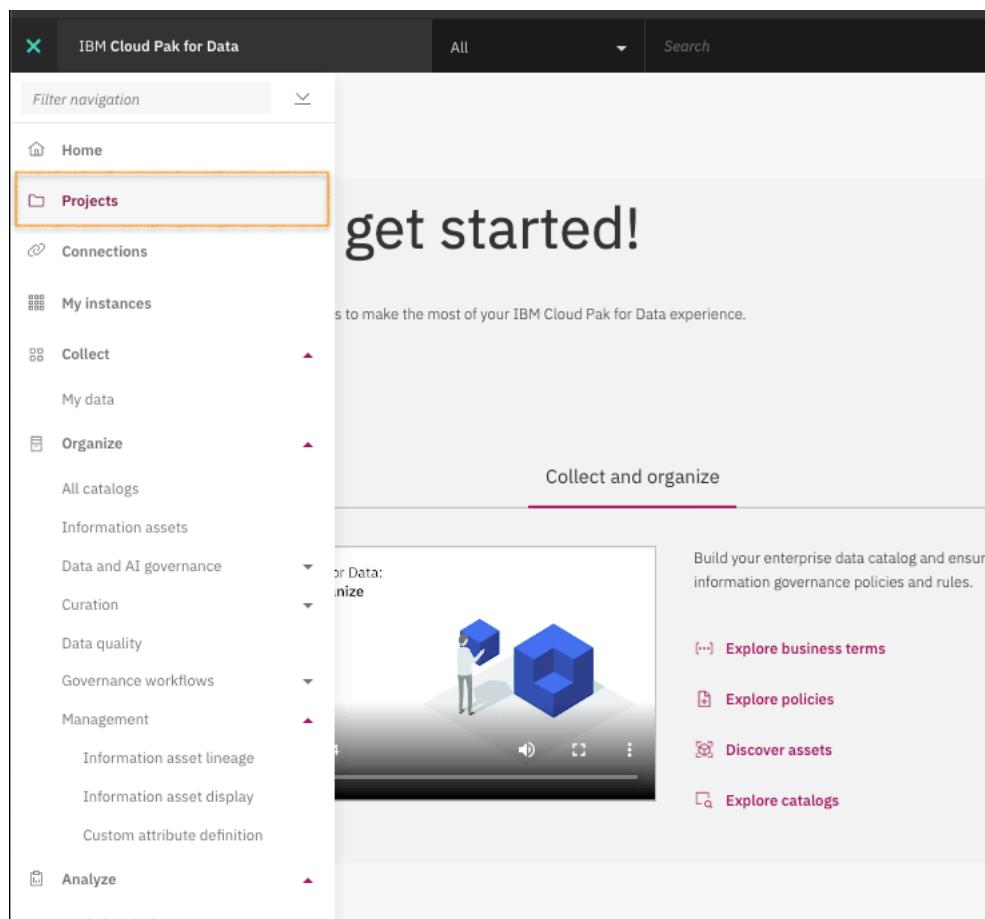
Understand the end-to-end data journey to see how your role fits into the story.

1. Model Training in CP4D

In this Lab, we will use the Web UI of CP4D to leverage machine learning to understand customer churn and determine which customer is likely to leave. You will learn how to use Jupyter notebook of CP4D to train a binary classification scikit learn (RandomForestClassifier) model.

1. Select a project to contain your notebook.

Click on the 3 short horizontal bars in the top left of the web page and choose “**Projects**”



Click “**New Project**” button to create one. Select to create an empty project, and name it “**<cp4d_login_userid>-IMLz_HOL**

IBM Cloud Pak for Data		All	Search	
Projects		Search	Search	+ New project
Name	Project Type	User Role	Last Updated	Actions
sudesh-uob	Analytics	Admin	30 Dec 2019, 10:20 PM	
vjprj	Analytics	Admin	11 Dec 2019, 10:14 AM	
test2	Analytics	Admin	28 Nov 2019, 2:41 PM	
garyde	Analytics	Admin	14 Jan 2020, 12:56 PM	
Teleco_Churn_CH	Analytics	Admin	4 Dec 2019, 7:15 PM	

← Back

Create a project

Choose whether to create an empty project or to preload your project with data and analytical assets. Add collaborators and data, and then choose the right tools to accomplish your goals. Add services as necessary.



Create an empty project

Add the data you want to prepare, analyze, or model. Choose tools based on how you want to work: write code, create a flow on a graphical canvas, or automatically build models.

USE TO

- Prepare and visualize data
- Analyze data in notebooks
- Train models

IBM Cloud Pak for Data All Search

New project

Define project details

Name

Description

Choose project options

Integrate this project with Git

Cancel Create

You should be now at the project overview page.

The screenshot shows the project overview for 'wmlz-IMLz_HOL'. At the top, there's a navigation bar with 'IBM Cloud Pak for Data', a search bar, and various icons for project management. Below the header, the project name 'wmlz-IMLz_HOL' is displayed along with its last update date ('Last Updated: 16 Jan, 2020'). Key metrics are shown: 0 Assets and 1 Collaborator. The main content area is divided into sections: 'Date created' (16 Jan, 2020), 'Description' (No description available), 'Storage' (File System, 0 Byte used), 'Collaborators' (ctp, Admin), and 'Associated deployment space' (No deployment space associated). A 'Recent activity' section is also present, showing a placeholder for alerts.

- 2. From the project overview, click on “Asset” to load 2 asset files **customers.csv** and **MyLabelEncoder-1.2.0.401.post202002061325.tar.gz**
Download the 2 files from the HOL GitHub link if you have not :
https://github.com/meichilin/IBMWMLz/tree/master/FastStart_2020

IBM Cloud Pak for Data

My Projects > wmlz-IMLz_HOL

Overview Assets Environments Jobs Access Control Settings

What assets are you looking for?

▼ Data assets

NAME	TYPE	CREATED BY	LAST MODIFIED	ACTIONS
You don't have any Data assets yet.				

Load Files Catalog

Drop files here or [browse](#) for files to upload.

IBM Cloud Pak for Data

My Projects > forMaggie

Overview Assets Environments Jobs Access Control Settings

What assets are you looking for?

▼ Data assets

0 asset selected.

<input type="checkbox"/> NAME	TYPE	CREATED BY	LAST MODIFIED	ACTIONS
<input type="checkbox"/> CSV customers.csv	Data Asset	ctp	10 Jan 2020, 12:56:15 pm	
<input type="checkbox"/> 81 MyLabelEncoder-1.2.0.401.post201912301918.tar.gz	Data Asset	ctp	10 Jan 2020, 12:56:01 pm	

