

## **Lab Center – Hands-on Lab**

**Session #3259**

**Session Title: Introduction to Data Science using Watson Studio**

**Lab-2: Deploy a Continuous Machine Learning Model using Watson Studio**

Bernard Beekman, IBM, [beekmanb@us.ibm.com](mailto:beekmanb@us.ibm.com)

Michael Cronk, IBM, [michael.cronk@ibm.com](mailto:michael.cronk@ibm.com)

## Table of Contents

Disclaimer.....	3
Introduction .....	5
Goals: .....	5
Step 1 Upload a New Data Asset.....	5
Step 2 Train, Compare, and Select a Machine Learning Model.....	8
Step 3 Set up Continuous Learning Model Capabilities .....	16
Step 4 Deploy a Machine Learning Model. ....	26
We Value Your Feedback! .....	33

## Disclaimer

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.

The development, release, and timing of any future features or functionality described for our products remains at our sole discretion I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results like those stated here.

Information in these presentations (including information relating to products that have not yet been announced by IBM) has been reviewed for accuracy as of the date of initial publication and could include unintentional technical or typographical errors. IBM shall have no responsibility to update this information. **This document is distributed "as is" without any warranty, either express or implied. In no event, shall IBM be liable for any damage arising from the use of this information, including but not limited to, loss of data, business interruption, loss of profit or loss of opportunity.** IBM products and services are warranted per the terms and conditions of the agreements under which they are provided.

IBM products are manufactured from new parts or new and used parts.

In some cases, a product may not be new and may have been previously installed. Regardless, our warranty terms apply."

**Any statements regarding IBM's future direction, intent or product plans are subject to change or withdrawal without notice.**

Performance data contained herein was generally obtained in controlled, isolated environments. Customer examples are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual performance, cost, savings or other results in other operating environments may vary.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business.

Workshops, sessions and associated materials may have been prepared by independent session speakers, and do not necessarily reflect the views of IBM. All materials and discussions are provided for informational purposes only, and are neither intended to, nor shall constitute legal or other guidance or advice to any individual participant or their specific situation.

It is the customer's responsibility to insure its own compliance with legal requirements and to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may

need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer follows any law.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products about this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. IBM does not warrant the quality of any third-party products, or the ability of any such third-party products to interoperate with IBM's products. **IBM expressly disclaims all warranties, expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for a purpose.**

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents, copyrights, trademarks or other intellectual property right.

IBM, the IBM logo, ibm.com and [names of other referenced IBM products and services used in the presentation] are trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at: [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml).

© 2019 International Business Machines Corporation. No part of this document may be reproduced or transmitted in any form without written permission from IBM.

**U.S. Government Users Restricted Rights — use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.**

# Introduction

In this lab, you will be using 2017 Chicago building data to make Chicago a safer place by building a model to predict when buildings are likely to fail inspection. You can then use the model to find which buildings are most dangerous and attend to those first. Continuous learning will be set up to monitor the model performance and adjust if necessary.

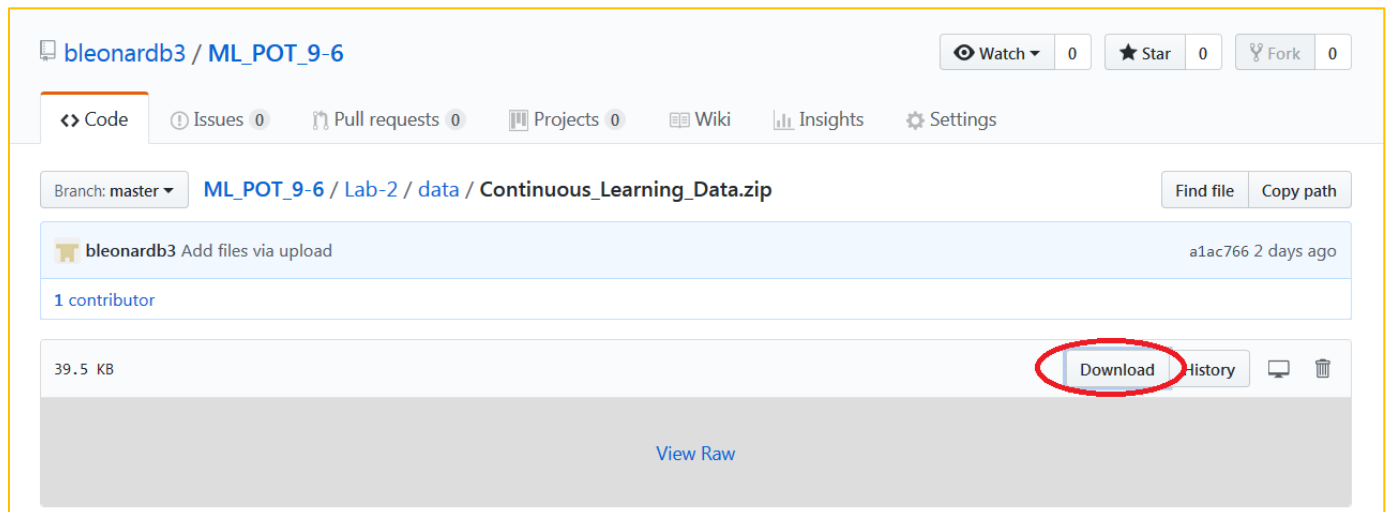
## Goals:

- Upload data to your Watson Studio project.
- Train, compare, and select a machine learning model.
- Set up continuous learning capabilities.
- Deploy a machine learning model.

## Step 1 Upload a New Data Asset.

Before we build our models, we need to load data into our project.

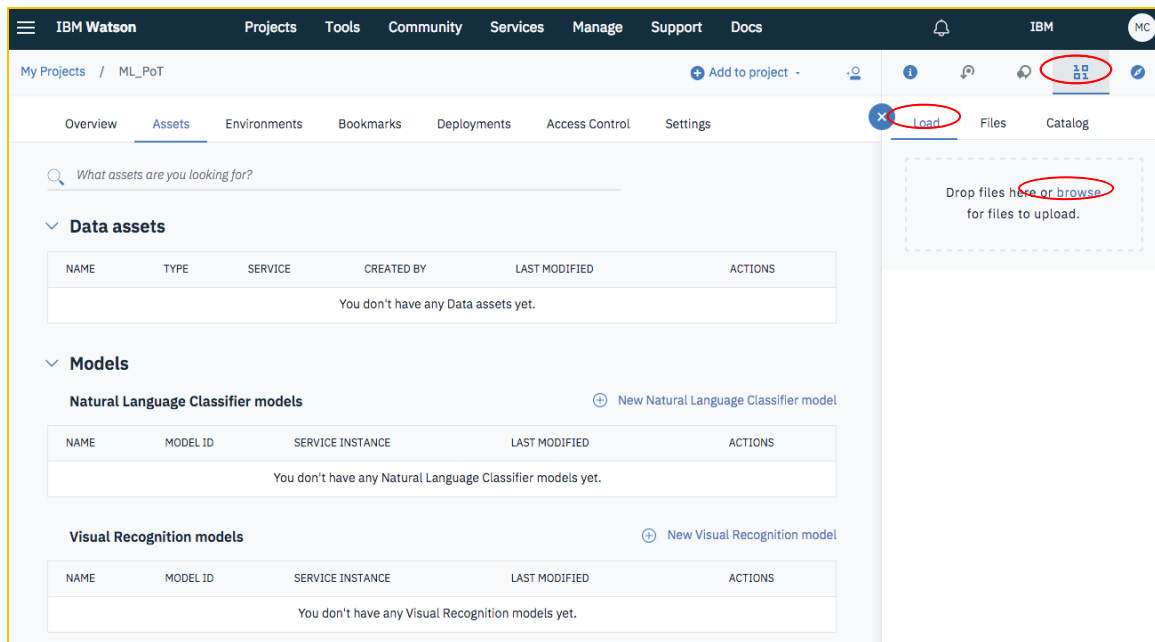
1. Click on [Building Data](#)
2. Click on Download.



