

Lab: Introduction to Watson OpenScale

Introduction

Businesses today are increasingly certain that AI will be a driving force in the evolution of their industries over the next few years. Yet for every successful AI project, there are many that fail to reach widespread adoption in the business and achieve their expected outcomes. This is partly because the mechanics of AI deployment can be complex, and there are still gaps in skills and tooling that can make it difficult for data science, IT operations, and business teams to work in lockstep. But beyond the operational challenges, there are also much more profound issues of trust and transparency that businesses need to address before they can truly turn AI into a business advantage.

Knowledge workers must be able to trust AI and explain the decisions it helps make before they will incorporate it in their business processes. If AI is a black box that simply takes in data and produces obscure, unexplainable outcomes, then there is no way for the business to judge whether these systems are producing fair, accurate outcomes, or have confidence in AI's ability to augment decision-making. Equally, the business will not be able to explain outcomes to customers, auditors, or compliance teams.

IBM Watson OpenScale is an open platform that helps remove barriers to enterprise-scale AI. Watson OpenScale enables the enterprise to:

- Measure performance of production AI and its impact on business goals
- Track actionable metrics in a single console
- Explain AI outcomes
- Detect and mitigate harmful bias to improve outcomes
- Accept feedback to compute accuracy measures
- Accelerate the integration of AI into existing business applications.

Objectives

The goal of this lab is to familiarize the user with the features of Watson OpenScale. After completing this lab, you will understand how to:

1. Import a machine learning model
2. Deploy the model
3. Provision Watson OpenScale
4. Configure the payload logging database and Machine Learning provider
5. Score Data
6. Prepare Deployed Model for Monitoring
7. Configure Payload Logging
8. Configure Quality
9. Configure Fairness
10. Configure Drift
11. Submit Feedback and View Quality Metrics

12. Score Data and View Fairness Metrics
13. Explain a Transaction.

Lab Use Case

Traditional lenders are under pressure to expand their digital portfolio of financial services to a larger and more diverse audience, which requires a new approach to credit risk modeling. Their data science teams currently rely on standard modeling techniques - like decision trees and logistic regression - which work well for moderate datasets and make recommendations that can be easily explained. This satisfies regulatory requirements that credit lending decisions must be transparent and explainable.

To provide credit access to a wider and riskier population, applicant credit histories must expand beyond traditional credit, like mortgages and car loans, to alternate credit sources like utility and mobile phone plan payment histories, plus education and job titles. These new data sources offer promise, but also introduce risk by increasing the likelihood of unexpected correlations which introduce bias based on an applicant's age, gender, or other personal traits.

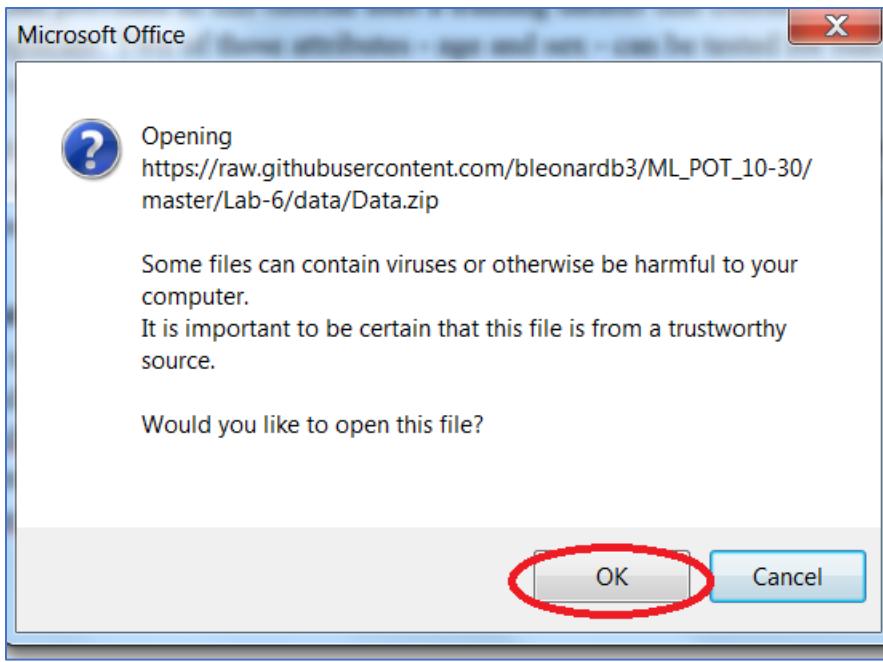
The data science techniques most suited to these diverse datasets, such as gradient boosted trees and neural networks, can generate highly accurate risk models, but at a cost. Such "black box" models generate opaque predictions that must somehow become transparent, to ensure regulatory approval such as Article 22 of the General Data Protection Regulation (GDPR), or the federal Fair Credit Reporting Act (FCRA) managed by the Consumer Financial Protection Bureau.

The credit risk model provided in this tutorial uses a training dataset that contains 20 attributes about each loan applicant. Two of those attributes - age and sex - can be tested for bias. For this tutorial, the focus will be on bias against sex and age.

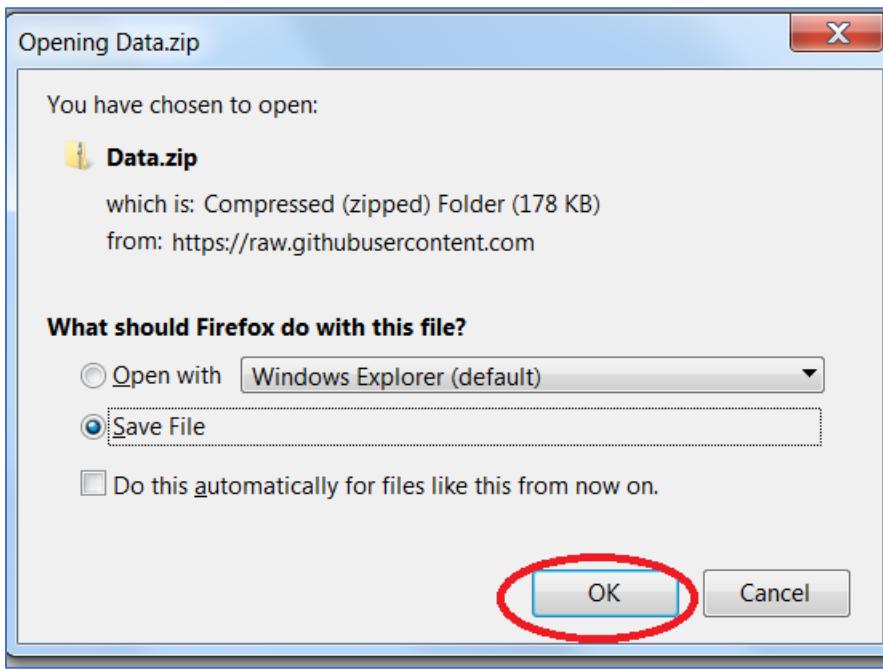
Watson OpenScale will monitor the deployed model's propensity for a favorable outcome ("No Risk") for one group (the Reference Group) over another (the Monitored Group). In this tutorial, the Monitored Group for sex is `female`, while the Monitored Group for age is `19 to 25`.