New data asset

3. Click “Add to project” to add “Notebook” asset to the project.

IBM Cloud Pak for Data

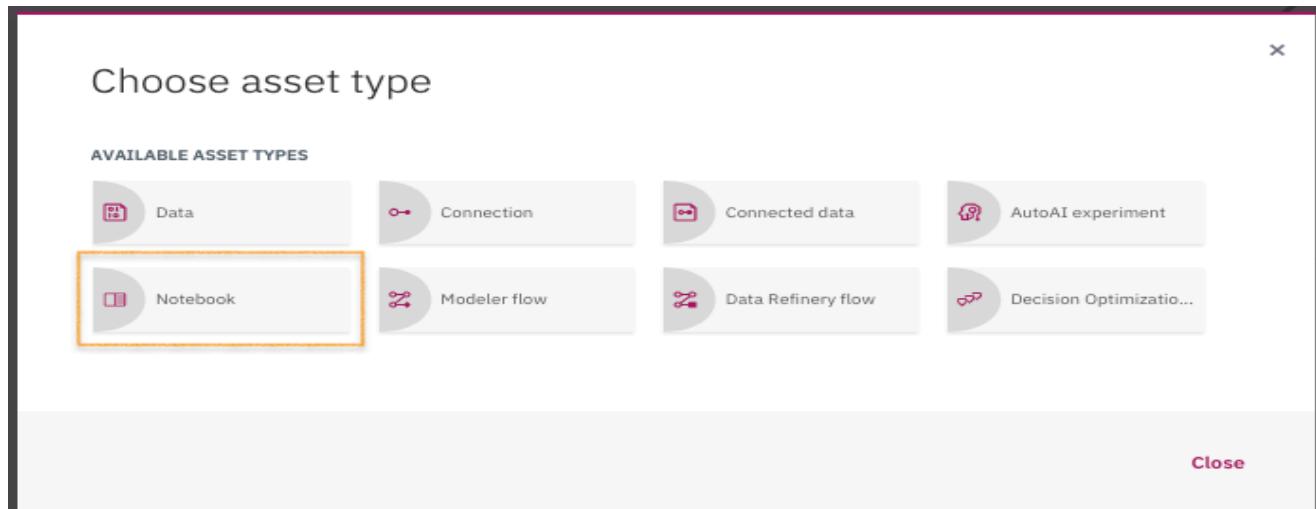
My Projects > wmlz-IMLz_HOL

Overview Assets Environments Jobs Access Control Settings

wmlz-IMLz_HOL
Last Updated: 16 Jan, 2020

Add to project

2 Assets 1 Collaborators



- 4. Create a new notebook “From file”. Import **ChurnScikit_CP4D_WMLz.ipynb** from the HOL GitHub link if you have not : https://github.com/meichilin/IBMWMLz/tree/master/FastStart_2020. Leave runtime to Default Python 3.6 (1 vCPU and 2 GB RAM). Then click “Create Notebook” button.

New notebook

Blank From file From URL

Name
Type Notebook Name here
40 characters remaining

Description (optional)
Type your Description here
500 characters remaining

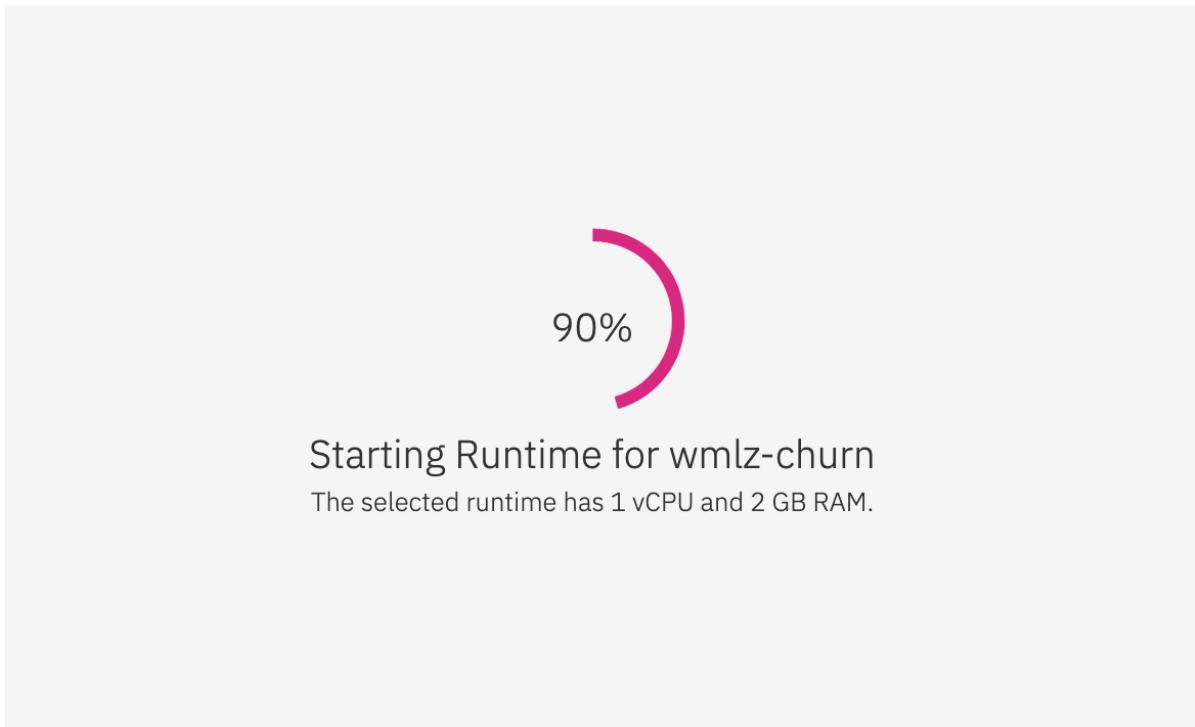
Select runtime
Default Python 3.6 (1 vCPU and 2 GB RAM)

Notebook file
Choose file
ChurnScikit_CP4D_WMLz.ipynb
Import a notebook file (.ipynb) from your local device.

Create Notebook

You will see the following spinner indicating a runtime container is being created for the Jupyter notebook.

This could take a minute or two for the first time you open a notebook container in your project.



A message indicates the Jupyter notebook is being launched. Shortly afterward, you will see the ChurnScikit_CP4D_WMLz.ipynb loaded.

```
In [1]: # In this Notebook we shall create a Machine Learning Model using Scikit Learn 0.19

There are several different approaches and frameworks for predicting the likelihood of a customer to churn. In this notebook, we illustrate how scikit learn can be used for this purpose.

In [110]: import sklearn
print(sklearn.__version__)

0.19.1

In [3]: !pip install --user scikit-learn==0.19.1

Collecting scikit-learn==0.19.1
  Downloading https://files.pythonhosted.org/packages/3d/2d/9fbc7baa5f44bc9e88ffb7ed32721b879bfa416573e85031e16f52569bc9/scikit_learn-0.19.1-cp36-cp36m-manylinux1_x86_64.whl (12.4MB)
  #####| 12.4MB 10.7MB/s eta 0:00:01
Installing collected packages: scikit-learn
Successfully installed scikit-learn-0.19.1

In [4]: !pip install /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz

Processing /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz
Building wheels for collected packages: MyLabelEncoder
  Building wheel for MyLabelEncoder (setup.py) ... done
    Created wheel for MyLabelEncoder: filename=MyLabelEncoder-1.2.0.401.post202001102058-cp36-none-any.whl size=1905 sha256=d6c65943acb3e1fb7417c46fc8531c544b18e381cb940cb66f0de2d243dce2a6
    Stored in directory: /home/wsuser/.cache/pip/wheels/2b/69/0b/0d1a542a512bea2988b3dcba44df82c09221a2c26ab00cba7c
Successfully built MyLabelEncoder
Installing collected packages: MyLabelEncoder
Successfully installed MyLabelEncoder-1.2.0.401.post202001102058

In [111]: import os
import numpy as np
```

Next, we read in a dataset that we will use to develop a Machine Learning model.

We can read the data here in various ways. We are showing here how to read data from a CSV file.

5. Now to train the model, execute each notebook cell step by step.

First, make sure we are using python scikit learn package 0.19.1 version, and install the customized transformer **MyLabelEncoder**.

Execute the first cell to know the current scikit learn package version. If it is already at 0.19.1 version, you can proceed on to the next step to install the customized transformer **MyLabelEncoder**.

