

# Deploy a Continuous Machine Learning Model using Watson Studio.

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:

In this lab you will

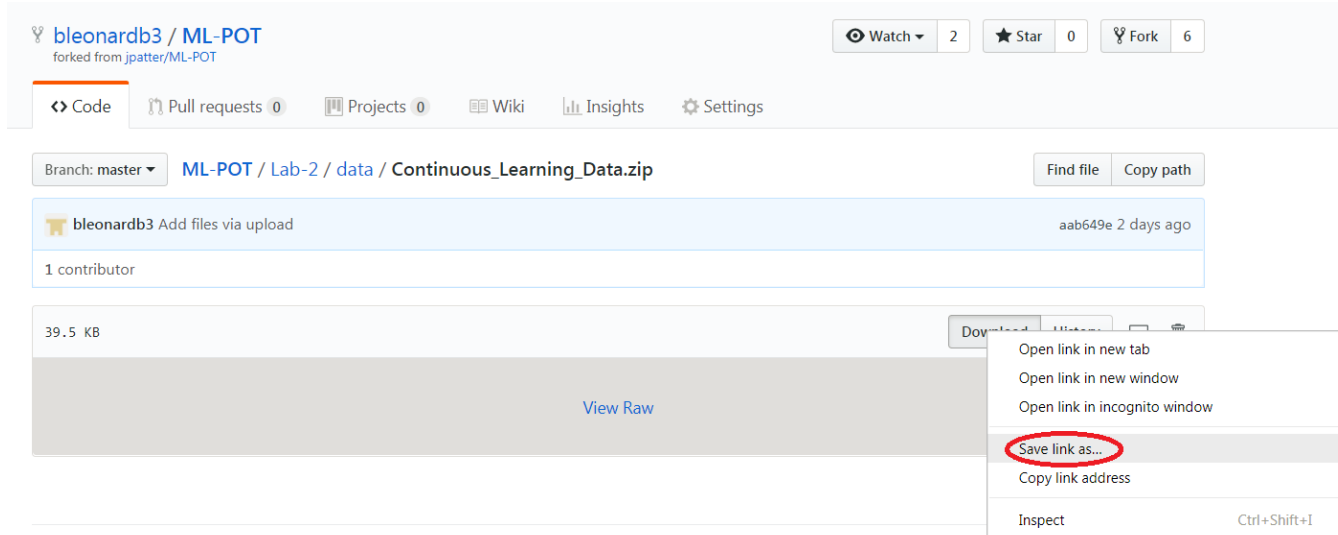
- Upload data to your Watson Studio project.
- Train, compare, and select a machine learning model.
- Set up continuous learning capabilities.
- Deploy a machine learning model.

## Exercise Instructions

### Step 1 Upload a New Data Asset.

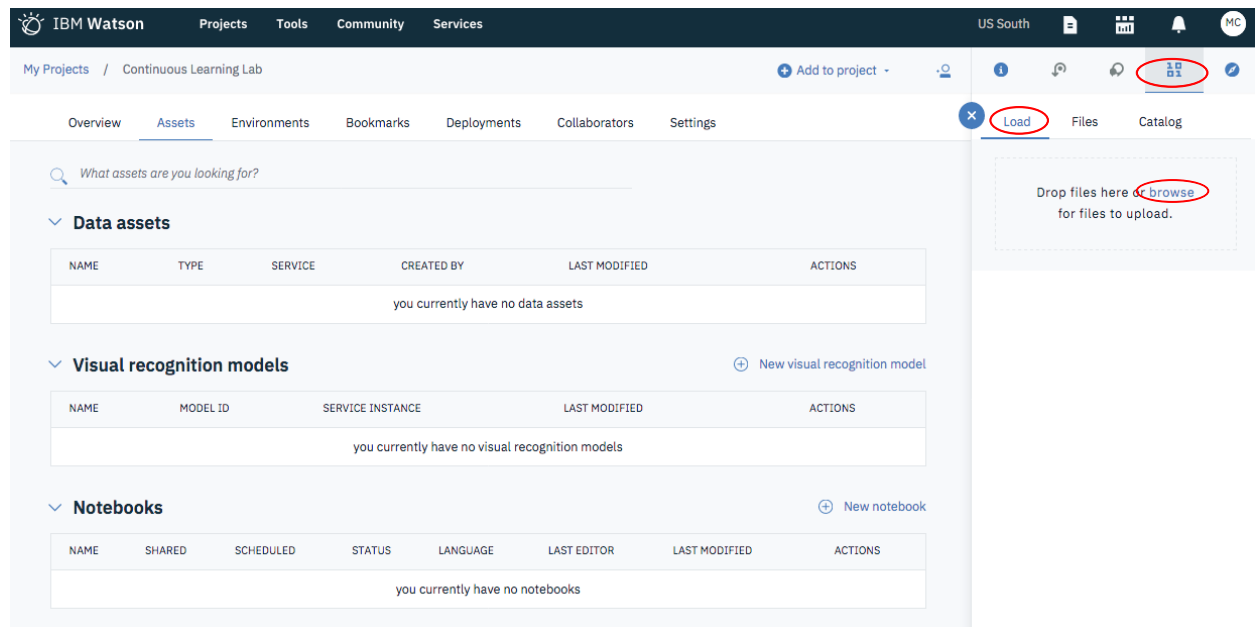
Before we build our models, we need to load data into our project.

1. Open [https://github.com/bleonardb3/ML-POT/blob/master/Lab-2/data/Continuous\\_Learning\\_Data.zip](https://github.com/bleonardb3/ML-POT/blob/master/Lab-2/data/Continuous_Learning_Data.zip)
2. Right click Download and click Save Link As.