3. Save the zip file to your desktop and unzip the contents. This zip file contains data for building inspections for each month. We will begin by training our model for the month of September and then add October and November data to show how we can continuously adjust over time.
4. Return to your assets page. From Watson Studio, you can click on the Projects

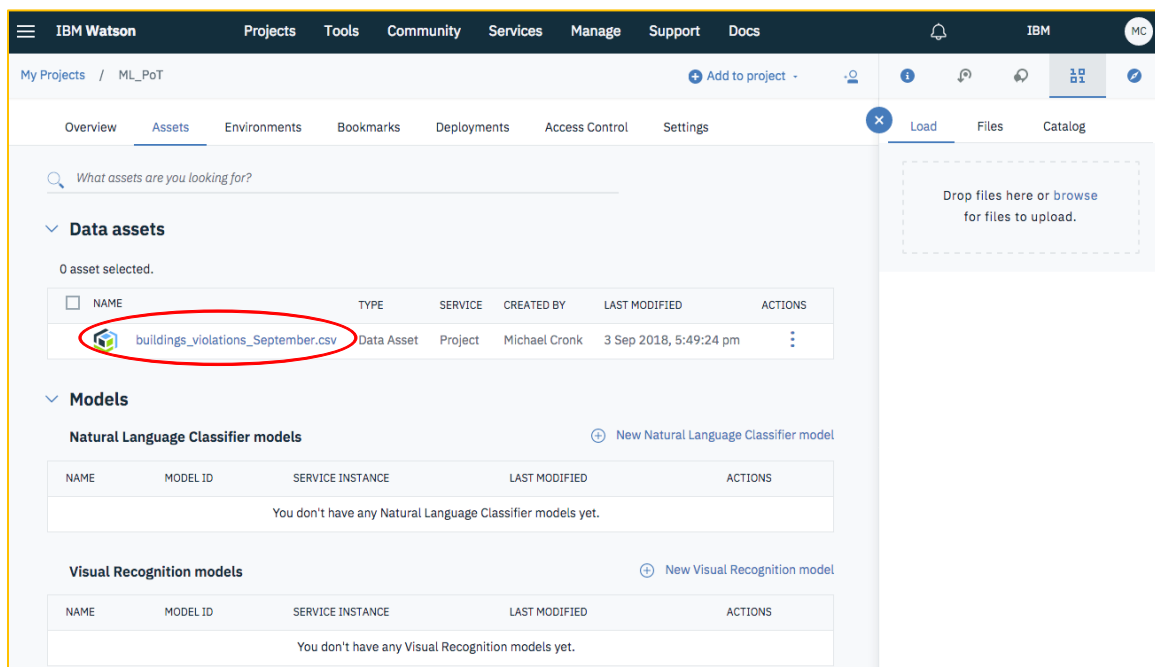
dropdown on the top navbar and then click on the name of your project.

5. In the top right of the screen, click the blue icon with 1's and 0's. This will open the data pallet.
6. Click on Load, browse, select the building\_violations\_September.csv file and click open.



The CSV file should now be listed under “Data assets.” It is now accessible by the Watson Studio modeling tools and applications.

7. Click on building\_violations\_September.csv under Data assets.



After clicking on building\_violations\_September.csv, you are brought to a data view. Once you are satisfied that this is the data you want, click on your project name to return to your project's assets.

The screenshot shows the IBM Watson ML PoT interface. The breadcrumb navigation path is 'My Projects' / **ML\_PoT** / 'buildings\_violations\_September.csv'. The 'ML\_PoT' breadcrumb is circled in red. Below the breadcrumb, there are tabs for 'Preview', 'Profile', and 'Lineage'. The 'Preview' tab is active, showing a table with 8 columns and 999 rows. The columns are: INSPECTION\_STAT..., VIOLATION\_CO..., VIOLATION\_STAT..., INSPECTION\_CATEGO..., PROPERTY\_GRO..., LONGITUDE, and LATITUDE. The table contains 15 rows of data, all with 'FAILED' inspection status. A right-hand panel displays details for the selected data asset 'buildings\_violations\_September.csv', including its description (none available), tags (none available), and metadata (Added: 09:49 PM UTC, 2018/09/03, Size: 71.679 KB). A 'Let's talk' button is located at the bottom right of the interface.

INSPECTION_STAT...	VIOLATION_CO...	VIOLATION_STAT...	INSPECTION_CATEGO...	PROPERTY_GRO...	LONGITUDE	LATITUDE
Type: String	Type: String	Type: String	Type: String	Type: String	Type: String	Type: String
FAILED	CN063014	OPEN	COMPLAINT	small	-87.691078	42.00245
FAILED	EL0086	OPEN	COMPLAINT	small	-87.714074	41.95654
FAILED	EL0086	OPEN	COMPLAINT	small	-87.633451	41.75931
FAILED	CN197087	OPEN	COMPLAINT	small	-87.795168	41.95265
FAILED	CN190019	OPEN	COMPLAINT	small	-87.769105	41.78514
FAILED	NC2022	OPEN	COMPLAINT	small	-87.712142	41.84204
FAILED	CN070014	OPEN	COMPLAINT	small	-87.713576	41.73967
FAILED	CN073024	COMPLIED	COMPLAINT	small	-87.727869	41.86917
FAILED	NC2022	OPEN	COMPLAINT	small	-87.830633	41.94983
FAILED	CN070034	OPEN	PERIODIC	small	-87.543687	41.73027
FAILED	PL157017	OPEN	COMPLAINT	small	-87.657112	41.79244
FAILED	PL237020	OPEN	COMPLAINT	small	-87.726443	41.90246
FAILED	VT1010	OPEN	PERMIT	small	-87.65453	41.92095
FAILED	EL0024	OPEN	COMPLAINT	small	-87.617871	41.80404
FAILED	PL194029	OPEN	COMPLAINT	small	-87.731726	41.92431
FAILED	CN197079	OPEN	COMPLAINT	small	-87.683636	41.88381
FAILED	CN141016	OPEN	COMPLAINT	small	-87.720044	41.94079

## Step 2 Train, Compare, and Select a Machine Learning Model

1. Scroll down and click New Watson Machine Learning model.

Models

Natural Language Classifier models

New Natural Language Classifier model

NAME	MODEL ID	SERVICE INSTANCE	LAST MODIFIED	ACTIONS
You don't have any Natural Language Classifier models yet.				

Visual Recognition models

New Visual Recognition model

NAME	MODEL ID	SERVICE INSTANCE	LAST MODIFIED	ACTIONS
You don't have any Visual Recognition models yet.				

Watson Machine Learning models

New Watson Machine Learning model

NAME	STATUS	TYPE	RUNTIME	LAST MODIFIED	ACTIONS
You don't have any Watson Machine Learning models yet.					

Notebooks

New notebook

NAME	SHARED	SCHEDULED	STATUS	LANGUAGE	LAST EDITOR	LAST MODIFIED	ACTIONS
You don't have any Notebooks yet.							