Download the Lab Files

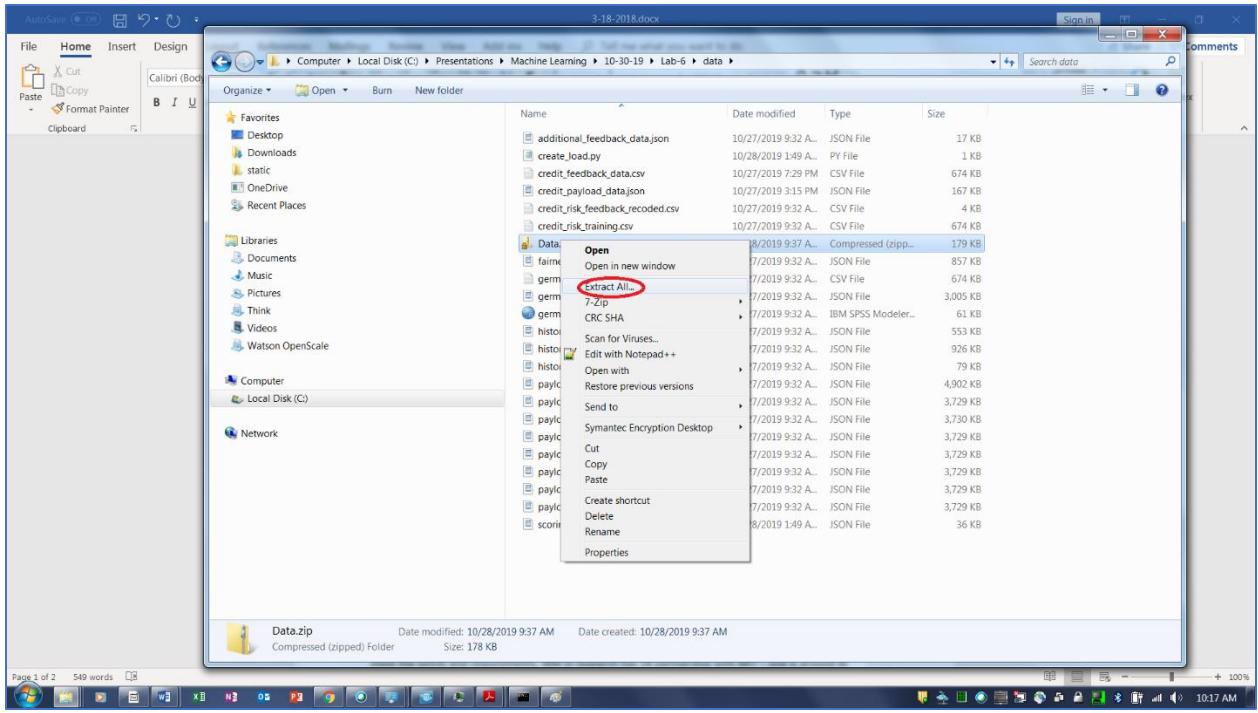
1. Click [here](#) to download the Data.zip file.
 1. `credit_feedback_data.csv`
 2. `credit_payload_data.json`
 3. `german_credit_data_biased_training.csv`
 4. `scoring.json`
2. Click **OK**. Note your browser may not prompt this message.



3. Click **OK**.



4. Navigate to the folder where the file is saved. Select the Data.zip file, right-click, and click **Extract All**.

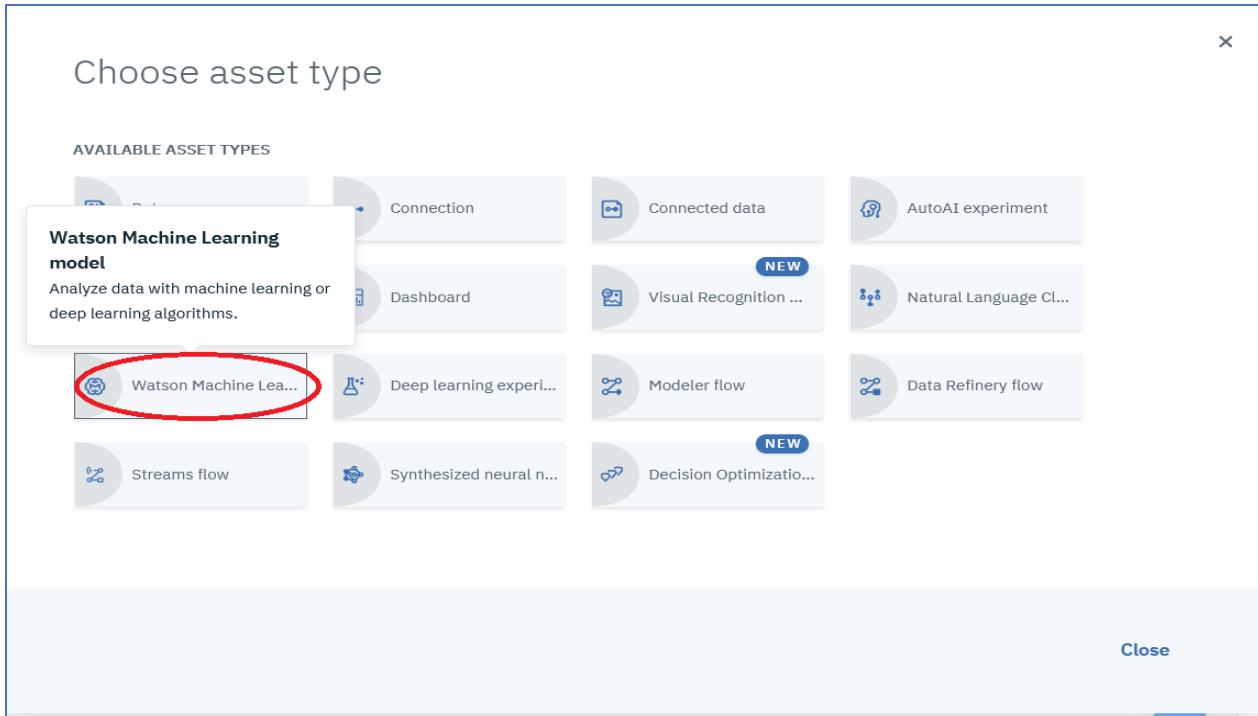


Import the Credit Risk Model

- From the Watson Studio project, click on **Add to project**.

The screenshot shows the Watson Studio interface with the 'Assets' tab selected. The 'Add to project' button is circled in red.

- Click on **Watson Machine Learning**.



- From the **Import model** page, click on **From sample** for the **Select model type**, click on **Credit Risk**, and then click on **Import**.

Deploy the Credit Risk Model

- From the **Model** page, click on the **Deployments** tab.

MODEL
credit-risk

Overview Evaluation **Deployments** Lineage

Summary

| | |
|--------------------------|--------------------------------------|
| Machine learning service | WatsonMachineLearning |
| Model Type | mllib-2.3 |
| Runtime environment | spark-2.3 |
| Training date | 27 Oct 2019, 1:11 PM |
| Label column | Risk |
| Latest version | fd202530-8cb7-48f1-a172-1575bee01ddd |

2. Click on **Add Deployments**.

My Projects / Watson Studio Labs / credit-risk

MODEL
credit-risk

Overview Evaluation **Deployments** Lineage

Add Deployment +

| NAME | STATUS | DEPLOYMENT TYPE | ACTIONS |
|-----------------------------|--------|-----------------|---------|
| Your model is not deployed. | | | |

3. From the **Create Deployment** page, type **credit-risk-deploy** for the **Name**, select **Web service** for the Deployment type, and click on **Save**.

Create Deployment

Define deployment details

Name

Description

Deployment type
 Web service
 Batch prediction

Cancel **Save**

4. The deployment status should go from **INITIALIZING** to **DEPLOY SUCCESS**. If the status doesn't change after a minute or so, refresh the browser.

The screenshot shows the 'credit-risk' model details page in Watson Studio. The 'Deployments' tab is selected. A table lists one deployment entry:

| NAME | STATUS | DEPLOYMENT TYPE | ACTIONS |
|--------------------|----------------|-----------------|---------|
| credit-risk-deploy | DEPLOY_SUCCESS | Web Service | |

The 'DEPLOY_SUCCESS' status is highlighted with a red oval.

Provision Watson OpenScale.