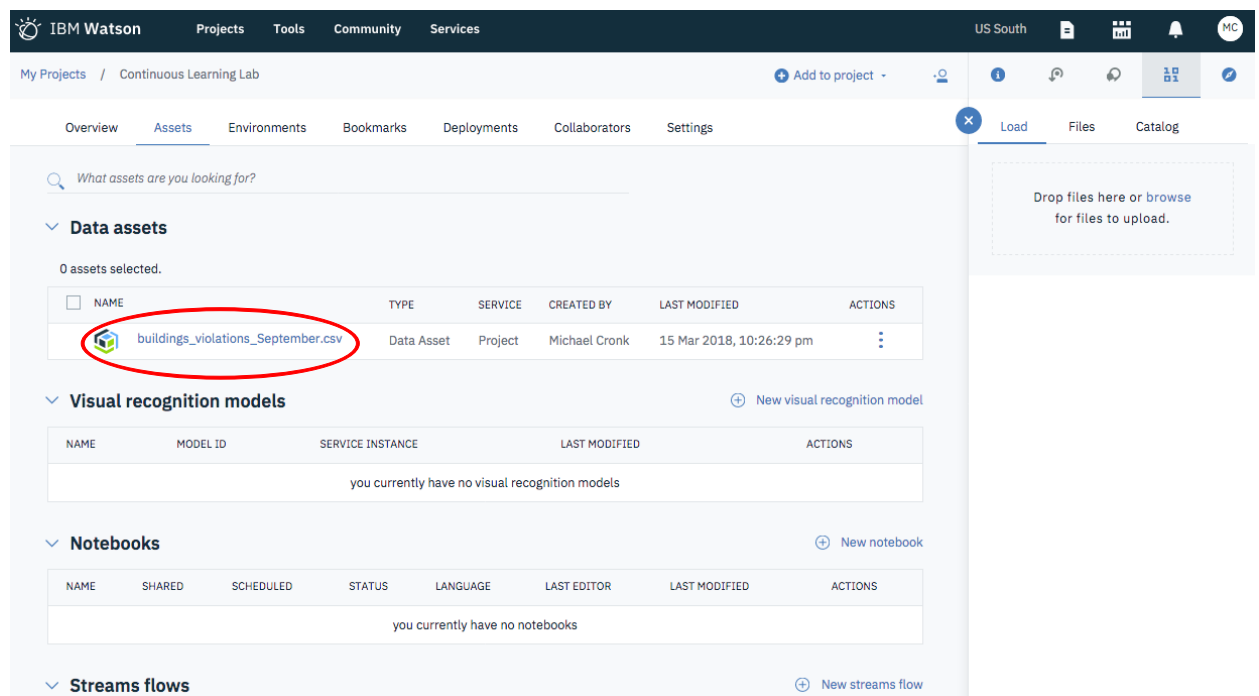
3. Save the zip file to your desktop and unzip the contents. This zip file contains data for building inspections for each month. We will begin by training our model for the month of September and then add October and November data to show how we can continuously adjust over time.
4. Return to your assets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



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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 Project interface. The top navigation bar includes 'IBM Watson', 'Projects', 'Tools', 'Community', and 'Services'. The 'Projects' tab is active, and the 'Continuous Learning Lab' project is selected. The breadcrumb path is 'My Projects > Continuous Learning Lab > buildings\_violations\_September.csv'. The 'Preview' tab is selected, showing a table with 8 columns and 100 rows of data. The table columns are: INSPECTION\_STAT..., VIOLATION\_CO..., VIOLATION\_STAT..., INSPECTION\_CATEGO..., PROPERTY\_GRO..., LONGITUDE, and LATITUDE. The data rows show various inspection statuses (FAILED, COMPLIED, OPEN) and categories (COMPLAINT, PERIODIC, PERMIT). A right-hand sidebar displays the 'Data Asset' details for 'buildings\_violations\_September.csv', including its description, tags, creator, added date, and size.

INSPECTION_STAT...	VIOLATION_CO...	VIOLATION_STAT...	INSPECTION_CATEGO...	PROPERTY_GRO...	LONGITUDE	LATITUDE
FAILED	CN063014	OPEN	COMPLAINT	small	-87.691078	42.002457
FAILED	EL0086	OPEN	COMPLAINT	small	-87.714074	41.956543
FAILED	EL0086	OPEN	COMPLAINT	small	-87.633451	41.759317
FAILED	CN197087	OPEN	COMPLAINT	small	-87.795168	41.952655
FAILED	CN190019	OPEN	COMPLAINT	small	-87.769105	41.785145
FAILED	NC2022	OPEN	COMPLAINT	small	-87.712142	41.842044
FAILED	CN070014	OPEN	COMPLAINT	small	-87.713576	41.739676
FAILED	CN073024	COMPLIED	COMPLAINT	small	-87.727869	41.869170
FAILED	NC2022	OPEN	COMPLAINT	small	-87.830633	41.949832
FAILED	CN070034	OPEN	PERIODIC	small	-87.543687	41.730277
FAILED	PL157017	OPEN	COMPLAINT	small	-87.657112	41.792445
FAILED	PL237020	OPEN	COMPLAINT	small	-87.726443	41.902468
FAILED	VT1010	OPEN	PERMIT	small	-87.654530	41.920956

**Data Asset**  
**buildings\_violations\_September.csv**  
 Description  
 No description available for this asset  
 Tags  
 No tags available for this asset  
 Creator: michael.cronk@ibm.com  
 Added: 02:26 AM UTC, 2018/03/16  
 Size: 106.389 KB