8

Think 2019



2. Enter a Name and a Description. Note that the Machine Learning Service should already be filled in from the prerequisites. Select the Default Spark Scala environment, Select Manual, and click Create. We are creating a model using “Model builder” but can also create models in notebooks as well as with SPSS or Deep Learning flow modelers.

Define model details

Name  
Building Violations Chicago 2017

Description  
Model description

Machine Learning Service  
Machine Learning

Select model type

☒ Model builder ☐ From file ☐ From sample

Select runtime  
Only Spark environments supporting Scala kernels can be used for model builder creation.  
Default Spark Scala 2.11

**Automatic**  
Prepare my data and create a model automatically

**Manual**  
Let me prepare my data and select which models to train

Need something more flexible? Create a [notebook](#) or design a [Modeler flow](#)

Cancel Create

3. You will be brought to a “Select data asset” page. Select building\_violations\_September.csv as our data asset and click Next.

IBM Watson Projects Tools Community Services Manage Support Docs

My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017

Select Data

Train

Evaluate

Select data asset

The model builder currently supports CSV files and IBM Db2 Warehouse on Cloud data assets.

What asset are you looking for?

NAME	TYPE	SERVICE
buildings_violations_September.csv	Data Asset	Project

Close Next

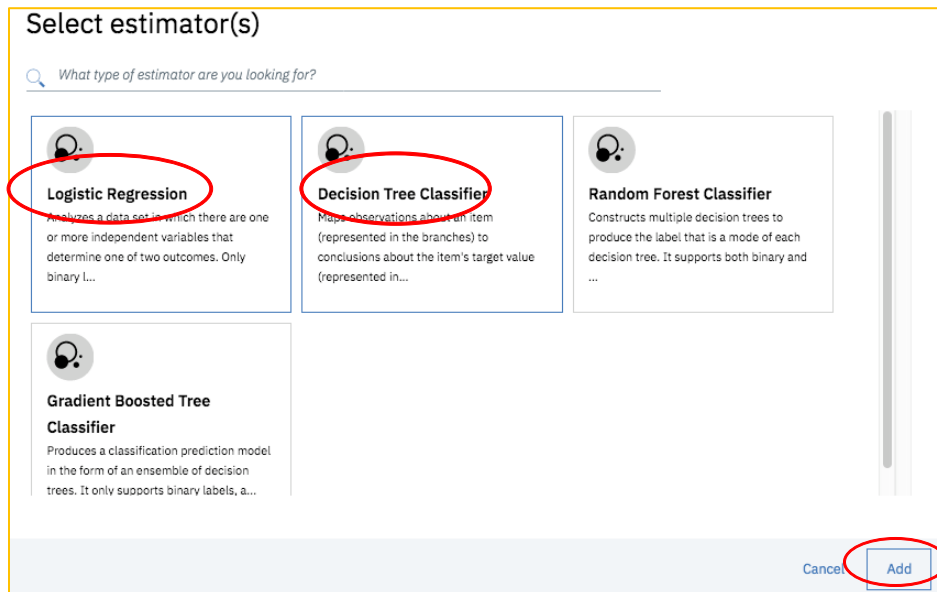
We will now choose which techniques may work well given our data and given our goal to predict which buildings are most likely to not pass inspection.

4. On the “Select a technique” page, click on the Select Label Col dropdown and select INSPECTION\_STATUS(String).
5. Select Binary Classification. Note that this is often automatically suggested by Watson Studio.
6. Click Add Estimators in the upper right corner of the page.

The screenshot displays the IBM Watson Studio interface for selecting a machine learning technique. The top navigation bar includes links for Projects, Tools, Community, Services, Manage, Support, and Docs. The main content area is titled "Select a technique" and features a sidebar on the left with "Train" and "Evaluate" tabs. The "Train" tab is active, showing a dropdown menu for "Column value to predict (Label Col)" with "INSPECTION\_STATUS (String)" selected. Below this, three suggested techniques are presented: "Binary Classification" (highlighted with a red circle), "Multiclass Classification", and "Regression". The "Binary Classification" card includes a description: "Classify new data into defined categories based on existing data. Choose if your label column contains two distinct categories." At the bottom of the main area, a "Validation Split" slider is shown, with markers for "Train: 60", "Test: 20", and "Holdout: 20". In the top right corner, a button labeled "Add Estimators" is highlighted with a red circle. The bottom right corner contains "Close", "Previous", and "Next" buttons.

Watson Studio only presents the estimators that would work with our selections on the previous page.

7. Select Logistic Regression and Decision Tree Classifier.
8. Click Add.



9. Note that you can click on the configured estimators to tune the hyperparameters associated with the algorithm. Click on Logistic Regression.

Select Data

**Select a technique**

You cannot change label column, feature columns, model type, or validation split after adding an estimator.  
You must first delete all estimators in order to make changes to these attributes.

Column value to predict (Label Col)  
INSPECTION\_STATUS (String)

Feature columns  
All (default)

Configured estimators

Logistic Regression  
Not Yet Trained

Decision Tree Classifier  
Not Yet Trained

10. We will not change any hyperparameters, so click on Cancel.

## Configure Logistic Regression

Weight column  
Select

Elastic net parameter (double)  
0

Fit an intercept  
☐ fitIntercept

Maximum iterations for convergence (integer)  
100

Regularization parameter (double)  
0

Standardize the training features before fitting the model  
☐ standardization

Threshold (double)  
0.5

Cancel Save

11. Back on the “Select a technique” page, click Next.

**Select a technique**

You cannot change label column, feature columns, model type, or validation split after adding an estimator. You must first delete all estimators in order to make changes to these attributes.

**Column value to predict (Label Col)**  
INSPECTION\_STATUS (String)

**Feature columns**  
All (default)

✓ Suggested technique.

**Binary Classification**

Classify new data into defined categories based on existing data. Choose if your label column contains two distinct categories.

**Multiclass Classification**

Classify new data into defined categories based on existing data. Choose if your label column contains a discrete number of categories.

**Regression**

Predict values from a continuous set of values. Choose if your label column contains a large number of values.

**Validation Split**

Train: 60      Test: 20      Holdout: 20

**Configured estimators**

- Logistic Regression  
Not Yet Trained
- Decision Tree Classifier  
Not Yet Trained

Close   Previous   **Next**   Let's talk

The Select model page will allow us to compare the results of different estimator types.

12. Both models did well. The Logistic Regression model performed slightly better.  
Select Logistic Regression.

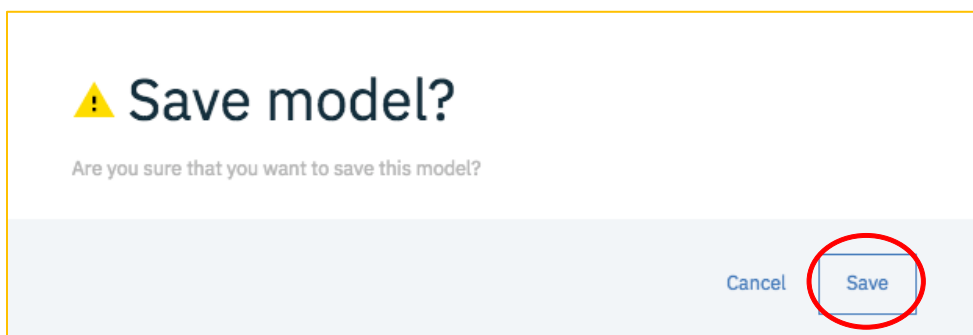
13. Click Save.