1. Right-click on the **IBM Watson Studio** label and click on **Open link in New Tab**.

The screenshot shows a browser context menu with the 'Open Link in New Tab' option circled in red. The menu also includes other options like 'Open Link in New Window' and 'Open Link in New Private Window'.

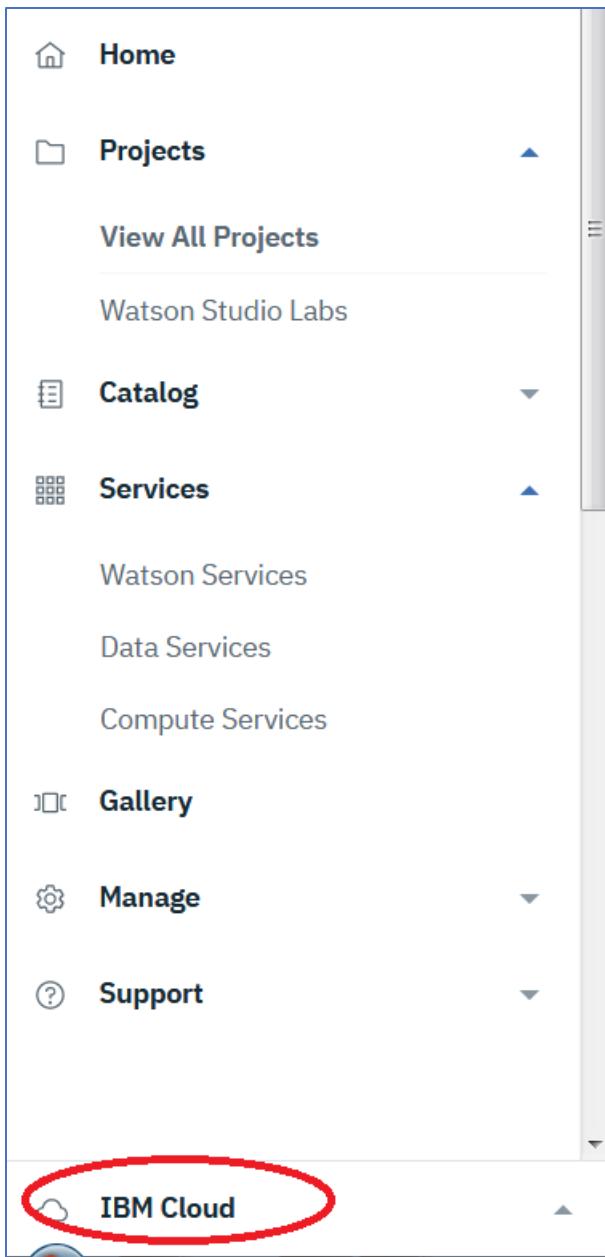
2. Click on the new **Watson Studio** browser tab.



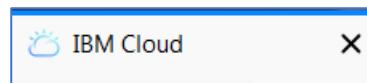
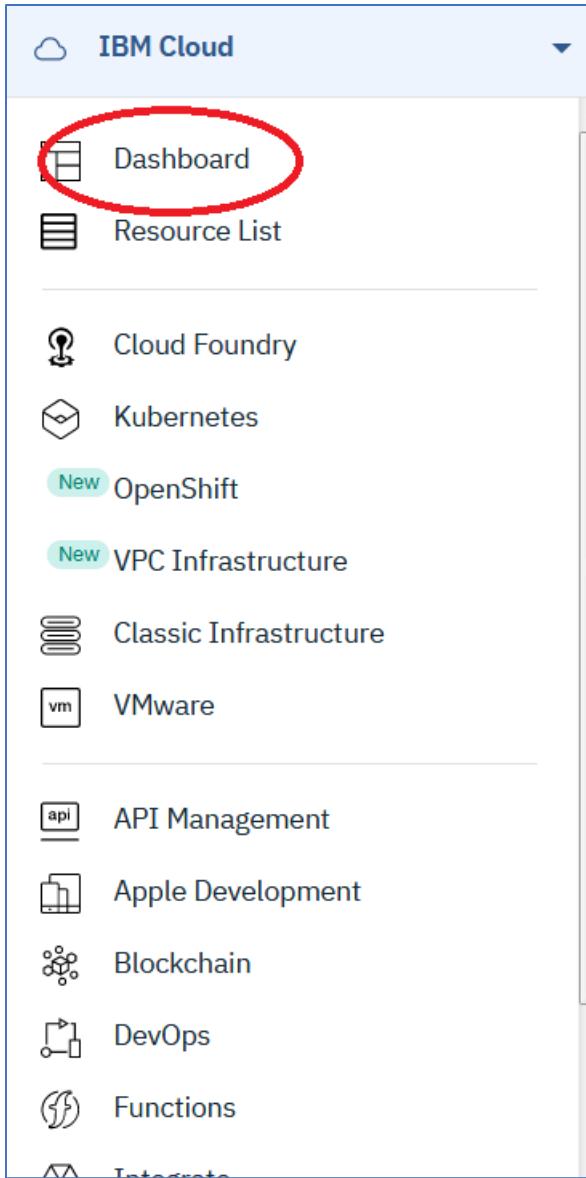
3. Click on the hamburger icon in the top left corner.

The screenshot shows the Watson Studio interface with the top navigation bar. The hamburger icon is circled in red. The bar also includes 'Upgrade', 'Felix Doe's Account', and other account-related links.

4. Click on **IBM Cloud**.



5. Click on **Dashboard**.



6. Note that the browser tab has been renamed to IBM Cloud.
7. Click on **Catalog**



8. Click on **AI**

Catalog

All Categories (50)

VPC Infrastructure

Compute (2)

Containers (1)

Networking

Storage (1)

AI (16) 



Analytics (4)

Databases (3)

Developer Tools (8)

Integration (4)

Internet of Things (1)

Security and Identity (3)

Starter Kits (1)

Web and Mobile (2)

Web and Application (4)

9. Scroll down and click on Watson OpenScale.

Catalog

label:lite

All Categories (50)

VPC Infrastructure

Compute (2)

Containers (1)

Networking

Storage (1)

AI (16) 

Analytics (4)

Databases (3)

Developer Tools (8)

Integration (4)

Internet of Things (1)

Security and Identity (3)

Starter Kits (1)

Web and Mobile (2)

Web and Application (4)

psychological traits.

APIs and services

APIs and services

APIs and services



Tone Analyzer

IBM

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, social, and language. This insight can th...

APIs and services



Visual Recognition

IBM

Find meaning in visual content! Analyze images for scenes, objects, and other content. Choose a default model off the shelf, or create your own...

APIs and services

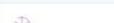


Voice Agent with Watson

IBM

Create a cognitive voice agent that uses Watson services to speak directly with customers using natural language over the telephone

APIs and services



Watson OpenScale

IBM

IBM Watson OpenScale is an enterprise-grade environment for AI infused applications that provides enterprises with visibility into how AI is...

APIs and services

10. Click on Create.

The screenshot shows the Watson OpenScale creation interface. At the top, there are tabs for 'Create' and 'About'. Below this, a section for 'Select a region' has 'Dallas' selected. Under 'Select a pricing plan', it shows the 'Lite' plan with its features and pricing details. To the right, a summary panel displays service information like 'Region: Dallas', 'Plan: Lite', and 'Service name: Watson OpenScale-13'. A large blue 'Create' button is prominently displayed at the bottom right of the main form, which is circled in red.

11. Click on Manage.

The screenshot shows the IBM Cloud dashboard. On the left, a sidebar menu includes 'Getting started' and 'Manage', with 'Manage' circled in red. The main content area shows a 'Watson OpenScale-94' resource card with details like 'Resource group: Default', 'Location: Dallas', and 'Add tags'. Below this, a 'Getting started tutorial (automated setup)' is listed with a last update date of '2020-01-28'. The overall interface is dark-themed.