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

1. Scroll down and click New model.

The screenshot shows the IBM Watson Machine Learning interface. The top navigation bar includes 'IBM Watson', 'Projects', 'Tools', 'Community', and 'Services'. The right side of the bar shows 'US South', a search icon, a list icon, a bell icon, and a user profile icon labeled 'MC'. Below the navigation bar, the breadcrumb 'My Projects / Continuous Learning Lab' is visible. The main content area is divided into four sections: 'Notebooks', 'Streams flows', 'Dashboard', and 'Models'. Each section has a table with columns for various attributes and an 'ACTIONS' column. The 'Models' section is currently empty, displaying the message 'you currently have no models'. A red circle highlights the '+ New model' button in the 'ACTIONS' column of the 'Models' section. On the right side, a sidebar is open with tabs for 'Load', 'Files', and 'Catalog'. The 'Files' tab is active, showing a search bar 'Find in storage' and a list of files, including '0 selected' and 'buildings\_violations\_September.csv'.

IBM Watson Projects Tools Community Services US South

My Projects / Continuous Learning Lab

+ Add to project

Notebooks New notebook

NAME	SHARED	SCHEDULED	STATUS	LANGUAGE	LAST EDITOR	LAST MODIFIED	ACTIONS
you currently have no notebooks							

Streams flows New streams flow

NAME	MODIFIED BY	LAST MODIFIED	ACTIONS
you currently have no streams flows			

Dashboard New dashboard

NAME	SHARED	LAST EDITOR	LAST MODIFIED	ACTIONS
you currently have no dashboard				

Models New model

NAME	STATUS	TYPE	RUNTIME	LAST MODIFIED	ACTIONS
you currently have no models					

Load Files Catalog

Find in storage

0 selected

buildings\_violations\_September.csv

2. Enter a Name and a Description, note that the Machine Learning Service and the Spark Service should already be filled in from the services defined in Lab-1, 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.

IBM Watson Projects Tools Catalog Community Services US South

### New model BETA

**Define model details**

Name  
Building\_Violations\_Chicago\_2017 68

Description  
Building violations continuous machine learning model. 246

Machine Learning Service  
predictive-modeling-jg

**Select model type**

☒ Model builder ☐ From file ☐ From sample

Spark Service  
spark-le

**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 an SPSS 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.

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My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017

### 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.

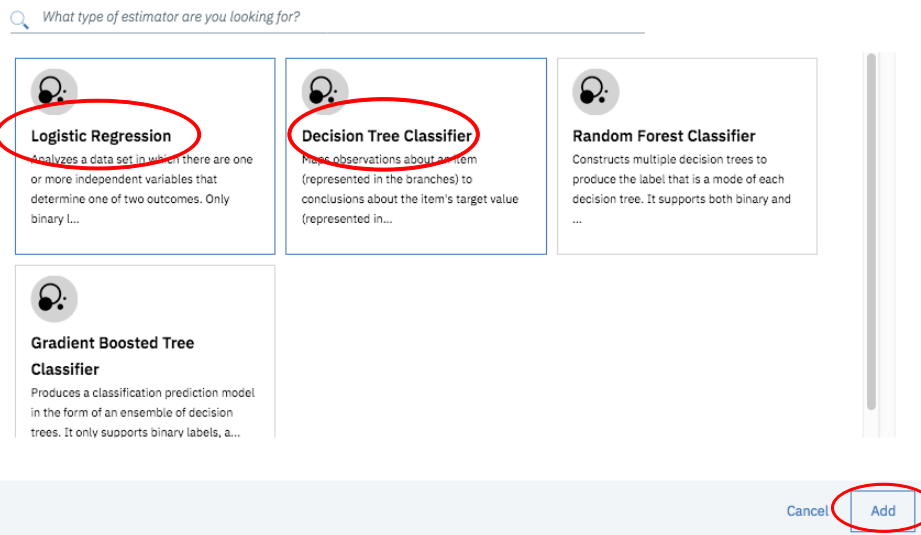
IBM Watson Studio interface showing the "Select a technique" page. The page displays options for selecting a technique (Binary Classification, Multiclass Classification, Regression) and configuring validation split (Train: 60, Test: 20, Holdout: 20). The "Add Estimators" button is highlighted in the top right corner.

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.

### Select estimator(s)



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

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Select Data  
Train  
Evaluate

### 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**

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

10. Both models have performed well. For this tutorial, select Logistic Regression.

11. Click Save.

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Select Data  
Train  
Evaluate

### 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	0.98752	0.90207	15 Mar 2018, 1:38 PM	⋮
<input type="radio"/> DecisionTreeClassifier	Trained & Evaluated	Excellent	0.94157	0.87188	15 Mar 2018, 1:38 PM	⋮

Close Previous **Save**

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

## ⚠ Save model?

Are you sure that you want to save this model?

Cancel

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.

13. 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 the IBM Watson logo and links to Projects, Tools, Catalog, Community, and Services. The current page is titled 'Building\_Violations\_Chicago\_2017' and has tabs for Overview, Evaluation, and Deployments. The 'Overview' tab is active, displaying a 'Summary' section with a table of model details. Below the summary is the 'Input Schema' section, which shows a table with columns and their types. A red circle highlights a button with an angle bracket icon in the top right corner of the Input Schema section, which is used to view the schema in JSON format.