 IBM Cloud Pak for Data All Search 🔍 grid icon file icon bell icon
My Projects > wmlz-IMLz_HOL > ChurnScikit_CPD_WMLz refresh icon play icon down arrow icon info icon link icon copy icon
File Edit View Insert Cell Kernel Widgets Help Not Trusted | Python 3.6 refresh icon
cell icon plus icon divide icon format icon up arrow icon down arrow icon run icon refresh icon next icon Format Code nbdiff

Pip install the scikit learn package to 0.19.1 version.

The screenshot shows the IBM Cloud Pak for Data Jupyter Notebook interface. The top navigation bar includes 'IBM Cloud Pak for Data', 'All', 'Search', and various icons. The left sidebar shows 'My Projects' with a selected item 'wmliz-IMLz_HOL' and a sub-item 'ChurnScikit_CP4D_WMLz'. The main toolbar has 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help' options. On the right, it says 'Not Trusted | Python 3.6 O'. Below the toolbar is a toolbar with icons for file operations like open, save, and run. The main content area displays a heading and a code cell with its output.

In this Notebook we shall create a Machine Learning Model using Scikit Learn 0.19

There are several different approaches and frameworks for predicting the likelihood of a customer to churn. In this notebook, we illustrate how scikit learn can be used for this purpose.

```
In [4]: import sklearn  
print(sklearn.__version__)  
0.20.3
```

```
In [3]: pip install --user scikit-learn==0.19.1  
Collecting scikit-learn==0.19.1  
  Downloading https://files.pythonhosted.org/packages/3d/2d/9fbcbbaaf4bc9e88ffb7ed32721b879bfa416573e8503le16f52569bc9/scikit_learn-0.19.1-cp36-c  
p36m-manylinux1_x86_64.whl (12.4MB)  
|████████████████████████████████████████| 12.4MB 10.7MB/s eta 0:00:01  
Installing collected packages: scikit-learn  
Successfully installed scikit-learn-0.19.1
```

Pip install the customized transformer **MyLabelEncoder**.

In [4]:

```
import sklearn
print(sklearn.__version__)
0.20.3
```

In [3]:

```
!pip install --user scikit-learn==0.19.1
Collecting scikit-learn==0.19.1
  Downloading https://files.pythonhosted.org/packages/3d/2d/9fbcb7baa5f44bc9e80ff87ed32721b879bfa416573e85031e16f52569bc9/scikit_learn-0.19.1-cp36-cp36m-manylinux1_x86_64.whl (12.4MB)
    #####
    12.4MB 10.7MB/s eta 0:00:01
Installing collected packages: scikit-learn
Successfully installed scikit-learn-0.19.1
```

In [4]:

```
!pip install /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz
Processing /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz
Building wheels for collected packages: MyLabelEncoder
  Building wheel for MyLabelEncoder (setup.py) ... done
    Created wheel for MyLabelEncoder: filename=MyLabelEncoder-1.2.0.401.post202001102058-cp36-none-any.whl size=1905 sha256=d6c65943acb3elfb7417c46fc853lc544b1e381cb940cb66f0de2d243dce2a6
    Stored in directory: /home/wsuser/.cache/pip/wheels/2b/69/0b/0dla542a512bea2988b3dcba44df82c09221a2c26ab00cba7c
Successfully built MyLabelEncoder
Installing collected packages: MyLabelEncoder
Successfully installed MyLabelEncoder-1.2.0.401.post202001102058
```

6. If your scikit learn package version is already in 0.19.1 version, skip this step.

Otherwise, exit the notebook to restart the kernel to let the new the scikit learn package version to take effect in the notebook session.

Exit out of the notebook by clicking on your project name to leave the page.

In [5]:

```
import sklearn
print(sklearn.__version__)
0.20.3
```

In **Assets** page, **Notebooks** section, locate the ChurnScikit_CP4D_WMLz notebook.

The screenshot shows the 'Assets' tab selected in the navigation bar. In the 'Notebooks' section, the 'ChurnScikit_CP4D_WMLz' notebook is highlighted with an orange border. The notebook details are shown below:

NAME	SHARED	SCHEDULED	STATUS	LANGUAGE	LAST EDITOR	LAST MODIFIED	ACTIONS
ChurnScikit_CP4D_WMLz	○		Python 3.6	ctp	16 Jan 2020	Stop Kernel	

Under **Action**, click on it to **Stop Kernel**.

IBM Cloud Pak for Data

All

Search

My Projects > wmlz-IMLz_HOL

Launch IDE Add to project

Overview Assets Environments Jobs Access Control Settings

What assets are you looking for?

▼ Data assets

0 asset selected.

<input type="checkbox"/>	NAME	TYPE	CREATED BY	LAST MODIFIED	ACTIONS
<input type="checkbox"/>	CSV customers.csv	Data Asset	ctp	16 Jan 2020, 11:14:24 am	View
<input type="checkbox"/>	86 MyLabelEncoder-1.2.0.401.post201912301918.tar.gz	Data Asset	ctp	16 Jan 2020, 11:14:02 am	View

▼ Notebooks

NAME	SHARED	SCHEDULED	STATUS	LANGUAGE	LAST EDITOR	LAST MODIFIED	ACTIONS
ChurnScikit_CP4D_WMLz				Python 3.6	ctp	16 Jan 2020	View Edit Stop Kernel Delete

Once the kernel is stopped, go back into the **ChurnScikit_CP4D_WMLz** notebook to continue.

IBM Cloud Pak for Data

My Projects > wmlz-IMLz_HOL

Overview Assets Environments Jobs Access Control Settings

What assets are you looking for?

Data assets

0 asset selected.

<input type="checkbox"/>	NAME	TYPE	CREATED BY	LAST MODIFIED	ACTIONS
<input type="checkbox"/>	CSV customers.csv	Data Asset	ctp	16 Jan 2020, 11:14:24 am	
<input type="checkbox"/>	MyLabelEncoder-1.2.0.401.post201912301918.tar.gz	Data Asset	ctp	16 Jan 2020, 11:14:02 am	

Notebooks

New notebook

NAME	SHARED	SCHEDULED	STATUS	LANGUAGE	LAST EDITOR	LAST MODIFIED	ACTIONS
ChurnScikit_CP4D_WMLz				Python 3.6	ctp	16 Jan 2020	

Enable the notebook in edit mode for continuous notebook execution.

IBM Cloud Pak for Data

My Projects > wmlz-IMLz_HOL > ChurnScikit_CP4D_WMLz

Edit

In [5]: `import sklearn
print(sklearn.__version__)`

0.20.3

Lets make sure the python scikit learn package shows 0.19.1 version.

The screenshot shows a Jupyter Notebook interface within the IBM Cloud Pak for Data environment. The top navigation bar includes 'IBM Cloud Pak for Data', 'All', 'Search', and various icons for project management and notifications. The current project path is 'My Projects > wmlz-IMLz_HOL > ChurnScikit_CP4D_WMLz'. The toolbar below has options like File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and nbdiff. A status bar indicates 'Not Trusted | Python 3.6'.

In this Notebook we shall create a Machine Learning Model using Scikit Learn 0.19

There are several different approaches and frameworks for predicting the likelihood of a customer to churn. In this notebook, we illustrate how scikit learn can be used for this purpose.

```
In [1]: import sklearn  
print(sklearn.__version__)  
0.19.1
```

— 7. Lets continue on to execute the notebook cell **one by one**.

Import numpy package.

Load the training data **customer.csv** and split training data.