**Select model**

ESTIMATOR TYPE	STATUS	PERFORMANCE	AREA UNDER ROC CURVE	AREA UNDER PR CURVE	LAST EVALUATION	ACTIONS
<input checked="" type="radio"/> LogisticRegression	Trained & Evaluated	Excellent	0.98399	0.86202	7 Nov 2018, 1:31 PM	⋮
<input type="radio"/> DecisionTreeClassifier	Trained & Evaluated	Excellent	0.91959	0.7881	7 Nov 2018, 1:32 PM	⋮

Close   Previous   **Save**

14. When the “Save model” window appears, click Save.



We have just saved the model in our Watson Machine Learning service and can now view information about the model specifications, details of construction, and input schema. The model can also be exposed as an API and used by data pipelines, applications, or other external systems.

15. Click on the console button with an “angle bracket” to view the schema in JSON format.

The screenshot shows the IBM Watson Machine Learning console interface. The top navigation bar includes "IBM Watson", "Projects", "Tools", "Community", "Services", "Manage", "Support", and "Docs". The breadcrumb trail is "My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017". The main content area is titled "Building\_Violations\_Chicago\_2017" and has tabs for "Overview", "Evaluation", "Deployments", and "Lineage". The "Overview" tab is active, showing a "Summary" section with a table of model details. Below this is the "Input Schema" section, which contains a table of input features. In the bottom right corner of the "Input Schema" section, there is a button with a blue icon and a right-pointing angle bracket, which is circled in red. A yellow "Let's talk" button is also visible in the bottom right corner.

COLUMN	TYPE
VIOLATION_CODE	string
VIOLATION_STATUS	string
INSPECTION_CATEGORY	string
PROPERTY_GROUP	string

This schema can be copied and used elsewhere to help existing systems easily interact with our model and the Watson Machine Learning service.

**Input Schema**

```
[
  {
    "name": "VIOLATION_CODE",
    "type": "string",
    "nullable": true,
    "metadata": {
      "columnInfo": {
        "columnPrimaryKey": false,
        "columnTypeName": "varchar",
        "columnSigned": true,
        "columnType": 12,
        "columnLength": 1024,
        "columnNullable": true,
        "columnScale": 0
      }
    }
  }
]
```

16. Scroll up and click on the Evaluation tab.

IBM Watson Projects Tools Community Services Manage Support Docs

My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017

**Building\_Violations\_Chicago\_2017**

Overview **Evaluation** Deployments Lineage

**Summary**

Machine learning service	pm-20-pw
Model Type	wml-1.1
Runtime environment	spark-2.1
Training date	3 Sep 2018, 5:03 PM
Label column	INSPECTION_STATUS
Latest version	2456f175-bee0-421a-901a-b414d4b61534

**Input Schema**

COLUMN	TYPE
VIOLATION_CODE	string
VIOLATION_STATUS	string
INSPECTION_CATEGORY	string
PROPERTY_GROUP	string

Let's talk

## Step 3 Set up Continuous Learning Model Capabilities

Model performance is critical for solving data science problems. This page provides information and functionality to aid in continuous training, tuning, and redeployment. We will now set up parameters to automatically retrain our model when performance falls below a certain threshold.

### 1. Click on Configure Performance Monitoring.

The screenshot shows the IBM Watson ML interface for a project named 'Building\_Violations\_Chicago\_2017'. The 'Evaluation' tab is selected, displaying the 'Last Evaluation Result' and the 'Performance Monitoring' section. The 'Performance Monitoring' section contains a text box explaining the configuration and a button labeled 'Configure Performance Monitoring' which is circled in red. Below this, the 'Versions' table shows a single entry for the model version.

Version	2456f175-bee0-421a-901a-b414d4b61534
Phase	setup
AreaUnderPR	0.902
AreaUnderROC	0.989

**Performance Monitoring**

Configure performance monitoring to evaluate and retrain the model periodically to ensure the model performance is acceptable. You will need an existing IBM Db2 Warehouse on Cloud connection associated with your project to be used as your feedback data connection.

[Configure Performance Monitoring](#)

**Versions**

TIME	VERSION	DEPLOYED	ACTIONS
03 Sep 2018 05:03pm	2456f175-bee0-421a-901a-b414d4b61534		

Let's talk



2. Under Prediction type, select binary.
3. Under Metric details, select areaUnderPR and enter 0.8.

This relies on a database table of new data. We will use DB2 Warehouse on Cloud, a data store optimized for analytic data sets.

4. Click on Create a new connection.

Configure performance monitoring

**Spark Service or Environment**  
Only Spark environments supporting Scala kernels can be used for continuous learning.  
spark-nn

**Prediction type**  
binary

**Metric details (type / optional threshold)**  
areaUnderPR 0.8

**Feedback data connection** (IBM Db2 Warehouse on Cloud) [Create new connection](#)  
Select feedback data reference

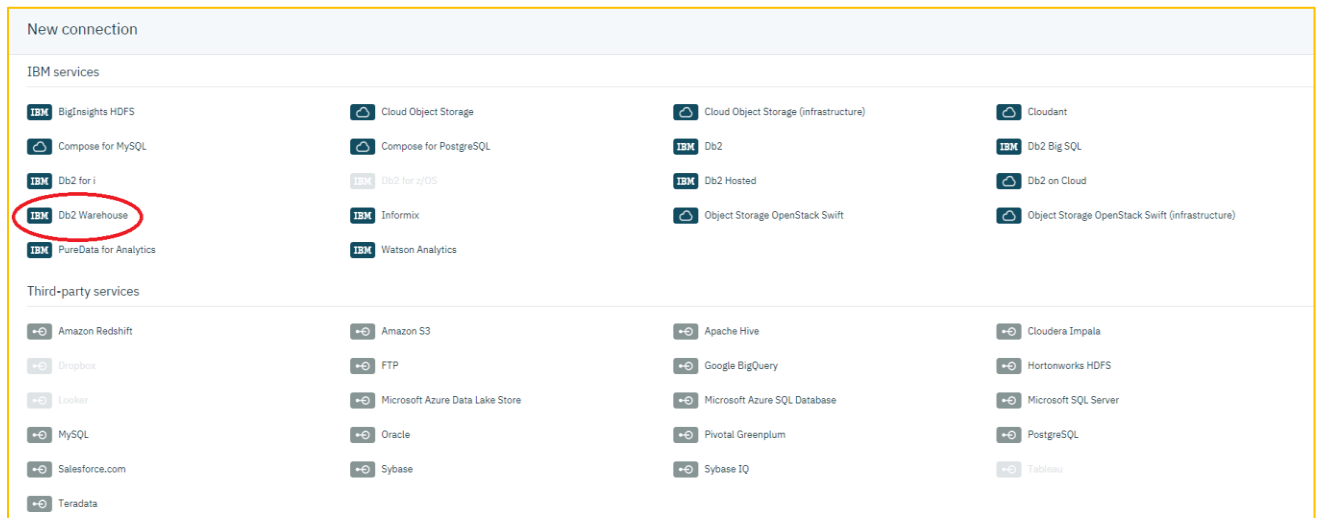
**Record count required for re-evaluation**  
1000

**Auto retrain**  
when model performance is below threshold

**Auto deploy**  
when model performance is better than previous version

Cancel Save **Let's talk**

5. On the “New connection” page, click DB2 Warehouse.



6. Access [DB2 Credentials](#)

Ask your instructor for your assigned database.