COLUMN	TYPE
VIOLATION_CODE	string
VIOLATION_STATUS	string

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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
      }
    }
  }
}
```

14. Scroll up and click on the Evaluation tab.

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My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017

**Building\_Violations\_Chicago\_2017**

Overview **Evaluation** Deployments

**Summary**

Machine learning service	predictive-modeling-jg
Model Type	wml-1.1
Runtime environment	spark-2.0
Training date	15 Mar 2018, 2:04 PM
Label column	INSPECTION_STATUS
Latest version	3cfc9e1e-3381-49d5-bd7b-fa669869be60
Model builder details	<a href="#">View</a>

**Input Schema**

```
{
  {
    "name": "VIOLATION_CODE",
    "type": "string",
    "nullable": true,
```

## 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.

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Overview Evaluation Deployments

#### Last Evaluation Result

Version	568f25c3-a274-44dd-bcf9-2fe1e2138a3d
Phase	setup
AreaUnderPR	0.902
AreaUnderROC	0.988

#### 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
16 Mar 2018 12:39am	568f25c3-a274-44dd-bcf9-2fe1e2138a3d		

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2. 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.

3. Click on Create a new connection.

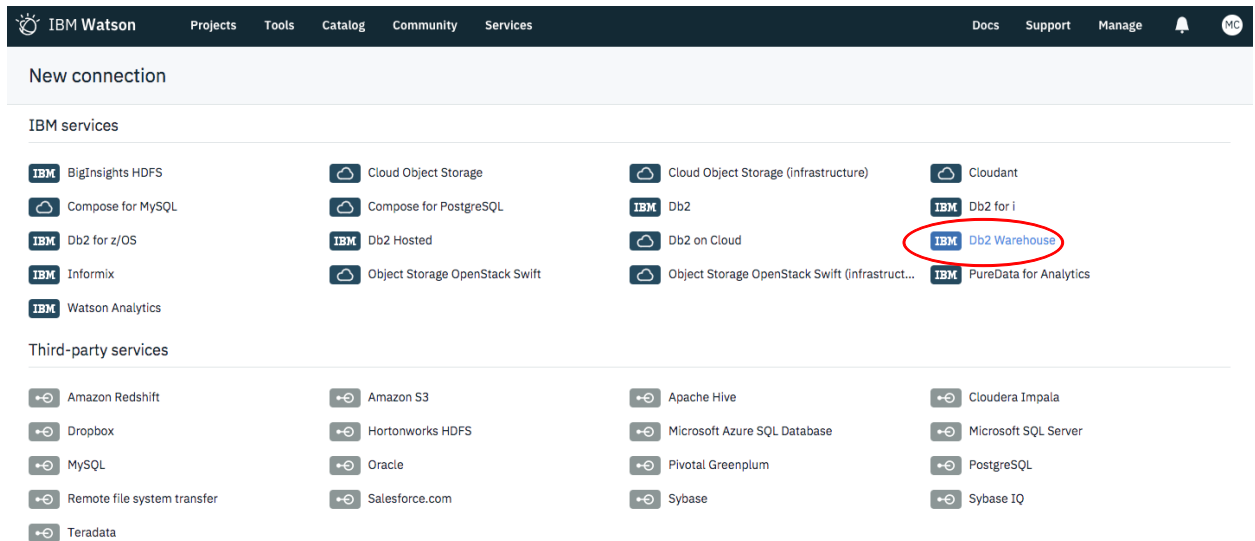
The screenshot shows the 'Configure performance monitoring' page in the IBM Watson interface. The page has a dark blue header with the IBM Watson logo and navigation links: Projects, Tools, Catalog, Community, and Services. On the right side of the header, it shows 'US South' and icons for a document, a list, a bell, and a user profile (MG).

The main content area is titled 'Configure performance monitoring'. It contains several sections:

- Spark service:** A dropdown menu with 'spark-le' selected.
- Prediction type:** A dropdown menu with 'binary' selected.
- Metric details (type / optional threshold):** A dropdown menu with 'areaUnderPR' selected and a text input field with '.8' entered. Both the dropdown and the input field are circled in red.
- Feedback data connection (IBM Db2 Warehouse on Cloud connection):** A link that says 'Create new connection' with a plus icon, which is also circled in red. Below it is a 'Select source' link.
- Record count required for re-evaluation:** A text input field with '1000' entered.
- Auto retrain:** A dropdown menu with 'when model performance is below threshold' selected.
- Auto deploy:** A dropdown menu with 'when model performance is better than previous version' selected.

At the bottom right of the page, there are 'Cancel' and 'Save' buttons, and a green circular icon with a white speech bubble.

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



5. Access <https://raw.githubusercontent.com/bleonardb3/ML-POT/master/Lab-2/DB2%20Warehouse%20Credentials.txt>

Ask your instructor whether you should be using credentials A or B.

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

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

The screenshot shows the 'New connection' form in the IBM Watson interface. The form is divided into two sections: 'Connection overview' and 'Connection details'. In the 'Connection overview' section, the 'Name' field is filled with 'Db2 Warehouse Connection' and the 'Description' field is filled with 'IBM Db2 warehouse database on Cloud'. In the 'Connection details' section, the 'Hostname or IP Address' field is filled with 'dashdb-entry-yp-dal09-08.services.dal.ibmcloud.net', the 'Database' field is filled with 'BLUDB', the 'Username' field is filled with 'dash15083', and the 'Password' field is filled with '\*\*\*\*\*'. All four fields in the 'Connection details' section are highlighted with red circles.