IBM Cloud Pak for Data All Search

My Projects > wmlz-IMLz_HOL > ChurnScikit_CP4D_WMLz

File Edit View Insert Cell Kernel Widgets Help Not Trusted | Python 3.6

File Edit View Insert Cell Kernel Widgets Help nbdiff

```
Collecting scikit-learn==0.19.1
  Downloading https://files.pythonhosted.org/packages/3d/2d/9fbc7baa5f44bc9e88ffb7ed32721b879bfa416573e85031e16f52569bc9/scikit_learn-0.19.1-cp36-cp36m-manylinux1_x86_64.whl (12.4MB)
    [########################################| 12.4MB 5.2MB/s eta 0:00:01
Installing collected packages: scikit-learn
Successfully installed scikit-learn-0.19.1
```

In [4]: `!pip install /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz`

```
Processing /project_data/data_asset/MyLabelEncoder-1.2.0.401.post201912301918.tar.gz
Building wheels for collected packages: MyLabelEncoder
  Building wheel for MyLabelEncoder (setup.py) ... done
    Created wheel for MyLabelEncoder: filename=MyLabelEncoder-1.2.0.401.post202001161959-cp36-none-any.whl size=1906 sha256=724c8b51255a395b1701c0c7d0eb350b1b0bb9b95db52f20438668e11c95e2b24
      Stored in directory: /home/wsuser/.cache/pip/wheels/2b/69/0b/0dla542a512bea2988b3dcba44df82c09221a2c26ab00cba7c
Successfully built MyLabelEncoder
Installing collected packages: MyLabelEncoder
Successfully installed MyLabelEncoder-1.2.0.401.post202001161959
```

In [2]: `import os
import numpy as np`

Next, we read in a dataset that we will use to develop a Machine Learning model.

We can read the data here in various ways. We are showing here how to read data from a CSV file.

In [3]: `import pandas as pd
df_data_1 = pd.read_csv('/project_data/data_asset/customers.csv')
df_data_1.head()`

Out[3]:

ID	LONGDISTANCE	INTERNATIONAL	LOCAL	DROPPED	PAYMETHOD	LOCALBILLTYPE	LONGDISTANCEBILLTYPE	USAGE	RATEPLAN	CHURN	GENDER	STATUS	CHILDREN	ESTINCOME	CAI
0	1	23	0	206	0	CC	Budget	Intl_discount	229	3	T	F	S	1	38000.00
1	6	29	0	45	0	CH	FreeLocal	Standard	75	2	F	M	M	2	29616.00
2	8	24	0	22	0	CC	FreeLocal	Standard	47	3	F	M	M	0	19732.80
3	11	26	0	32	1	CC	Budget	Standard	59	1	F	M	S	2	96.33
4	17	12	0	46	4	CC	FreeLocal	Standard	58	1	F	M	M	2	53010.80

Continue on the feature engineering work for model development.

IBM Cloud Pak for Data All Search

My Projects > forMaggie > ChurnScikit_CP4D_WMLz

File Edit View Insert Cell Kernel Widgets Help Not Trusted | Python 3.6 O

In [111]: `import os
import numpy as np`

Next, we read in a dataset that we will use to develop a Machine Learning model.

We can read the data here in various ways. We are showing here how to read data from a CSV file.

In [112]: `import pandas as pd
df_data_1 = pd.read_csv('/project_data/data_asset/customers.csv')
df_data_1.head()`

Out[112]:

	ID	LONGDISTANCE	INTERNATIONAL	LOCAL	DROPPED	PAYMETHOD	LOCALBILLTYPE	LONGDISTANCEBILLTYPE	USAGE	RATEPLAN	CHURN	GENDER	STATUS	CHILDREN
0	1	23	0	206	0	CC	Budget	Intl_discount	229	3	T	F	S	
1	6	29	0	45	0	CH	FreeLocal	Standard	75	2	F	M	M	
2	8	24	0	22	0	CC	FreeLocal	Standard	47	3	F	M	M	
3	11	26	0	32	1	CC	Budget	Standard	59	1	F	M	S	
4	17	12	0	46	4	CC	FreeLocal	Standard	58	1	F	M	M	

In [113]: `cmergedDf = df_data_1.copy()`

In [114]: `# drop the ID field
cmergedDf.drop(['ID'], axis=1, inplace=True)`

In [115]: `cmergedDf.head()`

Out[115]:

	LONGDISTANCE	INTERNATIONAL	LOCAL	DROPPED	PAYMETHOD	LOCALBILLTYPE	LONGDISTANCEBILLTYPE	USAGE	RATEPLAN	CHURN	GENDER	STATUS	CHILDREN
0	23	0	206	0	CC	Budget	Intl_discount	229	3	T	F	S	
1	29	0	45	0	CH	FreeLocal	Standard	75	2	F	M	M	
2	24	0	22	0	CC	FreeLocal	Standard	47	3	F	M	M	
3	26	0	32	1	CC	Budget	Standard	59	1	F	M	S	
4	12	0	46	4	CC	FreeLocal	Standard	58	1	F	M	M	

Split the data for training and testing.

The screenshot shows a Jupyter Notebook interface within the IBM Cloud Pak for Data environment. The top navigation bar includes 'IBM Cloud Pak for Data', 'All', 'Search', and various icons for navigation and project management. The current project path is 'My Projects > forMaggie > ChurnScikit_CP4D_WMLz'. The toolbar below the menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, and a status indicator 'Not Trusted | Python 3.6 O'.

```

In [116]: cmergedDf.columns.tolist()
Out[116]: ['LONGDISTANCE',
 'INTERNATIONAL',
 'LOCAL',
 'DROPPED',
 'PAYMETHOD',
 'LOCALBILLTYPE',
 'LONGDISTANCEBILLTYPE',
 'USAGE',
 'RATEPLAN',
 'CHURN',
 'GENDER',
 'STATUS',
 'CHILDREN',
 'ESTINCOME',
 'CAROWNER',
 'AGE']

In [117]: from sklearn.model_selection import train_test_split
y = cmergedDf['CHURN']
X = cmergedDf.drop('CHURN', axis=1)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2)

In [118]: from sklearn.pipeline import Pipeline
# from sklearn.preprocessing import StandardScaler, OneHotEncoder, LabelEncoder
from sklearn.preprocessing import LabelEncoder

#categorical_transformer = Pipeline(steps=[('onehot', OneHotEncoder(handle_unknown='ignore'))])
categorical_features = cmergedDf.select_dtypes(include=['object']).drop(['CHURN'], axis=1).columns

In [119]: cat_indices = [cmergedDf.columns.get_loc(c) for c in categorical_features]

In [120]: df1 = cmergedDf.copy()

In [121]: df1.head()
Out[121]:    LONGDISTANCE INTERNATIONAL LOCAL DROPPED PAYMETHOD LOCALBILLTYPE LONGDISTANCEBILLTYPE USAGE RATEPLAN CHURN GENDER STATUS CHILDREN

```

8. Use RandomForestClassifier as the algorithm for the pipeline training.

IBM Cloud Pak for Data All Search

My Projects > forMaggie > ChurnScikit_CPD_WMLz

File Edit View Insert Cell Kernel Widgets Help Not Trusted | Python 3.6 O

In [124]: `from sklearn.ensemble import RandomForestClassifier
rf = Pipeline(steps=[('cat',categorical_transformer),
 ('classifier', RandomForestClassifier())])`

In [125]: `print(rf._final_estimator)`

```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
                       max_depth=None, max_features='auto', max_leaf_nodes=None,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, n_estimators=10, n_jobs=1,
                       oob_score=False, random_state=None, verbose=0,
                       warm_start=False)
```

In [126]: `rf.fit(X_train, y_train)`

Out[126]: `Pipeline(memory=None,
steps=[('cat', Pipeline(memory=None,
steps=[('encoder', <MyLabelEncoder.MyLabelEncoder object at 0x7ff6ba428f28>))), ('classifier', RandomForestClassifier(bootstr...`