7. Enter a Name for your connection (e.g. DB2 Warehouse Connection).

8. Using the credentials cut and paste the fields under Hostname, Database, Username, and Password.

The screenshot shows the 'Connection overview' and 'Connection details' sections. The 'Name' field is 'Db2 Warehouse Connection'. The 'Description' field contains 'IBM Db2 warehouse database on Cloud'. The 'Connection details' section includes fields for 'Database \*' (BLUDB), 'Password \*' (masked), 'Hostname or IP Address \*' (dashdb-entry-yp-dal09-08.services.dal.blu), and 'Username \*' (dash11054). There is also a 'Secure Gateway' checkbox with the label 'Use a secure gateway'.

9. Click Create.

New connection (Db2 Warehouse Connection - Db2 Warehouse)

Connection overview

Name

Db2 Warehouse Connection

Description

IBM Db2 warehouse database on Cloud

2965

Connection details

Database \* ⓘ

BLUDB

Hostname or IP Address \* ⓘ

dashdb-entry-yp-dal09-08.services.dal.b1

Password \* ⓘ

\*\*\*\*\*

Username \* ⓘ

dash11054

Secure Gateway ⓘ

☐ Use a secure gateway

Let's talk

Cancel

Create

19

Think 2019

10. Return to the “Configure performance monitoring page” and click Select feedback data reference.

Configure performance monitoring

**Spark Service or Environment**  
Only Spark environments supporting Scala kernels can be used for continuous learning.  
spark-nn

**Prediction type**  
binary

**Metric details (type / optional threshold)**  
areaUnderPR 0.8

**Feedback data connection (IBM Db2 Warehouse on Cloud - Create new connection)**  
Select feedback data reference

**Record count required for re-evaluation**  
1000

**Auto retrain**  
when model performance is below threshold

**Auto deploy**  
when model performance is better than previous version

Cancel Save Let's talk

11. Click on your DB2 Warehouse-xx name.
12. Select the schema that matches DASH####.
13. Click select.

The screenshot shows the IBM Watson interface with the 'Select feedback data reference' dialog. The dialog has three columns: 'ML\_PoT', 'Db2 Warehouse Connection', and 'DASH11054'. The 'ML\_PoT' column shows 'Connections (1)' with 'Db2 Warehouse Connection' selected. The 'Db2 Warehouse Connection' column shows 'Schemas (13)' with 'DASH11054' selected. The 'DASH11054' column shows 'No drilldowns currently exist.' The 'Select' button is circled in red.

ML_PoT	Db2 Warehouse Connection	DASH11054
Connections (1)	Schemas (13)	
Db2 Warehouse Connection	DASH11054	
	ERRORSCHEMA	
	GOSALES	
	GOSALESBW	
	GOSALESBR	
	GOSALESMR	
	GOSALESRT	
	IBM_RTMON_DATA	
	NULLIDR1	
	NULLIDRA	
	SAMPLES	
	ST_INFORMTN_SCHEMA	
	TEST	

Cancel Select Let's talk

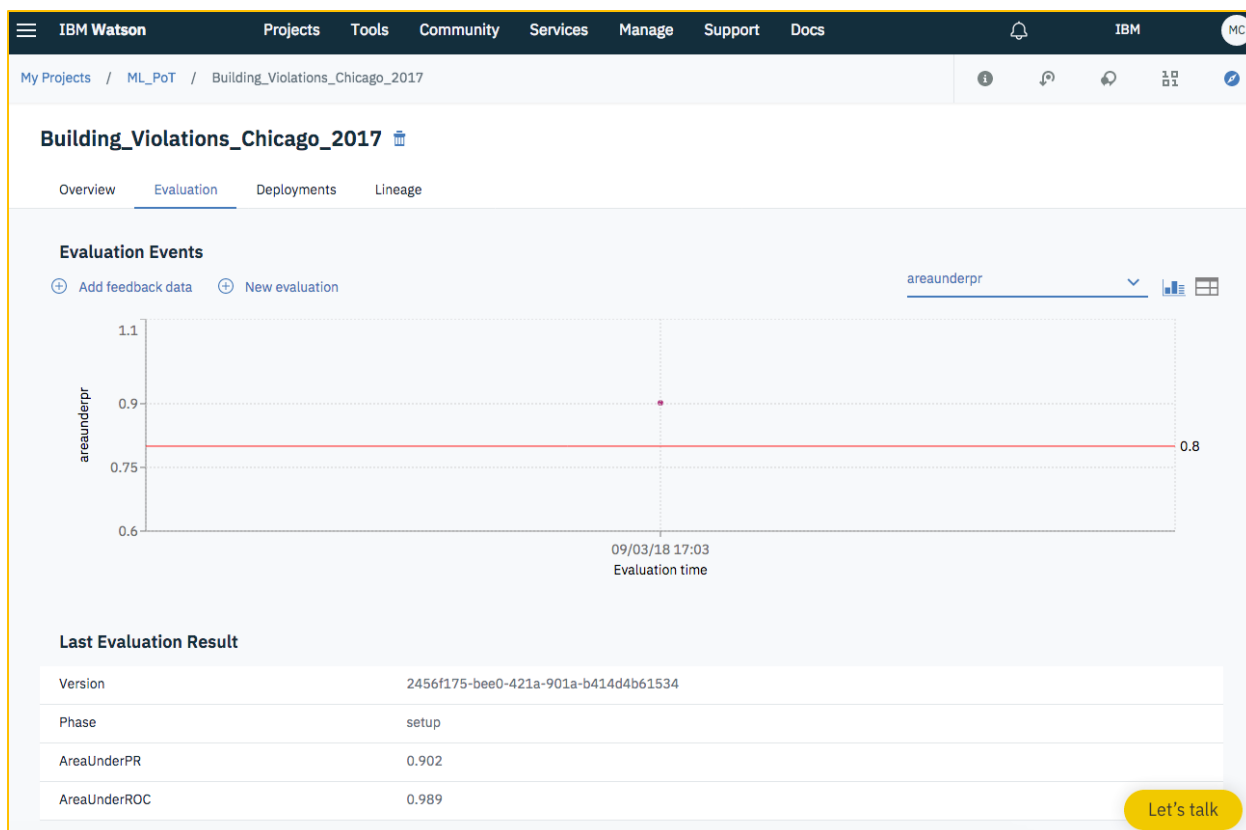
14. After returning to the “Configure performance monitoring” page, enter a unique table name (attendees are sharing the DB2 Warehouse service so make your name unique by appending your initials to the table name).
15. Enter 500 as the Record count.
16. Leave the default for Auto retrain. Under Auto deploy, select never.
17. Click Save.

The screenshot shows the 'Configure performance monitoring' page in the IBM Watson interface. The page has a dark blue header with navigation links: IBM Watson, Projects, Tools, Community, Services, Manage, Support, Docs, and a user profile icon (MC). The main content area is white and contains the following sections:

- Spark Service or Environment**: Only Spark environments supporting Scala kernels can be used for continuous learning. A dropdown menu shows 'spark-nn'.
- Prediction type**: A dropdown menu shows 'binary'.
- Metric details (type / optional threshold)**: A dropdown menu shows 'areaUnderPR' and a text input field shows '0.8'.
- Feedback data connection**: (IBM Db2 Warehouse on Cloud - [Create new connection](#))  
dashdb: BLUDB [Change feedback data reference](#)  
New2017Table
- Record count required for re-evaluation**: 500
- Auto retrain**: when model performance is below threshold
- Auto deploy**: never

At the bottom right, there are three buttons: 'Cancel', 'Save', and 'Let's talk'. The 'Save' button is highlighted with a red circle.