## 8. Click Create.

New connection (Db2 Warehouse Connection - Db2 Warehouse)

Connection overview

**Name**  
Db2 Warehouse Connection

**Description**  
IBM Db2 warehouse database on Cloud

Connection details

**Hostname or IP Address \***  
dashdb-entry-yp-dal09-08.services.dal.ibmcloud.net

**Username \***  
dash15083

**Secure Gateway**  
☐ Use a secure gateway

**Database \***  
BLUDB

**Password \***  
\*\*\*\*\*

**Connection discovery**  
☐ Discover data assets

Cancel **Create**

## 9. Return to the “Configure performance monitoring page” and click Select source.

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### Configure performance monitoring

**Spark service**  
spark-le

**Prediction type**  
binary

**Metric details (type / optional threshold)**  
areaUnderPR .8

Feedback data connection (IBM Db2 Warehouse on Cloud connection - Create new connection)

**Select source**

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

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

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ProjectsToolsCatalogCommunityServices

US South

MC

Select feedback data source

Continuous Learning Lab	Db2 Warehouse-6A	DASH7669
Connections (1)	Schemas (11)	
Db2 Warehouse-6A	DASH7669	No drilldowns currently exist.
	ERRORSCHEMA	
	GOSALES	
	GOSALESDW	
	GOSALESHR	
	GOSALESMR	
	GOSALESRT	
	NULLIDR1	
	NULLIDRA	
	SAMPLES	
	ST_INFORMTN_SCHEMA	

i

Select the data sources you want to work with.

Cancel

Select



13. 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).
14. Enter 500 as the Record count.
15. Under Auto deploy, select never.
16. Click Save.

### Configure performance monitoring

Spark service

spark-nn

Prediction type

binary

Metric details (type / optional threshold)

areaUnderPR

.8

Feedback data connection (IBM Db2 Warehouse on Cloud connection - [Create new connection](#))

dashdb: BLUDB [Change source](#)

New2017Table

Record count required for re-evaluation

500

Auto retrain

when model performance is below threshold

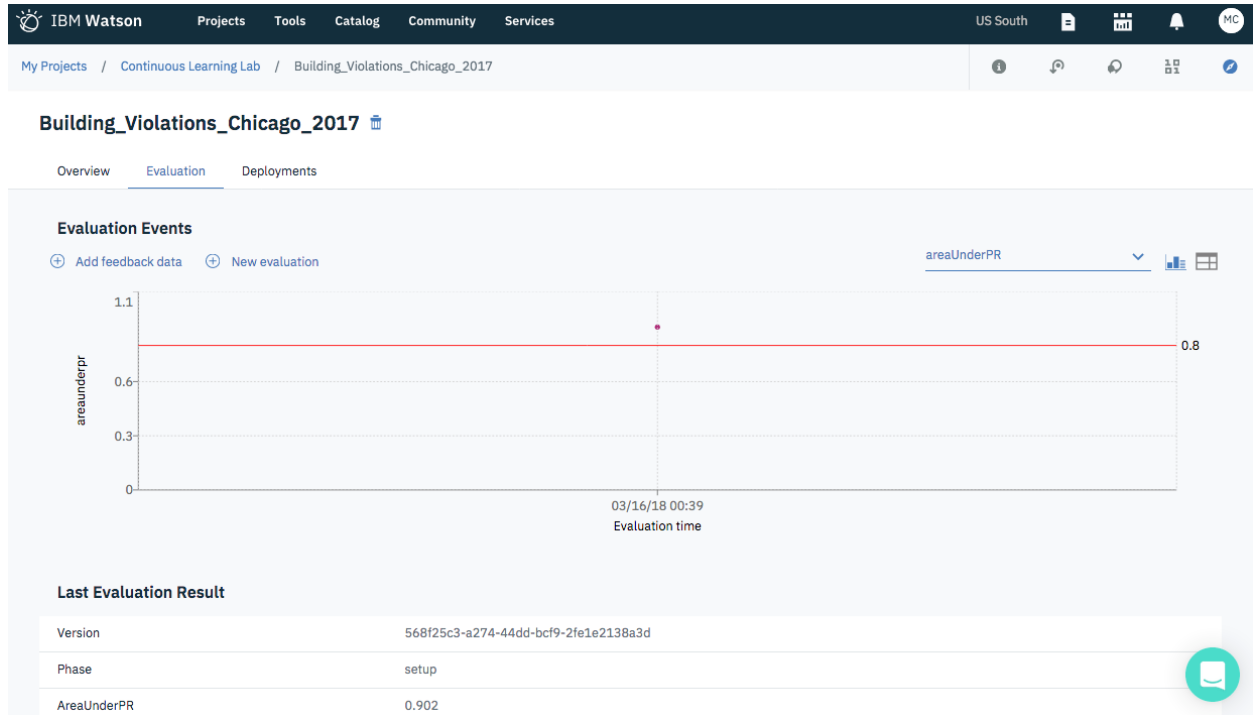
Auto deploy

never

Cancel

Save

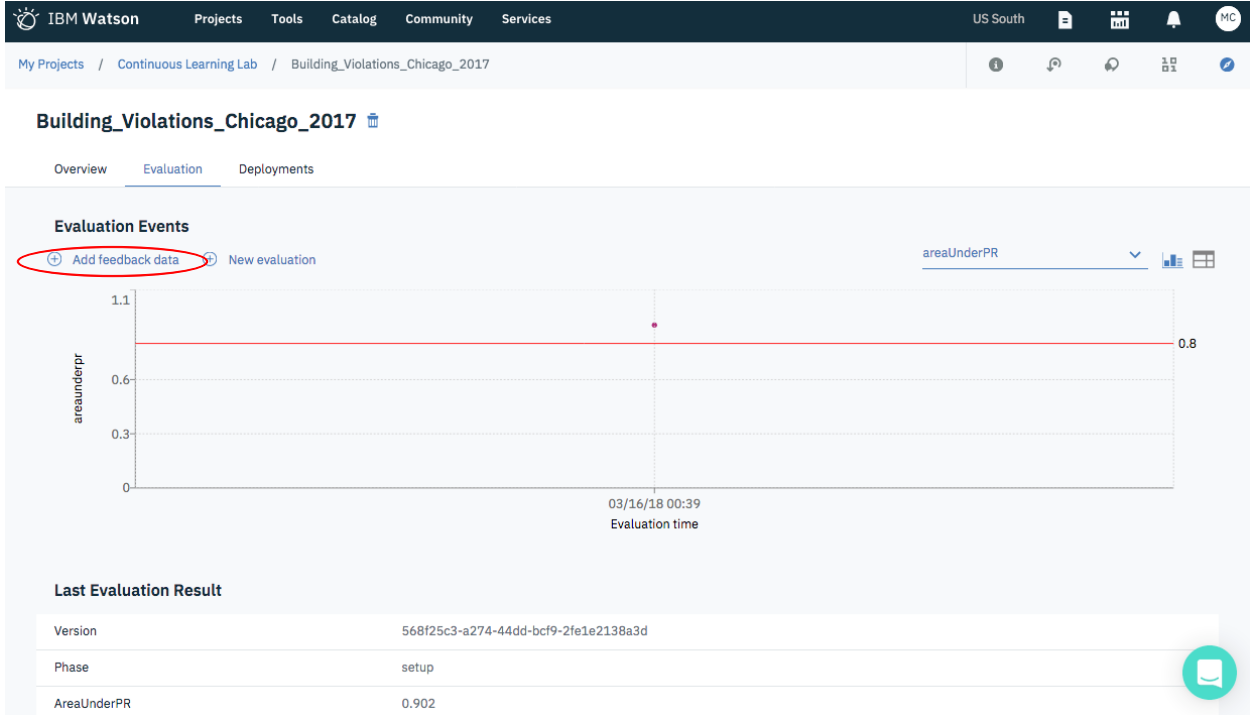
We have just set our model to retrain whenever its performance falls below 0.8. The evaluation screen has changed to reflect the decisions we have just made. Notice the graph lists our current areaunderPR and the threshold we have set. Clicking on Add feedback data will upload a new dataset. Clicking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

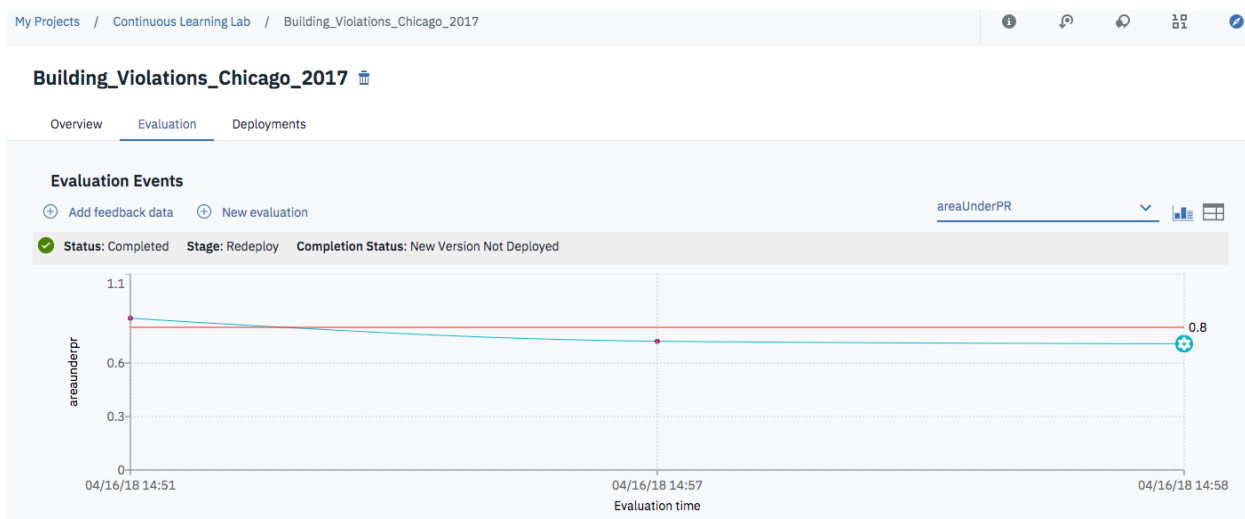
17. Click Add feedback data.

18. Select building\_violations\_October.csv.



19. 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 more files. If you scroll down you will be able to see all model versions listed. We have three versions, but no deployments.

My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017

**Last Evaluation Result**

Version	e2a674a9-e916-4eb0-81d3-702ce33fa9ba
Phase	training
AreaUnderPR	0.738

**Performance Monitoring** [Edit configuration](#)

Performance Metrics (Threshold)	areaUnderPR (0.8)
Feedback Data Source	dashdb: BLUDB / New2017Table
Record Count Required For Re-Evaluation	500
Auto Re-Train	conditionally
Auto Re-Deploy	never

**Versions**

TIME	VERSION	DEPLOYED	AREAUNDERPR	ACTIONS
16 Apr 2018 03:03pm	e2a674a9-e916-4eb0-81d3-702ce33fa9ba		0.738	⋮
16 Apr 2018 02:57pm	4cc6abb1-f3be-4e3b-b26d-b9c2dc67abec		0.708	⋮
16 Apr 2018 02:51pm	66245399-4be3-470d-b190-c849a076947a		0.851	⋮

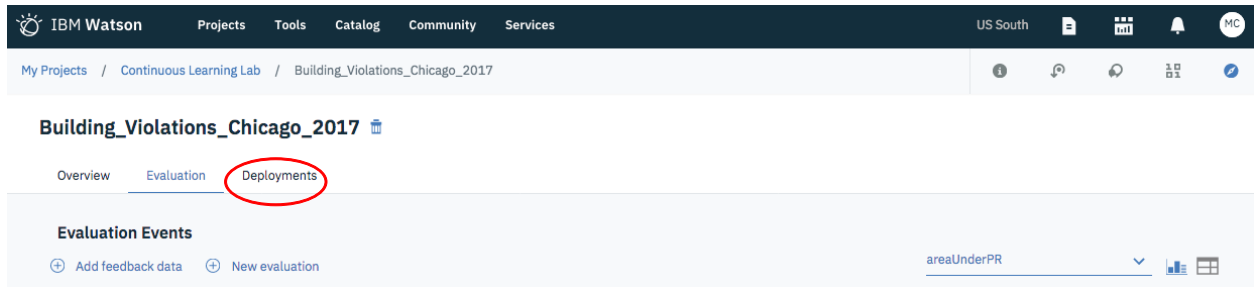
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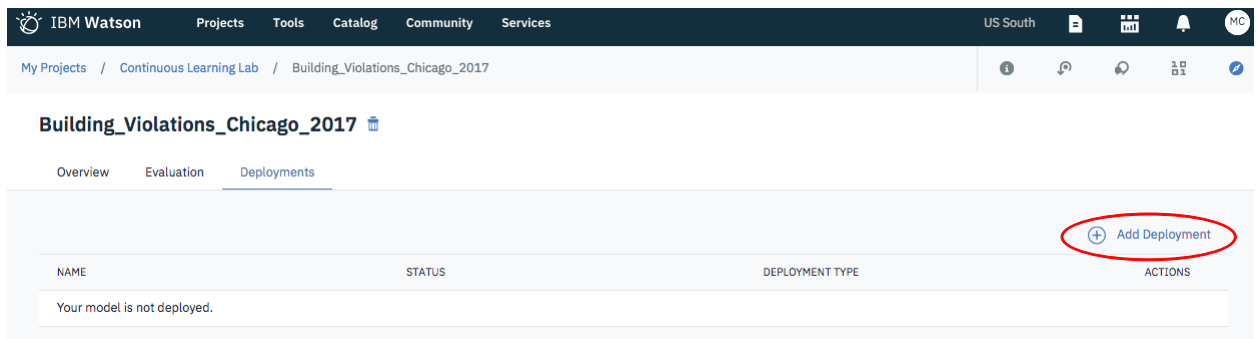