12. Click on Launch Application.

Manage
Plan

Resource list /
 Watson OpenScale-13
Resource group: Default Location: Dallas [Add Tags](#)



Watson OpenScale

Welcome to Watson OpenScale, let's get started.

[Launch Application](#)

13. Make sure to click on **Manual setup**.



Welcome to Watson OpenScale

Watson OpenScale monitors the health of AI models in operation, detects model bias, and provides explanations for every model transaction.

To get up-and-running, we'll set up a machine learning provider, lite database, and sample model for you. The process will take about 10 minutes. Ready to go?

[Manual setup](#) Auto setup

Setup System

1. In the system setup, we need to set up a database to collect the payload logging data. We also need to specify which deployed model will be monitored.
2. Click on **Free Lite plan database** for **Database type** and click on **Save**.

System setup

| | | |
|---|---|---|
| Database Machine learning providers | Required Database Description Select a database to store your model transactions and model evaluation results. A free database is available for Lite plan users to get started. Alternatively, you can use an existing PostgreSQL or Db2 database (lite Db2 plans not supported). You can also purchase a new database. <i>Note: The free Lite plan database is not GDPR compliant. If your model processes personally identifiable information (PII), you must purchase a new database or use an existing database that does conform to GDPR rules. Learn more.</i> | Database type Choose an option free lite plan database (highlighted) Compose for PostgreSQL Databases for PostgreSQL Db2 |
|---|---|---|

3. Click **Save**.

System setup

| | | |
|---|---|--|
| Database Machine learning providers | Required Database Description Select a database to store your model transactions and model evaluation results. A free database is available for Lite plan users to get started. Alternatively, you can use an existing PostgreSQL or Db2 database (lite Db2 plans not supported). You can also purchase a new database. <i>Note: The free Lite plan database is not GDPR compliant. If your model processes personally identifiable information (PII), you must purchase a new database or use an existing database that does conform to GDPR rules. Learn more.</i> | Database type Free lite plan database Purchase a database Cancel Save (highlighted) |
|---|---|--|

4. Click on **Machine learning providers**.

System setup

| | | |
|---|--|--|
| Machine learning providers (highlighted) | Required Database Description The Watson OpenScale database stores your model transactions and model evaluation results. | Database Database type: Free lite plan database Database: Internal database Schema: public |
|---|--|--|

5. Click on pencil icon to edit the connection.

The screenshot shows the 'System setup' interface with the 'Machine learning providers' section selected. On the left, there's a sidebar with 'Database' (selected), 'Machine learning providers' (selected), and 'Integrations (optional) beta'. In the center, it says 'New provider' and has a 'Description' field with a placeholder 'Click edit to enter provider description.' On the right, there's a 'Connection' field with a pencil icon, which is circled in red. Below it, it says 'Click edit to enter the connection information.'

6. Click on **Watson Machine Learning** for the **Service provider type**.

The screenshot shows the 'System setup' interface with the 'Machine learning providers' section selected. On the left, there's a sidebar with 'Database' (selected), 'Machine learning providers' (selected), and 'Integrations (optional) beta'. In the center, it says 'Connection' and has a 'Description' field with a placeholder 'Connect to the provider where your deployed models are stored and specify if the environment is a pre-production or production environment.' Below it are sections for 'Pre-production environments' and 'Production environments'. On the right, there's a 'Service provider type' dropdown menu with options: 'Choose an option' (selected), 'Watson Machine Learning' (highlighted with a red circle), 'Custom Environment', 'Amazon SageMaker', 'Microsoft Azure ML Studio', and 'Microsoft Azure ML Service'.

7. Click on **WatsonMachineLearning** for the **Watson Machine Learning service**. Click on **Production** for the **Environment type**. Click on **Save**.

System setup

Prepare Watson OpenScale for use by connecting it to a database, a machine learning provider, and integrated services.

Database **Machine learning providers** **Integrations (optional) beta**

Connection

Description
Connect to the provider where your deployed models are stored and specify if the environment is a pre-production or production environment.

Pre-production environments
Test pre-production models by uploading test data sets (csv files) and running evaluations. When the model is ready, approve it for production.

Production environments
Monitor production models by logging model transactions and sending feedback (labeled test data) to Watson OpenScale for continuous evaluation.

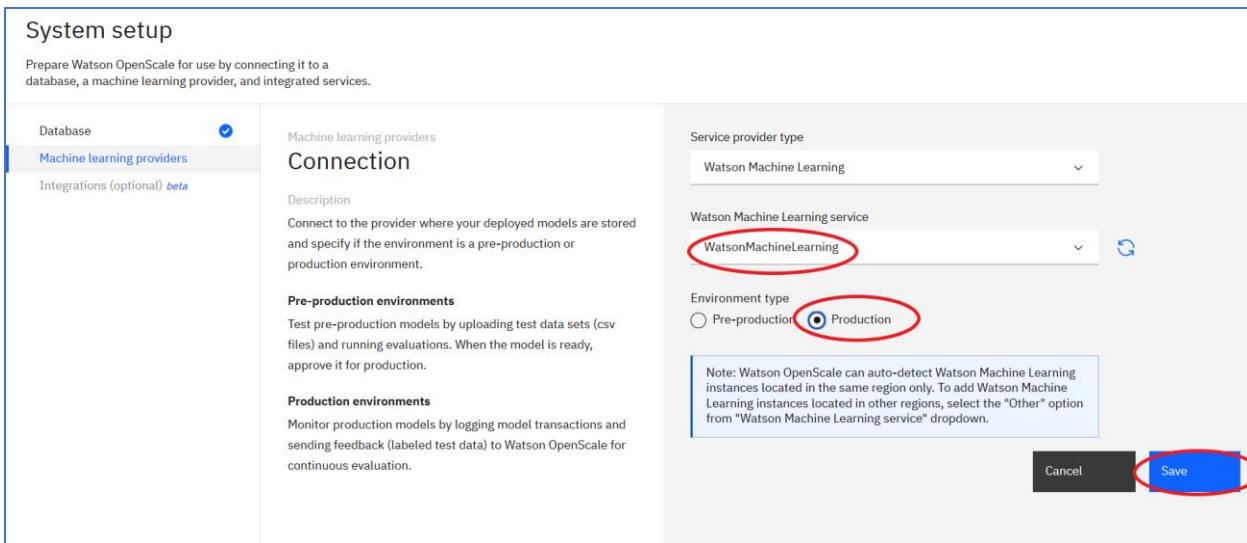
Service provider type
Watson Machine Learning