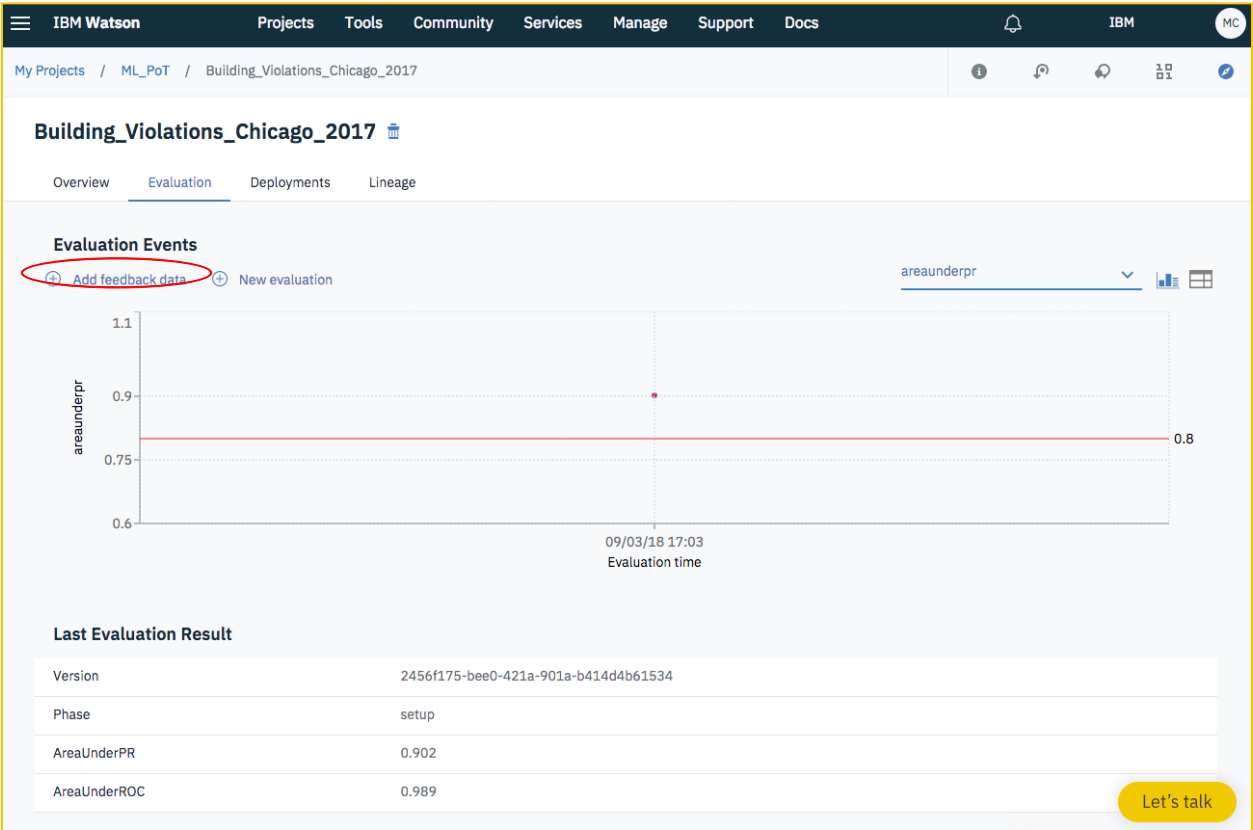
We have just set our model to retrain whenever its performance falls below 0.8. The evaluation screen has changed to reflect the decisions we have just made. Notice the graph lists our current areaunderPR and the threshold we have set. Clicking on Add feedback data will upload a new dataset. Clicking on new evaluation will then evaluate the model and check to see how the model compares to our 0.8 threshold.



Suppose September has passed, and we now have October data. We can trigger a new evaluation by adding more feedback data.

18. Click Add feedback data.

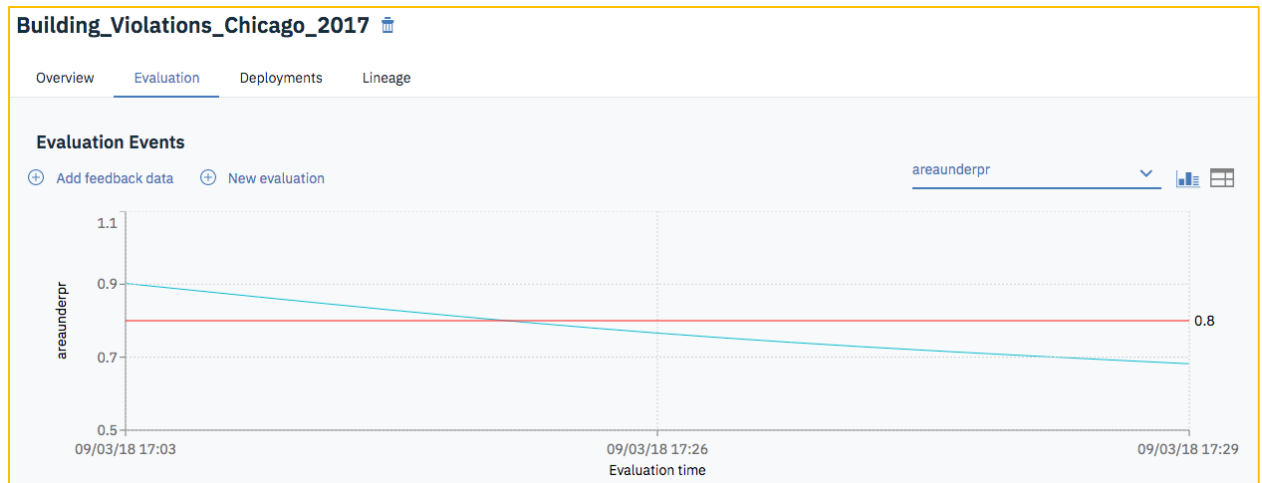
19. Select building\_violations\_October.csv.





20. When the “New evaluation” window appears, click New Evaluation. Re-evaluating the model may take a few minutes. This is a great time to grab coffee.

Notice that the October data has caused our model to fall below the 0.8 threshold and a new version has been trained. Although we run through these steps graphically, you can also configure a Watson Machine Learning continuous learning model entirely through APIs.



You can continue by adding the November data by the same process of hitting **Add feedback data** and adding the November file. If you scroll down you will be able to see all model versions listed. We have three versions, but no deployments.