# Step 4 Deploy a Machine Learning Model.

Now we will focus on deployment.

1. Click the Deployment tab.



2. Add Deployment.



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

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### Create Deployment

Web Service Batch Prediction Real-time Streaming Predictions

**Name**  
ChicagoOnline

**Description**  
Building violations 2017 model deployment.

258

Cancel Save

The model is now accessible by external systems.

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

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My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017

### Building\_Violations\_Chicago\_2017

Overview Evaluation Deployments

+ 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.

The screenshot shows the IBM Watson interface. At the top, there is a dark blue navigation bar with the IBM Watson logo and links for Projects, Tools, Catalog, Community, and Services. On the right side of this bar, it says 'US South' and has icons for a document, a grid, a bell, and a user profile. Below the navigation bar is a breadcrumb trail: 'My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017 / ChicagoOnline'. The main content area is titled 'ChicagoOnline'. Below this title are three tabs: 'Overview', 'Implementation' (which is circled in red), and 'Test'. The 'Implementation' tab is active and shows two sections: 'Deployment' and 'Model'. The 'Deployment' section contains a table with the following data:

Name	ChicagoOnline
Type	Web Service
Deployment ID	0bfd9e9c-6a0e-4577-b5ee-9420dfb4955e
Status	DEPLOY_SUCCESS
Machine learning service	predictive-modeling-jg
Created	15 Mar 2018 03:35pm
Last modified	15 Mar 2018 03:35pm

The 'Model' section contains a single row with the following data:

Name	Building_Violations_Chicago_2017
------	----------------------------------

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 interface. The top navigation bar includes 'IBM Watson', 'Projects', 'Tools', 'Community', 'Services', 'Docs', 'Support', 'Manage', and a user profile icon. The breadcrumb trail is 'My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017 / ChicagoOnline'. The main content area is titled 'ChicagoOnline' and has three tabs: 'Overview', 'Implementation', and 'Test'. The 'Test' tab is selected and circled in red. Below the tabs, there is a section titled 'Implementation' with a 'View API Specification' link. This section contains a table with three rows: 'Scoring End-point' with a long URL, 'Authorization: Bearer <token>' with a note to see code snippets, and 'Content-type: application/json' with a note that it's required for JSON bodies. Below this is a 'Code Snippets' section with tabs for 'cURL', 'Java', 'JavaScript', 'Python', and 'Scala'. The 'cURL' tab is selected, showing a code block with instructions to retrieve service credentials and a cURL command to get an authentication token. The code block also includes a TODO note and a partial cURL command for a POST request.

IBM Watson Projects Tools Community Services Docs Support Manage

My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017 / ChicagoOnline

### ChicagoOnline

Overview Implementation **Test**

#### Implementation

[View API Specification](#)

Scoring End-point	<a href="https://ibm-watson-ml.mybluemix.net/v3/wml_instances/06dfe38c-13c0-417c-980c-d74b6e0da298/published_models/a14ff2e1-5ce9-416a-ab1e-902898671137/deployments/c72cc266-3ae6-418d-a40b-dd69f763efa1/online">https://ibm-watson-ml.mybluemix.net/v3/wml_instances/06dfe38c-13c0-417c-980c-d74b6e0da298/published_models/a14ff2e1-5ce9-416a-ab1e-902898671137/deployments/c72cc266-3ae6-418d-a40b-dd69f763efa1/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 '{"fields": [
```