In [127]: `y_pred = rf.predict(X_test)`

In [128]: `print(y_pred)`

```
'F' 'F' 'F' 'T' 'F'  
'F' 'F' 'T' 'F' 'F' 'F' 'F' 'F' 'F' 'F' 'F' 'F' 'T' 'F' 'F' 'T' 'F' 'F' 'T'  
'T' 'T' 'F' 'T' 'F' 'F' 'F' 'T' 'F' 'F' 'T' 'F' 'F' 'T' 'F' 'T' 'F' 'F'  
'F' 'F' 'F' 'F' 'T' 'F' 'F' 'F' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'F'  
'T' 'T' 'T' 'F' 'T' 'F' 'F' 'T' 'T' 'F' 'F' 'F' 'T' 'F' 'T' 'T' 'T' 'F'  
'T' 'F' 'T' 'T' 'F' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F'  
'T' 'F' 'T' 'T' 'F' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F' 'T' 'F'  
'F' 'F' 'F' 'T' 'F' 'F' 'F' 'T' 'F' 'F' 'T' 'F' 'F' 'F' 'F' 'F' 'T' 'F'  
'F' 'F' 'F' 'T' 'F' 'F' 'T' 'F' 'T' 'F' 'F' 'T' 'F' 'F' 'F' 'T' 'F' 'F'  
'T' 'T' 'F' 'F' 'T' 'F' 'T' 'F' 'T' 'T' 'T' 'F' 'F' 'F' 'T' 'F' 'F' 'F'  
'T' 'F' 'T' 'F' 'F' 'F' 'F' 'F' 'F' 'T' 'F' 'T' 'F' 'F' 'F' 'F' 'F' 'T'
```

Note, this is a deprecation warning. Nothing to worry. Just continue.

In [15]: `from sklearn.ensemble import RandomForestClassifier
rf = Pipeline(steps=[('cat',categorical_transformer),
 ('classifier', RandomForestClassifier())])`

/home/wsuser/.local/lib/python3.6/site-packages/sklearn/ensemble/weight_boosting.py:29: DeprecationWarning: numpy.core.umath_tests is an internal Numpy module and should not be imported. It will be removed in a future NumPy release.
from numpy.core.umath_tests import innerld

- 9. Last part to import **WatsonMachineLearningAPIClient** package, use default space id to save the model.

Pip install **watson-machine-learning-client-V4** package if it is not there.

```
In [22]: pip install watson-machine-learning-client-V4
Requirement already satisfied: watson-machine-learning-client-V4 in /cc-home/_global/python-3.6 (1.0.55)
Requirement already satisfied: requests in /opt/conda/envs/Python-3.6/lib/python3.6/site-packages (from watson-machine-learning-client-V4) (2.21.0)
Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.6/lib/python3.6/site-packages (from watson-machine-learning-client-V4) (1.24.1)
```

Import **WatsonMachineLearningAPIClient** package.

```
IBM Cloud Pak for Data All Search
My Projects > wmlz-IMLz_HOL > ChurnScikit_CP4D_WMLz
File Edit View Insert Cell Kernel Widgets Help Trusted | Python 3.6 O
In [23]: from watson_machine_learning_client import WatsonMachineLearningAPIClient
In [24]: token = os.environ['USER_ACCESS_TOKEN']
wml_credentials = {
    "token": token,
    "instance_id": "wml local",
    "url": os.environ['RUNTIME_ENV_APXS_URL'],
    "version": "2.5.0"
}
In [25]: client = WatsonMachineLearningAPIClient(wml_credentials)
```

I M P O R T A N T : Update the <cp4d_login_userid> to your assigned HOL cp4d userid.

```
In [28]: your_HOL_USERID = "<cp4d_login_userid>"
space_name="Space@CP4D_By_" + your_HOL_USERID
space_id = client.spaces.store(meta_props=(client.spaces.ConfigurationMetaNames.NAME: space_name))["metadata"]["guid"]
```

Now save your trained model.

Your CP4D Space name : **Space@CP4D_By_<your_cp4d_login_userid>**
 Your CP4D Model name : **Skmodel-trained@CP4D_By_<your_**

cp4d login userid>

The screenshot shows a Jupyter Notebook interface within the IBM Cloud Pak for Data environment. The notebook has the following structure:

- In [79]:** `from watson_machine_learning_client import WatsonMachineLearningAPIClient`
- In [80]:** `token = os.environ['USER_ACCESS_TOKEN']`
`wml_credentials = {`
` "token": token,
 "instance_id": "wml_local",
 "url": os.environ['RUNTIME_ENV_APXS_URL'],
 "version": "2.5.0"`
`}`
- In [81]:** `client = WatsonMachineLearningAPIClient(wml_credentials)`
- In [82]:** `# Obtain the UID of your space`
`def guid_from_space_name(client, space_name):`
` instance_details = client.service_instance.get_details()`
` space = client.spaces.get_details()`
` return(next(item for item in space['resources'] if item['entity']['name'] == space_name)['metadata']['guid'])`
- In [83]:** `your_HOL_USERID = "HOLUserid2"`

A yellow box highlights the following code:
`space_name="Space@CP4D_By_" + your_HOL_USERID`

`space_id = client.spaces.store(meta_props=(client.spaces.ConfigurationMetaNames.NAME: space_name))["metadata"]["guid"]`
- In [84]:** `client.set.default_space(space_id)`
Out[84]: 'SUCCESS'
- In [85]:** `metadata = {`
` client.repository.ModelMetaNames.NAME:"Skmodel-trained@CP4D_By_"+your_HOL_USERID,
` client.repository.ModelMetaNames.TYPE: "scikit-learn_0.19",
` client.repository.ModelMetaNames.RUNTIME_UID: "scikit-learn_0.19-py3.6",
` client.repository.ModelMetaNames.SPACE_UID: space_id`
`}`
- In [86]:** `model_artifact = client.repository.store_model(rf, meta_props=metadata, training_data=X_train, training_target=y_train)`

A yellow box highlights the following print statements:
`print ("Your CP4D Space name: " + space_name)`
`print ("Your CP4D Model name: " + "Skmodel-trained@CP4D_By_"+your_HOL_USERID)`
`print ("Your model is saved successfully")`

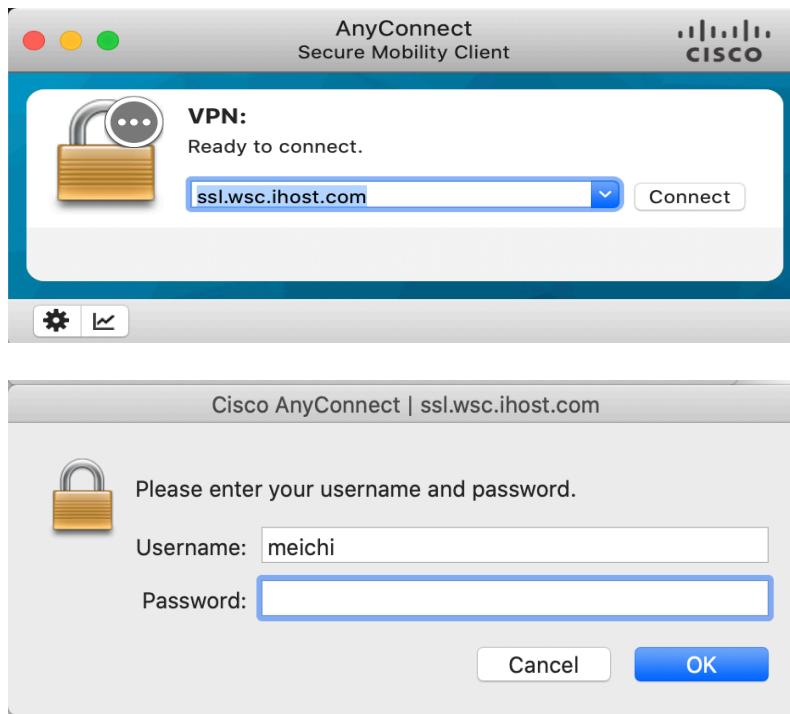
The output shows:
Your CP4D Space name: Space@CP4D_By_HOLUserid2
Your CP4D Model name: Skmodel-trained@CP4D_By_HOLUserid2
Your model is saved successfully

You complete the first part of the lab to get the model trained and saved successfully in CP4D.