My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017

Last Evaluation Result

Version	028ee821-4695-462f-9ec8-6d85dee03cee
Phase	training
AreaUnderPR	0.726

Performance Monitoring [Edit configuration](#)

Performance Metrics (Threshold)	areaUnderPR (0.8)
Feedback Data Reference	dashdb: BLUDB / New2017Table
Training Data Reference	COS: mlpot-donotdelete-pr-d2mpgp7cdyrjlt
Record Count Required For Re-evaluation	500
Auto Re-train	conditionally
Auto Re-deploy	never

Versions

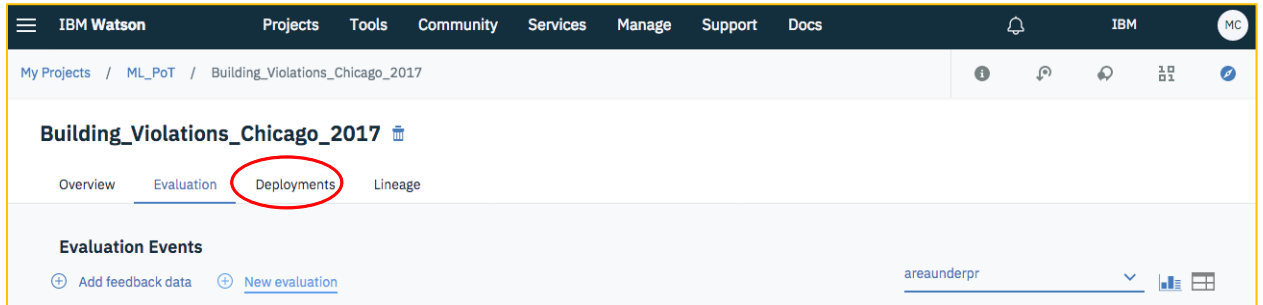
TIME	VERSION	DEPLOYED	AREAUNDERPR	ACTIONS
03 Sep 2018 05:33pm	028ee821-4695-462f-9ec8-6d85dee03cee		0.726	...
03 Sep 2018 05:27pm	15417ea0-2fe4-4b74-b053-53dbda504256		0.682	...
03 Sep 2018 05:03pm	2456f175-bee0-421a-901a-b414d4b61534		0.902	...

Let's talk

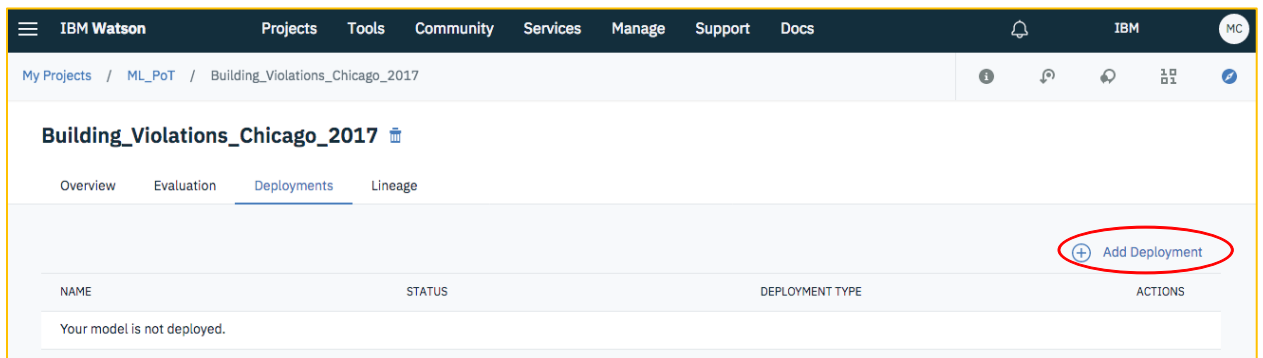
## Step 4 Deploy a Machine Learning Model.

Now we will focus on deployment.

### 1. Click the Deployment tab.



### 2. Add Deployment.



3. Enter a Name (e.g. ChicagoOnline).
4. Enter a Description.
5. Click Save.

Create Deployment

Define deployment details

Name  
Chicago Online

Description  
Deployment description

Deployment type  
☒ Web service

Cancel Save

The model is now accessible by external systems.

6. Click on your deployment (e.g. ChicagoOnline).

IBM Watson Projects Tools Community Services Manage Support Docs

My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017

Building\_Violations\_Chicago\_2017

Overview Evaluation Deployments Lineage

+ Add Deployment

NAME	STATUS	DEPLOYMENT TYPE	ACTIONS
ChicagoOnline	DEPLOY_SUCCESS	Web Service	

You are automatically brought to the Overview tab lists information related to the model deployment including services used and version number.

7. Click the Implementation tab.

IBM Watson

ProjectsToolsCommunityServicesManageSupportDocs

IBM

MC

My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017 / ChicagoOnline

ChicagoOnline

Overview

Implementation

Test

Deployment

Name	ChicagoOnline
Type	Web Service
Deployment ID	5d232eda-13b3-440f-8e13-de9ee1ea2187
Status	DEPLOY_SUCCESS
Asset type	model
Asset name	Building_Violations_Chicago_2017
Machine learning service	pm-20-pw
Created	03 Sep 2018 05:38pm
Last modified	03 Sep 2018 05:39pm

Model

Name	Building_Violations_Chicago_2017
ID	ffa1749a-c5e3-49e6-91fe-212b16e97dfb
Version ID	2456f175-bee0-421a-901a-b414d4b61534

Let's talk

The implementation tab provides developers information to help minimize the time it takes to develop models and place them in a production environment.

8. Click on the Test tab.

The screenshot shows the IBM Watson ChicagoOnline API page. The navigation bar at the top includes 'IBM Watson', 'Projects', 'Tools', 'Community', 'Services', 'Manage', 'Support', and 'Docs'. Below the navigation bar, the breadcrumb trail reads 'My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017 / ChicagoOnline'. The main content area has three tabs: 'Overview', 'Implementation', and 'Test'. The 'Test' tab is circled in red. The 'Implementation' tab is currently active, displaying a table with API details and a section for code snippets.

**ChicagoOnline**

Overview Implementation **Test**

**Implementation** [View API Specification](#)

Scoring End-point	<a href="https://us-south.ml.cloud.ibm.com/v3/wml_instances/2b0bce0d-7638-4b40-a2b2-0d4ed148368a/deployments/5d232eda-13b3-440f-8e13-de9ee1ea2187/online">https://us-south.ml.cloud.ibm.com/v3/wml_instances/2b0bce0d-7638-4b40-a2b2-0d4ed148368a/deployments/5d232eda-13b3-440f-8e13-de9ee1ea2187/online</a>
Authorization: Bearer <token>	See code snippets below for information on how to retrieve the WML Authorization Token to be passed with scoring requests.
Content-type: application/json	Required if the request body is sent in JSON format.

**Code Snippets**

cURL Java JavaScript Python Scala

```
# retrieve your $WML_SERVICE_CREDENTIALS_USERNAME, $WML_SERVICE_CREDENTIALS_PASSWORD, and $WML_SERVICE_CREDENTIALS_URL from the
# Service credentials associated with your IBM Cloud Watson Machine Learning Service instance.

curl --basic --user $WML_SERVICE_CREDENTIALS_USERNAME:$WML_SERVICE_CREDENTIALS_PASSWORD $WML_SERVICE_CREDENTIALS_URL/v3/identity/token

# the above CURL request will return an auth token that you will use as $WML_AUTH_TOKEN in the scoring request below
# TODO: manually define and pass values to be scored below
curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/json' --header "Authorization: Bearer $WML_AUTH_TOKEN" -d
```

The Test tab allows manual testing of the deployed model and viewing of results.