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.

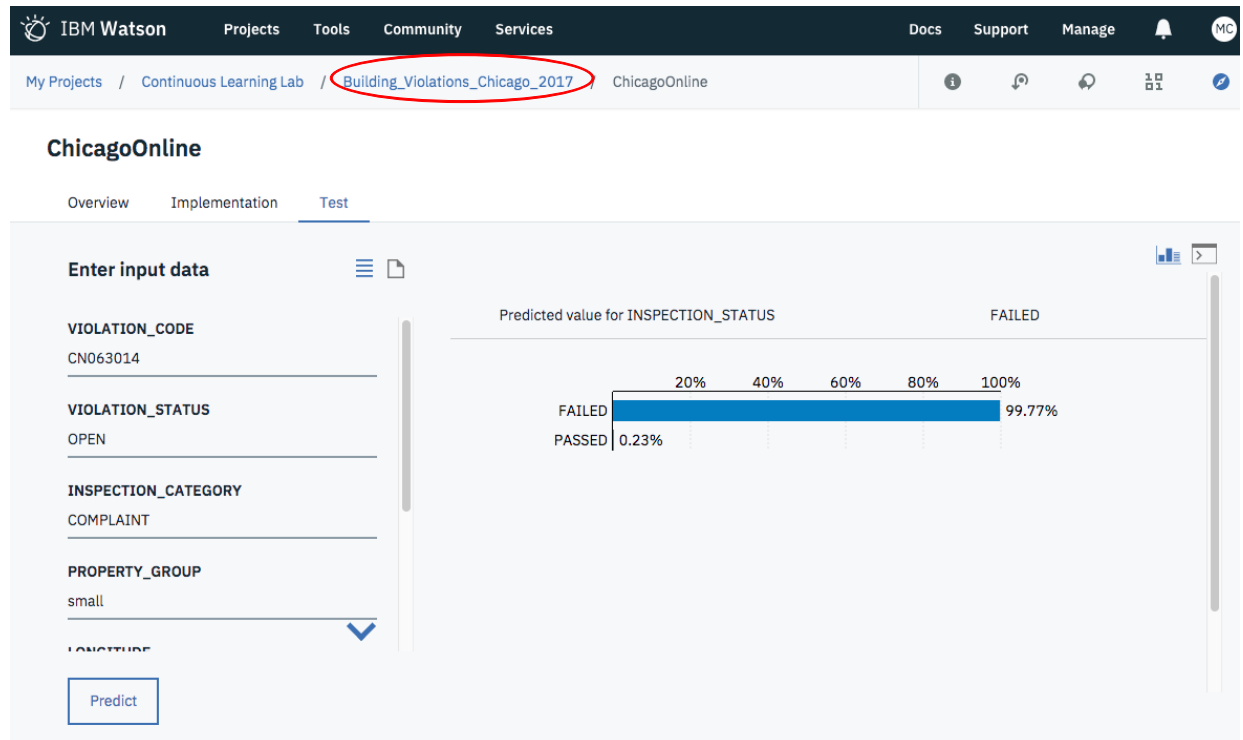
The screenshot shows the IBM Watson ChicagoOnline interface. The top navigation bar includes the IBM Watson logo and links to Projects, Tools, Catalog, Community, and Services. The user is logged in as 'US South'. The breadcrumb trail indicates the path: My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017 / ChicagoOnline. The main heading is 'ChicagoOnline'. Below it, there are three tabs: Overview, Implementation, and Test. The 'Test' tab is selected. The 'Enter input data' section contains several input fields with the following values: VIOLATION\_CODE (CN063014), VIOLATION\_STATUS (OPEN), INSPECTION\_CATEGORY (COMPLAINT), PROPERTY\_GROUP (small), and LONGITUDE (-87.691078). A blue checkmark is visible next to the LONGITUDE field. At the bottom of the input section, there is a 'Predict' button, which is circled in red.