[Log in to IBM Watson Machine Learning for z/OS](#)

The URL and authentication credentials for the WMLz Web UI are provided on a separate worksheet. Contact the lab instructor if you did not receive a worksheet.

- 10. Before you log in to IBM Watson Machine Learning for z/OS Web UI, you need to authenticate through **VPN** first. Open Cisco AnyConnect client and provide <wmlz_vpn_userid> & <wmlz_vpn_password> to get through VPN.



- 11. Start the Chrome or Firefox browser, and enter the URL assigned to you, e.g. <wmlz_login_url>. For the first-time logon, you are likely to be prompted with a message regarding the security of the page you are visiting. Click "Advance" and accept the exception and proceed with the intended URL.



Your connection is not private

Attackers might be trying to steal your information from **mlzdl03** (for example, passwords, messages, or credit cards). [Learn more](#)

NET::ERR_CERT_AUTHORITY_INVALID

- Help improve Safe Browsing by sending some [system information and page content](#) to Google.
[Privacy policy](#)

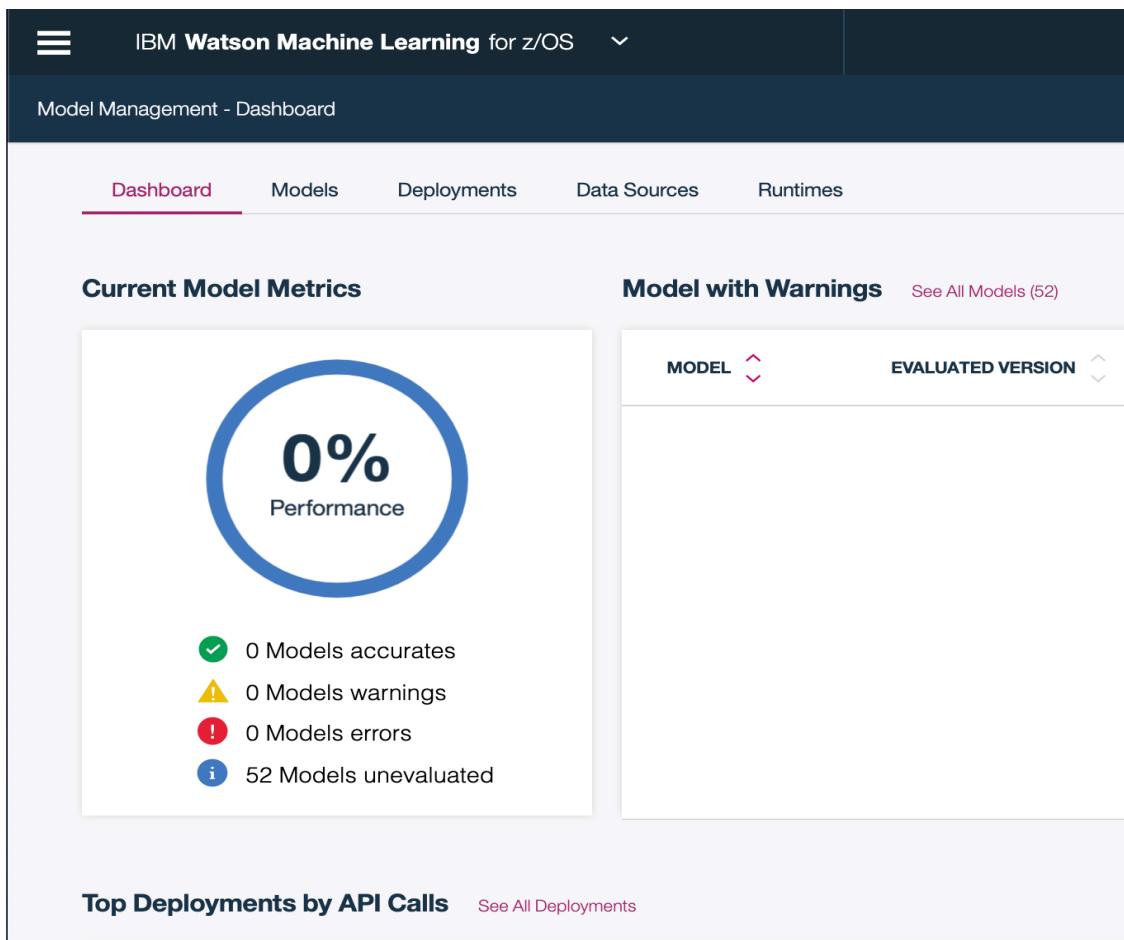
[Advanced](#)

[Back to safety](#)

- 12. Enter the <wmlz_login_userid> and <wmlz_login_password> credentials from your lab worksheet.

The screenshot shows a web browser window with a dark blue header bar. On the left side of the header is the IBM Watson Machine Learning logo, which consists of a stylized brain icon made of hexagons. To the right of the logo, the text "IBM Watson Machine Learning for z/OS" is displayed in white. Below the header, the main content area has a white background. At the top center of this area, the text "IBM Watson Machine Learning for z/OS" is printed in a small, dark font. Below this, the word "Sign in" is centered in a bold, dark font. Underneath "Sign in", there are two input fields: one labeled "Username" and another labeled "Password", both preceded by a placeholder text "Enter your credentials". At the bottom center of the form is a rectangular "Sign In" button with a thin black border and a light gray background. The overall interface is clean and modern.

You should be presented with the WMLz Model Management dashboard page



The screenshot shows the IBM Watson Machine Learning for z/OS Model Management dashboard. At the top, there's a navigation bar with a menu icon, the text "IBM Watson Machine Learning for z/OS", and a dropdown arrow. Below the navigation bar, the title "Model Management - Dashboard" is displayed. A horizontal menu bar follows, with "Dashboard" underlined in pink, and other options: "Models", "Deployments", "Data Sources", and "Runtimes".

The main content area is divided into three sections:

- Current Model Metrics**: A large circular gauge showing "0%" Performance.
- Model with Warnings**: A table header with columns "MODEL" and "EVALUATED VERSION". It lists 52 unevaluated models.
- Top Deployments by API Calls**: A section with a link "See All Deployments".

2. Model Management and Deployment in WMLz

In this part of the Lab, you will learn as a z/OS System Administrator, how you can use WMLz to view the details of the model that your Data Scientist has created, manage the deployment of the model on your production environment, schedule the model evaluation and test the model using online RESTful API and work with your Application Developer to use the model for scoring and prediction.

Section 1. Dashboard

- 1. The “**Model Management Dashboard**” shows the statistical information of IBM Machine Learning platform, including the model performance and overall status.

The screenshot displays the IBM Watson Machine Learning for z/OS Model Management - Dashboard. It features three main sections: "Current Model Metrics" (a large blue circle showing 0% Performance with a legend for accuracy, warnings, errors, and unevaluated models), "Model with Warnings" (a table listing five models with their evaluated versions, publishers, last evaluation dates, and warning counts), and "Top Deployments by API Calls" (a table listing two deployments with their deployment dates, models, deployers, and API call counts).