9. Enter:

VIOLATION\_CODE: CN063014

VIOLATION\_STATUS: OPEN

INSPECTION\_CATEGORY: COMPLAINT

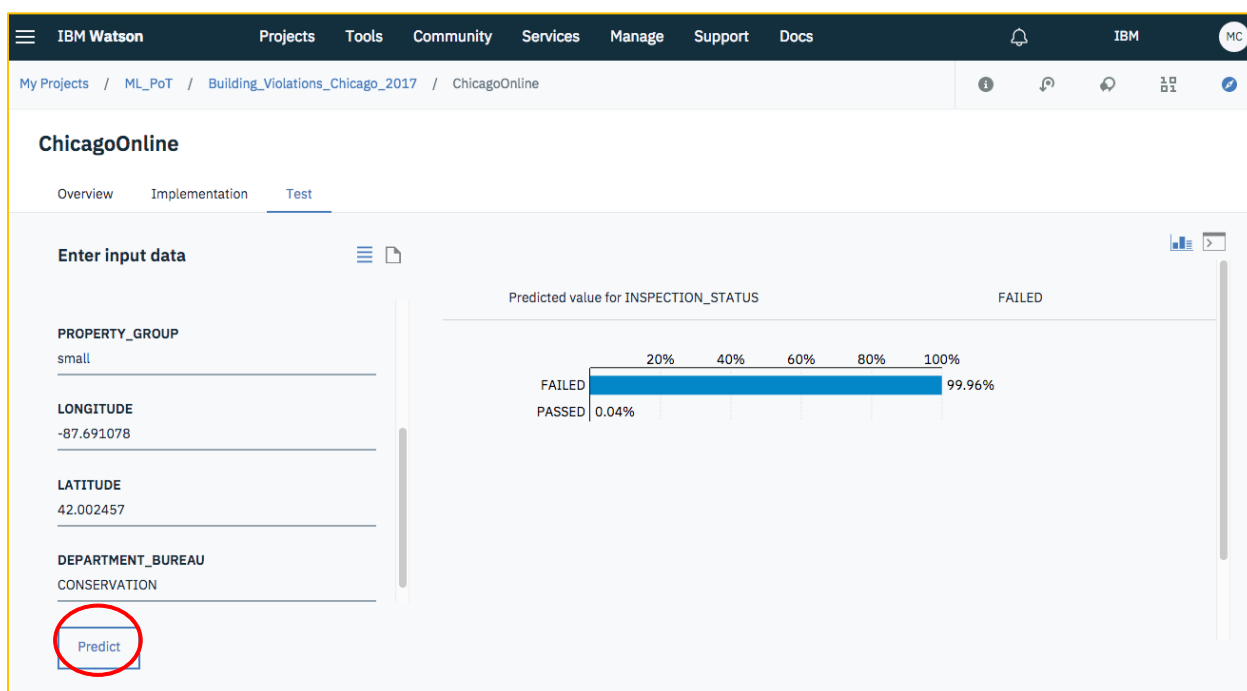
PROPERTY\_GROUP: small

LONGITUDE: -87.691078

LATITUDE: 42.002457

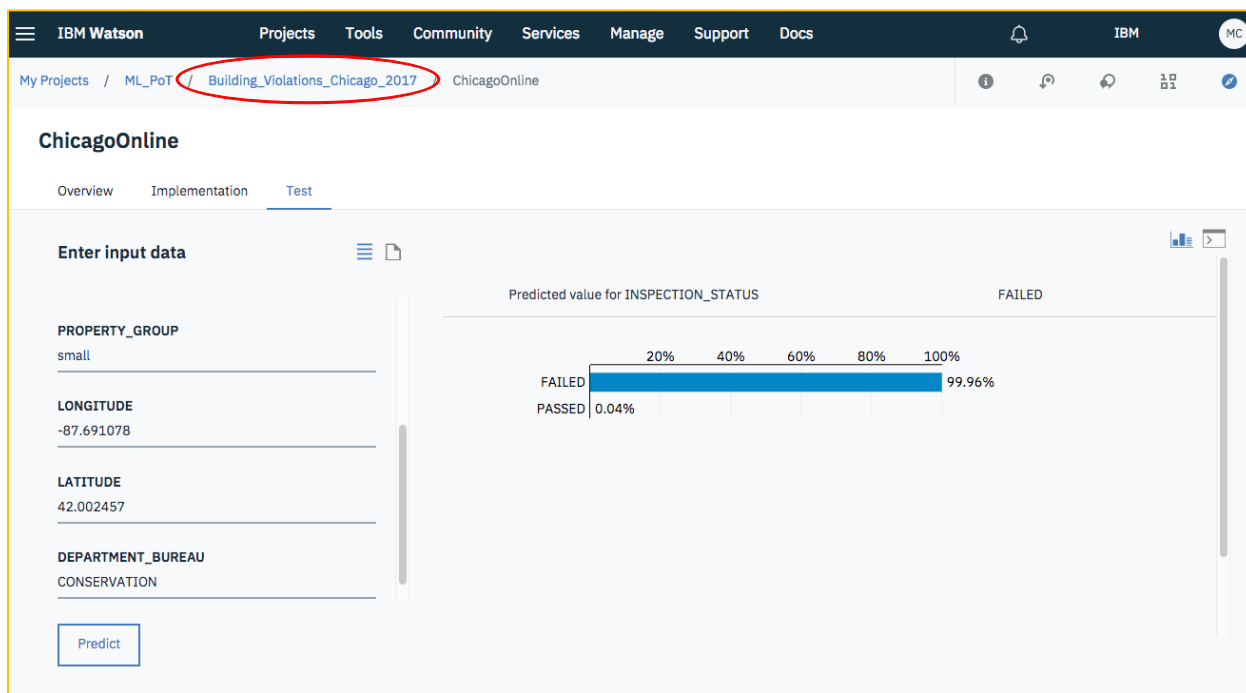
DEPARTMENT\_BUREAU: CONSERVATION

10. Click Predict.



According to our model, a building with our input data has a 0.04% chance of passing inspection (your numbers may differ slightly)

11. Feel free to change the input data and run new predictions. When ready, click on you model name (e.g. Building\_Violations\_Chicago\_2017)



12. Click on the Evaluation tab.

The screenshot shows the IBM Watson Machine Learning interface. The top navigation bar includes 'IBM Watson', 'Projects', 'Tools', 'Community', 'Services', 'Manage', 'Support', and 'Docs'. The breadcrumb trail is 'My Projects / ML\_PoT / Building\_Violations\_Chicago\_2017'. The main heading is 'Building\_Violations\_Chicago\_2017'. Below it, there are four tabs: 'Overview', 'Evaluation' (which is circled in red), 'Deployments', and 'Lineage'. The 'Evaluation' tab is active, showing a 'Summary' section with a table of model details.

Summary	
Machine learning service	pm-20-pw
Model Type	wml-1.1
Runtime environment	spark-2.1
Training date	3 Sep 2018, 5:03 PM
Label column	INSPECTION_STATUS
Latest version	028ee821-4695-462f-9ec8-6d85dee03cee

If you scroll to the bottom you will be able to see the different model versions that have been created and which model is currently deployed. You can select the vertical ellipsis under ACTIONS to change the deployed version.

Versions				
TIME	VERSION	DEPLOYED	AREAUNDERPR	ACTIONS
03 Sep 2018 05:33pm	028ee821-4695-462f-9ec8-6d85dee03cee		0.726	⋮
03 Sep 2018 05:27pm	15417ea0-2fe4-4b74-b053-53dbda504256		0.682	⋮
03 Sep 2018 05:03pm	2456f175-bee0-421a-901a-b414d4b61534	✓	0.902	⋮

Let's talk

During this lab we have very quickly compared various machine learning models and chosen the best one tuned to our dataset and objectives. We then created a continuous machine learning model that automatically monitors and retrains allowing Watson Machine Learning to keep applications, data pipelines, or external systems relying on the machine learning model as up to date as possible.

*You have completed Lab 02*



## **We Value Your Feedback!**

- Don't forget to submit your Think 2019 session and speaker feedback! Your feedback is very important to us – we use it to continually improve the conference.
- Access the Think 2019 agenda tool to quickly submit your surveys from your smartphone, laptop or conference kiosk.