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According to our model, a building with our input data has a 0.23% chance of passing inspection.

11. Feel free to change the input data and run new predictions. When ready, click on your 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', and 'Services'. The breadcrumb trail is 'My Projects / Continuous Learning Lab / Building\_Violations\_Chicago\_2017'. The 'Evaluation' tab is selected and circled in red. Below the tabs, the 'Summary' section displays the following details:

Property	Value
Machine learning service	predictive-modeling-xd
Model Type	wml-1.1
Runtime environment	spark-2.1
Training date	16 Apr 2018, 2:51 PM
Label column	INSPECTION_STATUS
Latest version	e2a674a9-e916-4eb0-81d3-702ce33fa9ba
Model builder details	<a href="#">View</a>

The 'Input Schema' section shows the following columns and types:

COLUMN	TYPE
VIOLATION_CODE	string
VIOLATION_STATUS	string

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.

Versions				
TIME	VERSION	DEPLOYED	AREAUNDERPR	ACTIONS
16 Apr 2018 03:03pm	e2a674a9-e916-4eb0-81d3-702ce33fa9ba		0.738	⋮
16 Apr 2018 02:57pm	4cc6abb1-f3be-4e3b-b26d-b9c2dc67abec		0.708	⋮
16 Apr 2018 02:51pm	66245399-4be3-470d-b190-c849a076947a	✓	0.851	⋮

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*