MODEL	EVALUATED VERSION	PUBLISHER	LAST EVALUATION	WARNINGS
IML_NB_Sanity_201 9-01-31...	v1	wmlz11	Jan 31, 2019 11:59 AM	1
IML_VMB_XJ_Regression 19-01-20...	v1	wmlz11	Feb 4, 2019 5:37 PM	2
IML_VMB_Sanity_20 19-01-20...	v1	wmlz11	Feb 4, 2019 3:20 PM	1
IML_VMB_Sanity_20 19-01-23...	v1	wmlz11	Feb 5, 2019 8:22 AM	2
IML_NB_Sanity_201 9-01-20...	v2	wmlz11	Feb 4, 2019 3:25 PM	2

DEPLOYMENT	DATE DEPLOYED	MODEL	DEPLOYER	API CALLS
jason_test_test	Jan 31, 2019 6:07 AM	jason_test	wmlz11	3
NB-XGBClassifierPipelineG...	Jan 30, 2019 8:41 AM	IML_NB_Sanity_2019-01-30...	wmlz11	2

Section 2. Model Management

- 2. Click the “**Models**” tab. The “**Models**” page is where you list and manage the Machine Learning models that have been created and exist in your environment. You can view the model details and model versions, retrain, delete and create deployment for a certain model. It also provides a filter to help you locate a specific model.

MODEL NAME	PUBLISHER	DATE PUBLISHED	MODEL TYPE	LATEST VERSION	EVALUATOR	ACTIONS
jerry-smartloan	jerry	Feb 5, 2019 11:45 AM	PMML	v1	—	⋮

- 3. Click on “**Import model**” to import models that are trained outside of WMLz. You see import From File or **From Cloud Pak 4 Data** option.
Choose **From Cloud Pak 4 Data** option, fill in the CP4D host, CP4D port, username, password.
Note, if the CP4D environment is listening on port other than 443, provide both CP4D host and port values in the **CP4D Host & CP4D Port** fields, such as <services-uscentral.skytap.com & 13441>

IBM Watson Machine Learning for z/OS

Published Models > Import Model

From File **From Cloud Pak for Data**

CP4D Host *
mlpattern.184.170.232.151.nip.io

CP4D Port
443

User Name *
ctp

Password *

Deployment space *
Select deployment space

Supported model name * ⓘ
Select model name

Cancel **Import model**

The screenshot shows the 'Import Model' interface. The 'From Cloud Pak for Data' tab is active. The 'CP4D Host' field contains 'mlpattern.184.170.232.151.nip.io'. The 'CP4D Port' field contains '443'. The 'User Name' field contains 'ctp'. The 'Password' field contains '*****'. The 'Deployment space' dropdown is open, showing 'Select deployment space'. The 'Supported model name' dropdown is open, showing 'Select model name'. At the bottom right, there are 'Cancel' and 'Import model' buttons.

- 4. Once it is connected to the CP4D instance, the deployment space drop-down has a list of spaces that is available for you to choose. Choose **Space@CP4D_By_<your_cp4d_login_userid>** from the list.

IBM Watson Machine Learning for z/OS

Published Models > Import Model

CP4D Host *	mlpattern.184.170.232.151.nip.io	48
CP4D Port	443	2
User Name *	ctp	47
Password *	*****	44
Deployment space *	Select deployment space <ul style="list-style-type: none"> deplieques Space@CP4D_By_HOLUserid2 (highlighted) Space@CP4D_By_HOLUserid2 RaanonDeployments ACG Deployments Intelligent-Maintenance-Project-Demo-Deployments DusanM 	
	cancel	Import model

- Once **Space@CP4D_By_<your_cp4d_login_userid>** deployment space is selected, go to the **Model name** drop-down list. Choose the mode **Skmodel-trained@CP4D_By_<your_cp4d_login_userid>** model to be imported.

IBM Watson Machine Learning for z/OS

Published Models > Import Model

From File **From Cloud Pak for Data**

CP4D Host *
mlpattern.184.170.232.151.nip.io

48

CP4D Port
443

2

User Name *
ctp

47

Password *

44

Deployment space *
Space@CP4D_By_HOLUserid2

▼

Supported model name * i
Select model name

Skmodel-trained@CP4D_By_HOLUserid2

Skmodel-trained@CP4D_By_HOLUserid2
Cancer Import model

- 6. Once you import the model, it takes you back to the Mode list page where you can see your imported model appear in the list.

MODEL NAME	PUBLISHER	DATE PUBLISHED	MODEL TYPE	LATEST VERSION	EVALUATOR	ACTIONS
June22	jamespakk	Jan 14, 2020 11:47 AM	scikit-learn	v1	—	⋮
IMPORTED_June21_jamespakk_1579031205891	jamespakk	Jan 14, 2020 11:46 AM	scikit-learn	v1	—	⋮
IMPORTED_June21_jamespakk_1579031051134	jamespakk	Jan 14, 2020 11:44 AM	scikit-learn	v1	—	⋮
churn-scikit-trained@CP4D	mlin	Jan 10, 2020 10:26 PM	scikit-learn	v3	—	⋮
CarsModelScala-ByMaggie	mlin	Jan 7, 2020 11:49 AM	SparkML	v3	—	⋮
v210_scikit_test	jamespakk	Jan 2, 2020 2:41 PM	scikit-learn	v1	—	⋮
June21	mlztest	Dec 30, 2019 7:38 PM	scikit-learn	v1	—	⋮
churnQin-z-4	mlztest	Dec 20, 2019 11:02 AM	IBM SparkML	v1	—	⋮
June21_v210	mlztest	Dec 7, 2019 11:04 AM	scikit-learn	v1	—	⋮
importFromJames1202	mlin	Nov 26, 2019 2:40 PM	SparkML	v1	—	⋮

Section 3. Deployment Model to Scoring Server

As a System Administrator, you will need to deploy the model to your z/OS environment and test online. It may sound like a daunting task, but it can be accomplished easily in the WMLz framework:

7. Deploy the model

- Click on the models tab to show the models page. You should already be on this model list page.
- On the row where the model **Skmodel-trained@CP4D_By_<your_cp4d_login_userid>** is, click the actions menu and select “Deploy” button under “ACTIONS.”

You also have the option to deploy a model created by others.

MODEL NAME	PUBLISHER	DATE PUBLISHED	MODEL TYPE	LATEST VERSION	EVALUATOR	ACTIONS
jerry-smartloan	jerry	Feb 5, 2019 11:45 AM	PMML	v1	—	⋮

1 models in total

1 of 1 pages First View details Deploy Setup deployment Retrain Delete Publish to WML Export latest version

- 8. On the “**Create deployment**” page, enter the name of the deployment and select “**Online**” for the **Type**. Choose the scoring service whose name ends in “scoring-cp4d”, and then click the “**Create**” button to save.

Create deployment

Model Name
jerry-smartloan

Deployment name
jerry-smartloan-dep

Deployment type
Online

Engine
PMML

Model Version
1

Scoring Service
mlz16 (9.30.128.39:30163)

Cancel Create

Wait until the deployment completes successfully. Then locate your deployment under the “**Deployments**” page. The “**Deployments**” page is where you view the list of models that have been deployed to your z/OS environment for scoring and prediction. You can test the model here, manage the deployment and schedule evaluations to check the performance of the model on a regular basis.