Watson Machine Learning service
 WatsonMachineLearning

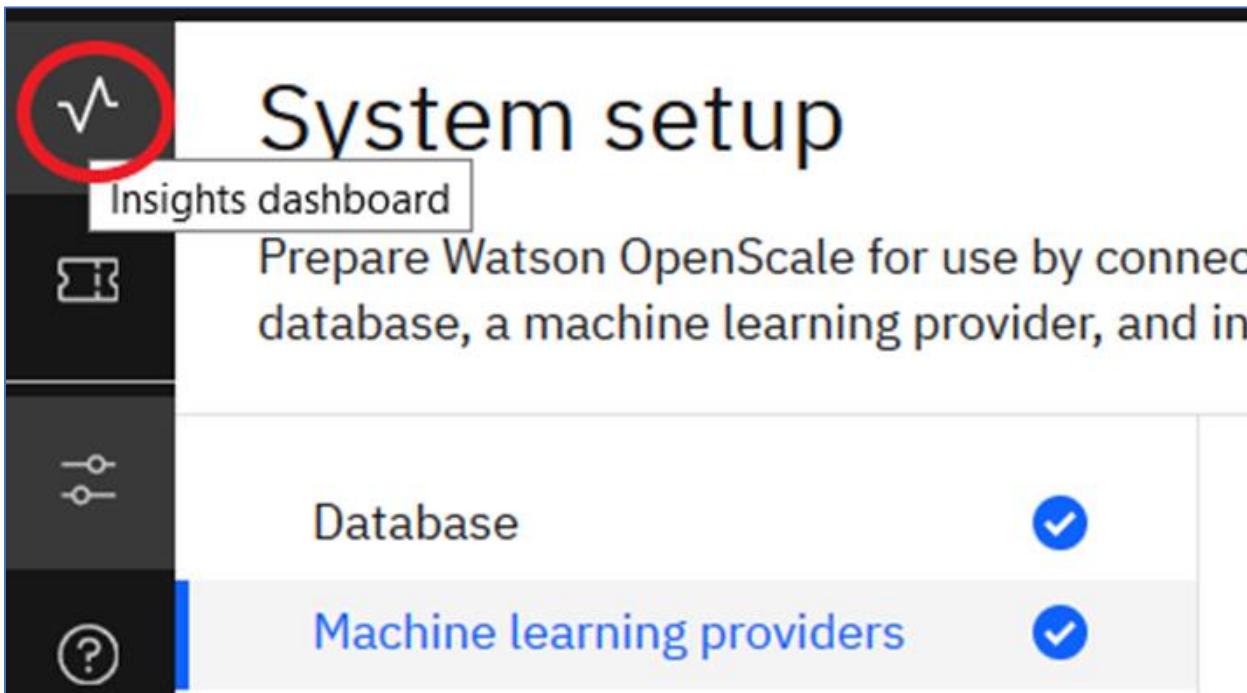
Environment type
 Pre-production Production

Note: Watson OpenScale can auto-detect Watson Machine Learning instances located in the same region only. To add Watson Machine Learning instances located in other regions, select the "Other" option from "Watson Machine Learning service" dropdown.

Cancel **Save**



8. Click on the  icon.



9. Click on **Add** to add a deployment to monitor.

b

The screenshot shows the Insights Dashboard interface. At the top left, there is a sidebar with a single item labeled "Model Monitors" and a count of "0". Below this, there are four main monitoring categories displayed in a grid:

| Deployments Monitored | Quality Alerts | Fairness Alerts | Drift Alerts |
|-----------------------|----------------|-----------------|--------------|
| 0 | 0 | 0 | 0 |

In the center of the dashboard, there is a message: "Add a deployed model to get started." Below this message is a blue button with the word "Add" in white. A red oval highlights this "Add" button.

10. Click on **credit-risk-deploy** and then click on **Configure** to configure the model details, and the quality, fairness, and drift monitors.

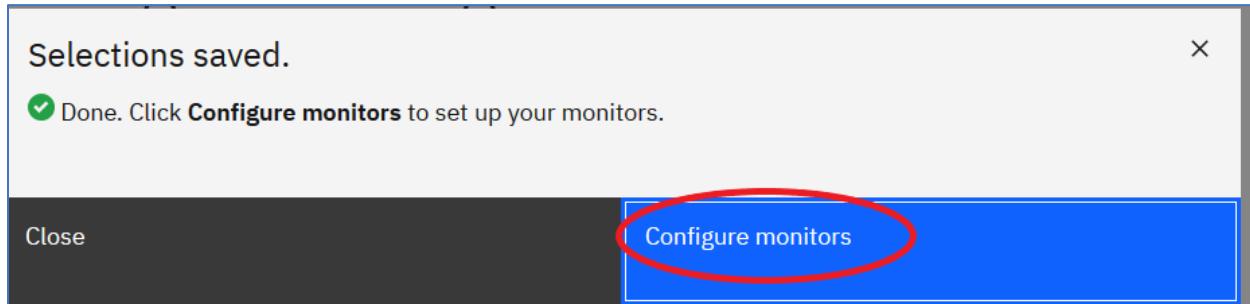
The screenshot shows a modal dialog box titled "Select a model deployment". The dialog contains the following elements:

- A close button "X" in the top right corner.
- A descriptive text: "Select the deployment you want to monitor."
- A "Machine learning Provider" dropdown menu set to "New provider (Production)".
- A table listing a single deployment entry:

| Deployment | Description | Created |
|--------------------|-------------|---------------------------------|
| credit-risk-deploy | | Tue, Mar 24, 2020, 11:52 AM EDT |

At the bottom of the dialog, there are two buttons: "Cancel" and "Configure". The "Configure" button is highlighted with a red oval.

11. Click on **Configure monitors**.



12. Setup is now complete. Do not proceed until you do the scoring step below.

Score Data

Before proceeding with the monitor configuration, we need to send scoring data to the deployed model in order to generate payload logging data that the monitors can consume. We will use the `credit_risk_data.json` file as sample data that Watson Studio will submit to the deployed model.



1. Click on the **Watson Studio** Browser tab
2. You should be back at the **credit-risk Model** page. Click on **credit-risk-deploy**.

The image shows a screenshot of the Watson Studio interface. At the top, there's a navigation bar with 'My Projects' and 'Watson Studio Labs' followed by a separator and 'credit-risk'. Below this is a 'MODEL' section with the name 'credit-risk'. Underneath, there are tabs: 'Overview', 'Evaluation', 'Deployments' (which is highlighted in blue), and 'Lineage'. The main area shows a table of deployments. The first row in the table has columns: 'NAME', 'STATUS', 'DEPLOYMENT TYPE', and 'ACTIONS'. The 'NAME' column contains 'credit-risk-deploy', which is circled in red. The 'STATUS' column shows 'DEPLOY_SUCCESS'. The 'DEPLOYMENT TYPE' column shows 'Web Service'. There is also a small 'Add Deployment' button at the top right of the table.

| NAME | STATUS | DEPLOYMENT TYPE | ACTIONS |
|--------------------|----------------|-----------------|----------------|
| credit-risk-deploy | DEPLOY_SUCCESS | Web Service | Add Deployment |

3. Click on the **Test** tab.

| credit-risk-deploy | |
|--------------------------|--------------------------------------|
| Overview | Implementation |
| Deployment | |
| Name | credit-risk-deploy |
| Type | Web Service |
| Deployment ID | 203b492f-f9ca-4166-95c9-a93e3018f091 |
| Status | DEPLOY_SUCCESS |
| Asset type | model |
| Asset name | credit-risk |
| Machine learning service | WatsonMachineLearning |
| Created | 27 Oct 2019 01:18pm |
| Last modified | 27 Oct 2019 03:20pm |

4. Click on the  icon to accept input as JSON.

credit-risk-deploy

- Overview
- Implementation
- Test

Enter input data



Provide input data as JSON

Paste the request payload here

Predict

5. Copy the file contents of **credit_payload_data.json** into the **input data** area and click on **Predict**.

credit-risk-deploy

Overview

Implementation

Test

Enter input data



```
{  
  "fields":  
    ["CheckingStatus", "LoanDuration", "CreditHistory", "Loa  
    nPurpose", "LoanAmount", "ExistingSavings", "Employme  
    ntDuration", "InstallmentPercent", "Sex", "OthersOnLoan  
    ", "CurrentResidenceDuration", "OwnsProperty", "Age", "I  
    nstallmentPlans", "Housing", "ExistingCreditsCount", "Jo  
    b", "Dependents", "Telephone", "ForeignWorker"],  
  "values":  
    []
```

Predict

6. The results should appear as below.

credit-risk-deploy

Overview

Implementation

Test

Enter input data



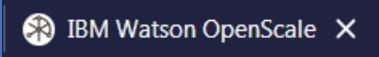
```
{  
  "fields":  
    ["CheckingStatus", "LoanDuration", "CreditHistory", "Loa  
    nPurpose", "LoanAmount", "ExistingSavings", "Employme  
    ntDuration", "InstallmentPercent", "Sex", "OthersOnLoan  
    ", "CurrentResidenceDuration", "OwnsProperty", "Age", "I  
    nstallmentPlans", "Housing", "ExistingCreditsCount", "Jo  
    b", "Dependents", "Telephone", "ForeignWorker"],  
  "values":  
    []
```

Predict

```
{  
  "fields": [  
    "CheckingStatus",  
    "LoanDuration",  
    "CreditHistory",  
    "LoanPurpose",  
    "LoanAmount",  
    "ExistingSavings",  
    "EmploymentDuration",  
    "InstallmentPercent",  
    "Sex",  
    "OthersOnLoan",  
    "CurrentResidenceDuration",  
    "OwnsProperty",  
    "Age",  
    "InstallmentPlans",  
    "Housing",  
    "ExistingCreditsCount",  
    "Job",  
    "Dependents",  
    "Telephone",  
    "ForeignWorker"]  
}
```

Configure Model Details

1. Switch back to Watson OpenScale by clicking on the Watson OpenScale browser tab.



2. Click on pencil icon to edit the **Model input**.

The screenshot shows the "Model details" page. On the left, there's a "Model details" section with a "Description" field containing placeholder text about training data and model output. On the right, there's a "Model input" section with a descriptive text and a blue-bordered edit icon (pencil symbol) in the top right corner.

3. Click on **Numeric/categorical** for the **Data type**. Click on **Binary classification** for the **Algorithm type**. Click on **Save and Continue**.

The screenshot shows a modal dialog titled "Select input type and algorithm". It has a "Description" field with placeholder text. Below it are three options: "Numeric/categorical" (selected), "Image", and "Unstructured text". On the right side of the dialog, there are two dropdown menus: "Data type" set to "Numeric/categorical" and "Algorithm type" set to "Binary classification". At the bottom right of the dialog is a "Save and continue" button with a blue border and a red circle around it, and a "Cancel" button.

4. Click on pencil icon to edit **Training data**.

Model details

Description

Provide information about the training data and deployed model output to prepare Watson OpenScale for monitoring and providing explanations for model transactions.

Model input

Data type
Numeric/categorical

Algorithm type
Binary classification

Training data

To connect to the training data, click the edit icon.

Training data label

5. Accept the defaults for the database configuration and click **Next**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------------|----------------------------------|
| Model details | <input type="radio"/> |
| Quality | <input type="radio"/> |
| Fairness | <input type="radio"/> |
| Explainability | <input type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

This is the preferred option. Use this option if the training data is stored in a Db2 database or cloud object storage.

Restricted (statistics only)

Use this option if you do not want to provide the training data. Analyze the training data in a data science notebook to generate a file containing training data statistics.

dashdb-txn-sbox-yp-dal09-03.services.dal.bluemix.net

SSL port
50001

Database
BLUDB

Username
cmb91569

Password

Schema
CMB91569

Table
CREDIT_RISK_TRAIN_DATA

Cancel **Next**

6. Watson OpenScale has determined that Risk is the label (target) column. Click **Next**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------------|----------------------------------|
| Model details | <input type="radio"/> |
| Quality | <input type="radio"/> |
| Fairness | <input type="radio"/> |
| Explainability | <input type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

Select the label column

Description

From the selected training features, select a single feature as the label. The label represents the correct prediction (ground-truth) for each record.

Select the label column

Features (1)

| Features (1) | Type |
|--------------|------|
| Risk | A |

Cancel **Back** **Next**

7. All of the features are used to train the model. Watson OpenScale has determined the feature types. Click **Next**.

Dashboard / Configure
credit-risk-deploy

Select the training features

Model details

- Quality
- Fairness
- Explainability
- Drift
- Endpoints

Description

From the training data, select the features used to train the model.

For each selected feature with a numeric data type, indicate if the numeric feature values represent codes or categories by checking the Categorical checkbox. This instructs OpenScale to process the feature as a set of classifications (ex. ZIP code) rather than continuous numeric values (ex. median household income).

| Features (20) | Type | Categorical |
|--------------------------|------|-------------------------------------|
| Age | 88 | <input type="checkbox"/> |
| CheckingStatus | A | <input checked="" type="checkbox"/> |
| CreditHistory | A | <input checked="" type="checkbox"/> |
| CurrentResidenceDuration | 88 | <input type="checkbox"/> |
| Dependents | 88 | <input type="checkbox"/> |
| EmploymentDuration | A | <input checked="" type="checkbox"/> |

Cancel Back **Next**

8. Logging has already been configured and is shown active. Click **Next**.

Dashboard / Configure
credit-risk-deploy

Examining model output

Model details

- Quality
- Fairness
- Explainability
- Drift
- Endpoints

Description

Watson OpenScale tracks and stores transactions processed by this model. To prepare Watson OpenScale, send a scoring request. You can send a scoring request in one of the following ways:

Send JSON payload

Enter payload data and send a scoring request directly from Watson OpenScale.

Use the payload logging API

Send a scoring request from an external application or data science notebook using code snippets.

Scoring method

Automatic logging

Logging is active Click Next

Cancel Back **Next**

9. Watson OpenScale has determined the feature that contains the prediction generated by the AI deployment. Click **Save**.

10. Model details are now complete. Note that Explainability input is also complete. The next step is to configure Quality.

Configure Quality

The Quality Monitor evaluates how well your deployed model predicts accurate outcomes. It identifies when model quality declines so you can retrain appropriately.

1. Click **Quality** to configure the quality inputs.

2. Click on the pencil icon to edit the **Quality threshold**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------|----------------------------------|
| Model details | <input checked="" type="radio"/> |
| Quality | <input type="radio"/> |
| Fairness | <input type="radio"/> |
| Explainability | <input checked="" type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

Quality

Description

The Quality monitor evaluates how well your model predicts accurate outcomes. It identifies when model quality declines, so you can retrain your model appropriately.

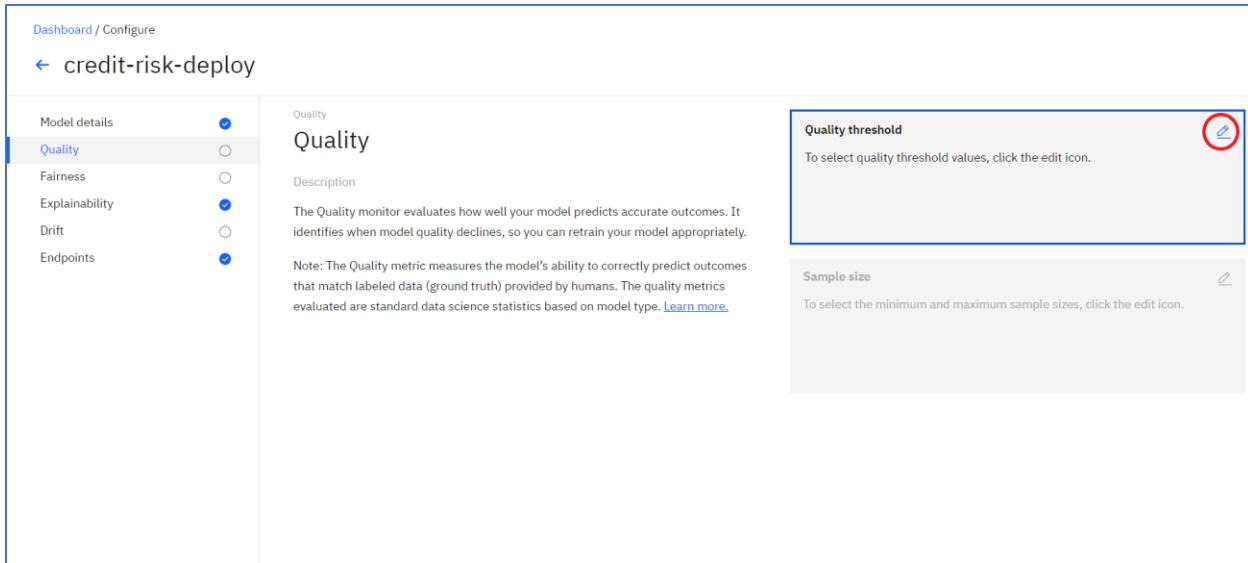
Note: The Quality metric measures the model's ability to correctly predict outcomes that match labeled data (ground truth) provided by humans. The quality metrics evaluated are standard data science statistics based on model type. [Learn more](#).