The screenshot shows the 'Deployments' page of the IBM Watson Machine Learning for z/OS interface. The search bar at the top contains the text 'jerry'. The table below lists one deployment:

DEPLOYMENT NAME	DEPLOYER	MODEL NAME	SCORING SERVICE	TYPE	ENGINE	DATE DEPLOYED	NEXT EVALUATION	ACTIONS
jerry-smartloan-dep	jerry	jerry-smartloan v1	mlz16	online	PMML	Feb 5, 2019 11:52 AM	—	⋮

1 deployment in total

Click the “**View details**” button under “**ACTIONS**” to check the details of the deployment.

The screenshot shows the same 'Deployments' page as before, but with a red box highlighting the 'View details' button in the 'ACTIONS' column of the deployment row. A tooltip for this button is visible, listing several options: 'Schedule evaluation', 'Test API', 'Update', and 'Delete'.

Note the API details for the RESTful API provided by the scoring service of WMLz which allows your application to call the model for online scoring. In the next step, you will test this scoring API and the model online in the Web UI. If the test is successful, you can then have your application developer update the application to call this REST API. This allows you to implement online scoring on the same system as the transactions running under z/OS.

The screenshot shows the IBM Watson Machine Learning for z/OS interface. At the top, there's a navigation bar with a globe icon, the text "IBM Watson Machine Learning for z/OS", and a dropdown menu. Below the navigation bar, the page title is "Deployments > jerry-smartloan-dep - Overview".

Deployment Name: jerry-smartloan-dep

Scoring Endpoint: https://9.30.128.39:30163/ml/v2/scoring/online/cfcfaed4-be8a-4185-bd85-0c96fabe380

Online Feedback Endpoint: —

API Specification: API specification for scoring endpoint is available. [Download](#)

Publisher: jerry

Type: online

Scoring Service: miz16 (9.30.128.39:30163)

Date Deployed: Feb 5, 2019 11:52 AM

Engine: PMML

Number of Invocation: 0

Associated Model Name: jerry-smartloan

Next Evaluation Time: —

Average Elapsed Time: 0 ms

Request Header: See the [API documentation](#) for more details.

Model Schema

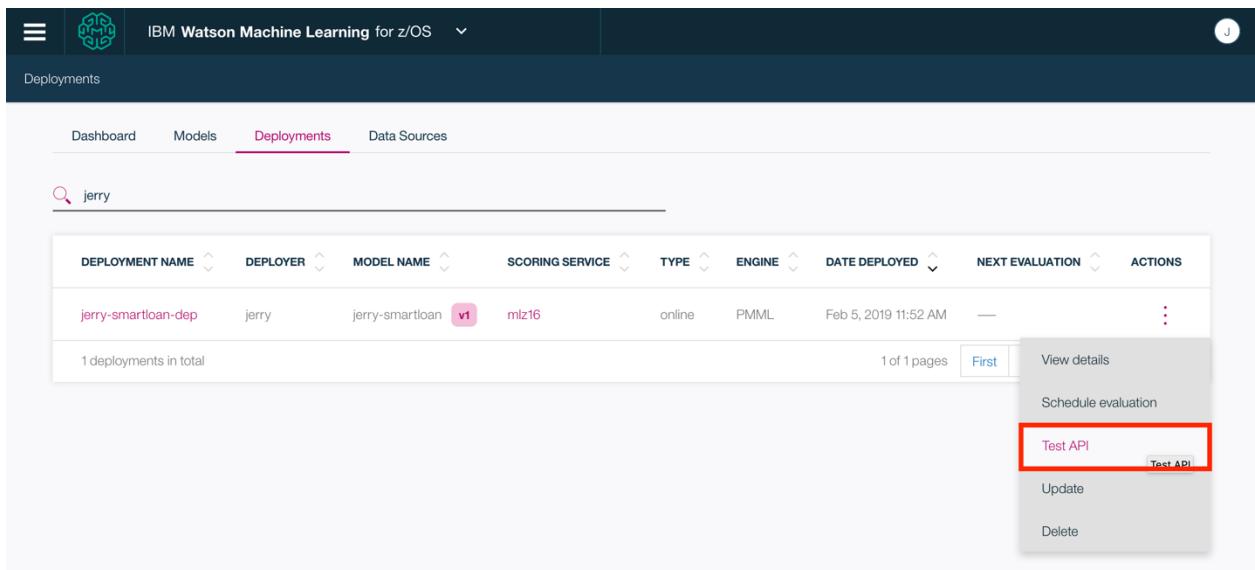
Input Schema			Output Schema		
NAME	TYPE	NULLABLE	NAME	TYPE	NULLABLE
dti	real	false	R_loan_status	string	false
home_ownership	string	false	R_loan_status	real	false
term	real	false	R_loan_status	string	false
total_current_balance	real	false	RP_charged_off	real	false
			RP_fully_paid	real	false

Evaluation Results

START TIME	END TIME	STATUS	RECORDS COUNT
no results found			

Test API

- 9. Go back to the “**Deployments**” page, click the “**Test API**” button under “**ACTIONS**”



The screenshot shows the IBM Watson Machine Learning for z/OS interface. The top navigation bar includes a menu icon, the product logo, and the text "IBM Watson Machine Learning for z/OS". Below the header, the word "Deployments" is highlighted in blue. The main content area has tabs for "Dashboard", "Models", "Deployments" (which is active), and "Data Sources". A search bar contains the text "jerry". The main table lists one deployment:

DEPLOYMENT NAME	DEPLOYER	MODEL NAME	SCORING SERVICE	TYPE	ENGINE	DATE DEPLOYED	NEXT EVALUATION	ACTIONS
jerry-smartloan-dep	jerry	jerry-smartloan v1	mlz16	online	PMML	Feb 5, 2019 11:52 AM	—	View details Schedule evaluation Test API Update Delete

Below the table, it says "1 deployments in total". On the right side of the table, there are buttons for "View details", "Schedule evaluation", "Test API" (which is highlighted with a red box), "Update", and "Delete".

- 10. On the “**Test API**” page, enter a record for values according to the schema of the input record of the model as below. Input values are case sensitive!

IBM Watson Machine Learning for z/OS

Deployments > Deployment: deployHOLuser2 > Test API

Input

	Table	JSON
RATEPLAN *	5	
GENDER *	M	
ESTINCOME *	7000	
STATUS *	M	
USAGE *	34	
CHILDREN *	1	
AGE *	23	

Clear **Submit**

Sample Input Record:

rateplan:	5
gender:	M
estincome:	7000
status:	M
usage:	34
children:	1
age:	23
dropped:	0
localbilltype:	FreeLocal
longdistance:	25
local:	86
international:	0
longdistancebilltype:	Standard
paymethod:	CH
carowner:	N

- 11. Click the “**Submit**” button to test the prediction. The result will be shown in “**Result**” area.

IBM Watson Machine Learning for z/OS

Deployments > Deployment: deployHOLuser2 > Test API

Input

Table JSON

RATEPLAN *
5

GENDER *
M

ESTINCOME *
7000

STATUS *
M

USAGE *
34

CHILDREN *
1

AGE *
23

Clear Submit

Result

```
[  
  {  
    "prediction": "T",  
    "probability": [  
      0.4,  
      0.6  
    ]  
  }  
]
```

IBM Watson Machine Learning for z/OS

Deployments > Deployment: deployHOLuser2 > Test API

Input

Table JSON

RATEPLAN *
5

GENDER *
M

ESTINCOME *
7000

STATUS *
M

USAGE *
34

CHILDREN *
5

AGE *
23

Clear Submit

Result

```
[{"prediction": "F", "probability": [0.7, 0.3]}]
```

You now complete the second part of the lab to get the CP4D trained model imported to WMLz, and deployed to WMLz scoring server, and tested a scoring call against the deployed model using WMLz!

We Value Your Feedback!

Don't forget to submit your session feedback! Your feedback is very important to us – we use it to continually improve the lab.