Quality threshold

To select quality threshold values, click the edit icon.

Sample size

To select the minimum and maximum sample sizes, click the edit icon.



3. Enter .9. Disregard the .8 shown in the screen print. Click **Next**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------|----------------------------------|
| Model details | <input checked="" type="radio"/> |
| Quality | <input type="radio"/> |
| Fairness | <input type="radio"/> |
| Explainability | <input checked="" type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

Quality threshold

Description

Area under ROC

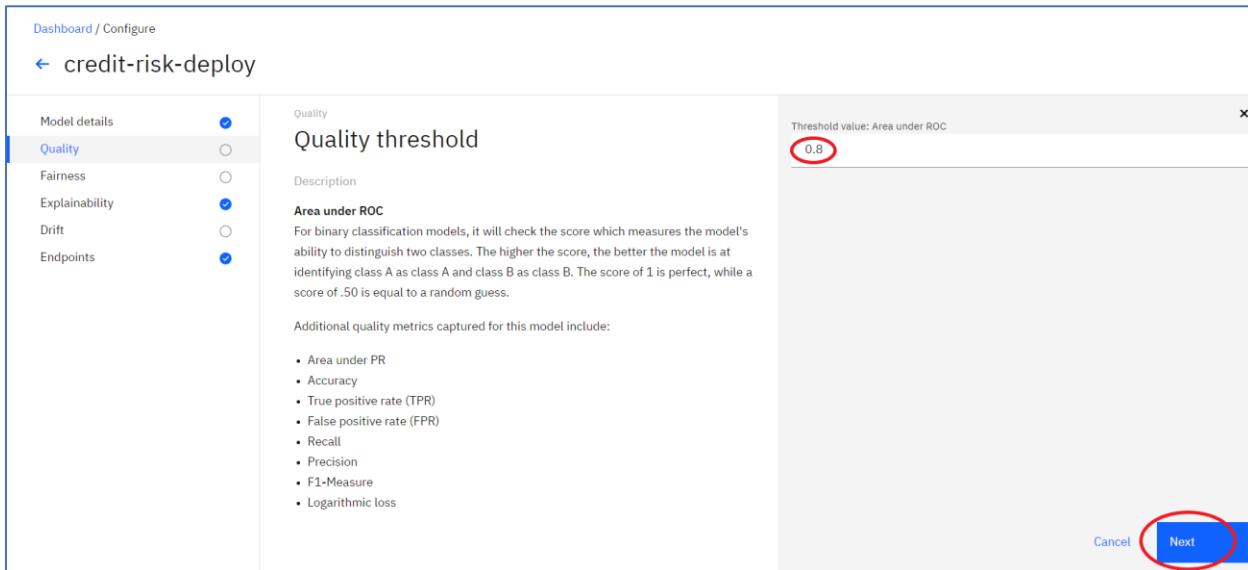
For binary classification models, it will check the score which measures the model's ability to distinguish two classes. The higher the score, the better the model is at identifying class A as class A and class B as class B. The score of 1 is perfect, while a score of .50 is equal to a random guess.

Additional quality metrics captured for this model include:

- Area under PR
- Accuracy
- True positive rate (TPR)
- False positive rate (FPR)
- Recall
- Precision
- F1-Measure
- Logarithmic loss

Threshold value: Area under ROC
0.8

Cancel Next



4. Set minimum and maximum values for the sample size to be analyzed for quality. 100 is chosen for the minimum sample size, and 10000 is chosen for the maximum. Click **Save**.

Dashboard / Configure

← credit-risk-deploy

| Model details | |
|----------------|----------------------------------|
| Quality | <input checked="" type="radio"/> |
| Fairness | <input type="radio"/> |
| Explainability | <input checked="" type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

Quality

Sample size

Description

Ensure that your minimum sample size is large enough to be accurately represent the variety of requests the deployment receives. Set the maximum sample size to limit the volume of data analyzed.

Minimum sample size (number of transactions)
100

Maximum sample size (number of transactions)
10000

Cancel Back Save

5. This completes the **Quality** configuration. The next step is to configure Fairness.

Configure Fairness

The Fairness monitor checks your deployment for biases. It tracks when the model shows a propensity to provide a particular outcome more often for one group over another.

1. Click on **Fairness** to configure the Fairness monitor.

Dashboard / Configure

← credit-risk-deploy

| Model details | |
|----------------|----------------------------------|
| Quality | <input checked="" type="radio"/> |
| Fairness | <input checked="" type="radio"/> |
| Explainability | <input type="radio"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="radio"/> |

Quality

Description

The Quality monitor evaluates how well your model predicts accurate outcomes. It identifies when model quality declines, so you can retrain your model appropriately.

Note: The Quality metric measures the model's ability to correctly predict outcomes that match labeled data (ground truth) provided by humans. The quality metrics evaluated are standard data science statistics based on model type. [Learn more](#).

Quality threshold

Threshold value: Area under ROC
0.8

Sample size

Minimum sample size
100

Maximum sample size
10,000

2. Click on the pencil icon to edit the **Favorable outcomes**.

Dashboard / Configure

credit-risk-deploy

Model details

Quality

Fairness

Explainability

Drift

Endpoints

Fairness

Description

The Fairness monitor checks your deployments for biases. It tracks when the model shows a tendency to provide a favorable (preferable) outcome more often for one group over another. You will specify which values represent favorable outcomes, select the features to monitor for bias (for example, Age or Sex), and specify the groups to monitor for each selected feature.

Favorable outcomes

To select the favorable outcomes, click the edit icon.

Sample size

To select the minimum sample size, click the edit icon.

Features to evaluate (0)

Add feature +

7:50 PM

3. Check the Favorable check box for **No Risk** and check the Unfavorable check box for **Risk**. Then click **Next**.

Dashboard / Configure

credit-risk-deploy

Model details

Quality

Fairness

Explainability

Drift

Endpoints

Select the favorable outcomes

Description

For each group, Watson OpenScale will calculate the percentage of transactions that receive a favorable outcome.

Select the values that represent favorable (preferable) outcomes. You can also add a value manually if it is not included in the list.

Select the favorable outcomes

Enter a value

Add value

| Values | Favorable | Unfavorable |
|---------|-------------------------------------|-------------------------------------|
| No Risk | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Risk | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Cancel Next

7:50 PM

4. Change the **Minimum sample size** to 200 and click **Next**.

The screenshot shows the Watson OpenScale configuration interface for a deployment named 'credit-risk-deploy'. On the left, a sidebar lists 'Model details', 'Quality', 'Fairness' (which is selected), 'Explainability', 'Drift', and 'Endpoints'. The main area is titled 'Fairness' and contains a 'Sample size' section. A tooltip provides a description: 'Ensure that your minimum sample size is large enough to be accurately represent the variety of requests the deployment receives.' A modal dialog box is open, asking for the 'Minimum sample size (number of transactions)' with the value '200' highlighted by a red circle. At the bottom right of the dialog are 'Cancel', 'Back', and 'Next' buttons, with 'Next' also circled in red.

5. Scroll if needed and click on the **Sex** check box and the **Age** check box to monitor those features for bias, and then click on **Next**.

The screenshot shows the 'Select the features to monitor' dialog. It lists several features with checkboxes: 'Sex' (checked and circled in red), 'OthersOnLoan', 'CurrentResidenceDuration', 'OwnsProperty', 'Age' (checked and circled in red), 'InstallmentPlans', and 'Housing'. Each feature has a small icon and a 'Details' button. Below the list are 'Cancel', 'Back', and 'Next' buttons, with 'Next' circled in red.

6. Enter 19 for the **minimum value** and 25 for the maximum value and then click **Add value**. We are defining the age range 19-25 as the age monitoring group.

Dashboard / Configure

credit-risk-deploy

Model details

- Quality
- Fairness
- Explainability
- Drift
- Endpoints

Fairness

Specify the monitored groups for [Age]

Description

Add value ranges and select the groups to monitor. Minimum and maximum values from the training data are presented for reference.

The percentage of favorable outcomes delivered to the monitored groups will be compared to the percentage of favorable outcomes delivered to the remaining groups (the reference groups) to check for potential bias.

A fairness score of 100% implies that the monitored group and reference group received an equal number of favorable values. Likewise, a fairness score of 50% implies that the monitored group received half as many favorable outcomes as the reference group.

Set the fairness alert threshold to track when the fairness value falls below an acceptable level.

Select the groups to monitor [Age]

Minimum value: 19 Maximum value: 74

19 25 Add value

| Values | Monitored | Reference | Recommended |
|--------|--------------------------|--------------------------|-------------|
| 19-25 | <input type="checkbox"/> | <input type="checkbox"/> | |

Set fairness alert threshold [Age]

80

Cancel Back Next

Specify the monitored groups for [Age]

19-25

Set fairness alert threshold [Age]

80

7. Enter 26 as the **minimum value** and 74 as the **maximum value** and then click **Add value**. We are defining the age range 26-74 as the reference group.

Dashboard / Configure

credit-risk-deploy

Model details

- Quality
- Fairness
- Explainability
- Drift
- Endpoints

Fairness

Specify the monitored groups for [Age]

Description

Add value ranges and select the groups to monitor. Minimum and maximum values from the training data are presented for reference.

The percentage of favorable outcomes delivered to the monitored groups will be compared to the percentage of favorable outcomes delivered to the remaining groups (the reference groups) to check for potential bias.

A fairness score of 100% implies that the monitored group and reference group received an equal number of favorable values. Likewise, a fairness score of 50% implies that the monitored group received half as many favorable outcomes as the reference group.

Set the fairness alert threshold to track when the fairness value falls below an acceptable level.

Select the groups to monitor [Age]

Minimum value: 19 Maximum value: 74

26 74 Add value

| Values | Monitored | Reference | Recommended |
|--------|--------------------------|--------------------------|-------------|
| 19-25 | <input type="checkbox"/> | <input type="checkbox"/> | |

Set fairness alert threshold [Age]

80

Cancel Back Next

Specify the monitored groups for [Age]

19-25

Set fairness alert threshold [Age]

80

8. Check the **Monitored** check box for the 19-25 group and check the **Reference** check box for the 26-74 group. Set **95%** for the **fairness alert threshold**. Click **Next**.

9. Check the **Monitored** check box for female and check the **Reference** check box for male. Set **95%** for the **fairness alert threshold**. Click on **Save**.

10. This completes the Fairness configuration. The next step is to configure Drift.

Configure Drift

The Drift monitor measures two types of changes. It measures the drop in accuracy of the deployed model during runtime. The model accuracy could drop if there is an increase in the number of transactions similar to ones that the model was not able to accurately evaluate in the training data.

It measures the drop in consistency of the data in runtime as compared to the characteristics of the data at training.

1. Click on **Drift** to configure the Drift monitor.

The screenshot shows the Watson OpenScale configuration interface for a model named "credit-risk-deploy". On the left, a sidebar lists "Model details" with checkboxes for Quality (checked), Fairness, Explainability, Drift (unchecked), and Endpoints. The main content area is titled "Quality" and contains a "Description" section stating: "The Quality monitor evaluates how well your model predicts accurate outcomes. It identifies when model quality declines, so you can retrain your model appropriately." Below this is a note: "Note: The Quality metric measures the model's ability to correctly predict outcomes that match labeled data (ground truth) provided by humans. The quality metrics evaluated are standard data science statistics based on model type. [Learn more](#)". To the right, there are two sections: "Quality threshold" (threshold value: Area under ROC 0.9) and "Sample size" (minimum sample size 100, maximum sample size 10,000).

2. Click on the pencil icon to select a **drift model training option**.

The screenshot shows the Watson OpenScale configuration interface for the same model "credit-risk-deploy". The sidebar now has "Drift" checked. The main content area is titled "Drift" and contains a "Description" section stating: "The drift test measures two types of changes." Below this are two sections: "Drop in accuracy" (structured binary and multi-class classification models only) and "Drop in data consistency". The "Drop in accuracy" section notes: "Watson OpenScale estimates the drop in accuracy of the model at runtime. The model accuracy could drop if there is an increase in transactions similar to those which the model was unable to evaluate correctly in the training data." The "Drop in data consistency" section notes: "Watson OpenScale estimates the drop in consistency of the data at runtime as compared to the characteristics of the data at training time. A drop in model accuracy and data consistency may lead to a negative impact on the business outcomes associated with the model." To the right, there are three sections: "Drift model" (with a red circle around the edit icon), "Drift threshold" (with a red circle around the edit icon), and "Sample size" (with a red circle around the edit icon).

3. Watson OpenScale will detect a drop in accuracy using a custom drift model generated from the training data. Similarly, it detects a drop in data consistency by analyzing your training data. Click on **Train in Watson OpenScale**. Click **Next**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------|-------------------------------------|
| Model details | <input checked="" type="checkbox"/> |
| Quality | <input checked="" type="checkbox"/> |
| Fairness | <input checked="" type="checkbox"/> |
| Explainability | <input checked="" type="checkbox"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="checkbox"/> |

Train a drift model

Description

Watson OpenScale will detect a drop in accuracy using a custom drift model generated from your training data. Similarly, it detects a drop in data consistency by analyzing your training data. Watson OpenScale can analyze the data and train the model for you or you can do it yourself using a custom notebook.

Train in Watson OpenScale

If you connected your training data to Watson OpenScale and it is less than 500 MB, use this option.

Train in a data science notebook

If you did not connect your training data to Watson OpenScale or it exceeds 500 MB, use this option.

Training option

Train in Watson OpenScale

Train in a data science notebook

Cancel **Next**

4. Set the drift alert threshold. Leave **10%**. Click **Next**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------|-------------------------------------|
| Model details | <input checked="" type="checkbox"/> |
| Quality | <input checked="" type="checkbox"/> |
| Fairness | <input checked="" type="checkbox"/> |
| Explainability | <input checked="" type="checkbox"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="checkbox"/> |

Drift threshold

Description

Watson OpenScale will track the degree of change in model accuracy when compared to the accuracy at training time.

For example, if the accuracy of the model tested against the training data is 90% and the drift threshold is set to 5%, the estimated accuracy of the model on incoming transactions must be 85% or greater to avoid a threshold violation.

Testing the model on a sample of the training data set determines the baseline for measuring change. The drift measure will be reported as an estimated value with a specified margin of error. The drift threshold must be 5% or greater.

Drift threshold

10 %

Cancel Back **Next**

5. Set the **Sample size** to compute Drift. Select **200**. Click **Save**.

Dashboard / Configure

credit-risk-deploy

| | |
|----------------|-------------------------------------|
| Model details | <input checked="" type="checkbox"/> |
| Quality | <input checked="" type="checkbox"/> |
| Fairness | <input checked="" type="checkbox"/> |
| Explainability | <input checked="" type="checkbox"/> |
| Drift | <input type="radio"/> |
| Endpoints | <input checked="" type="checkbox"/> |

Drift

Sample size

Description

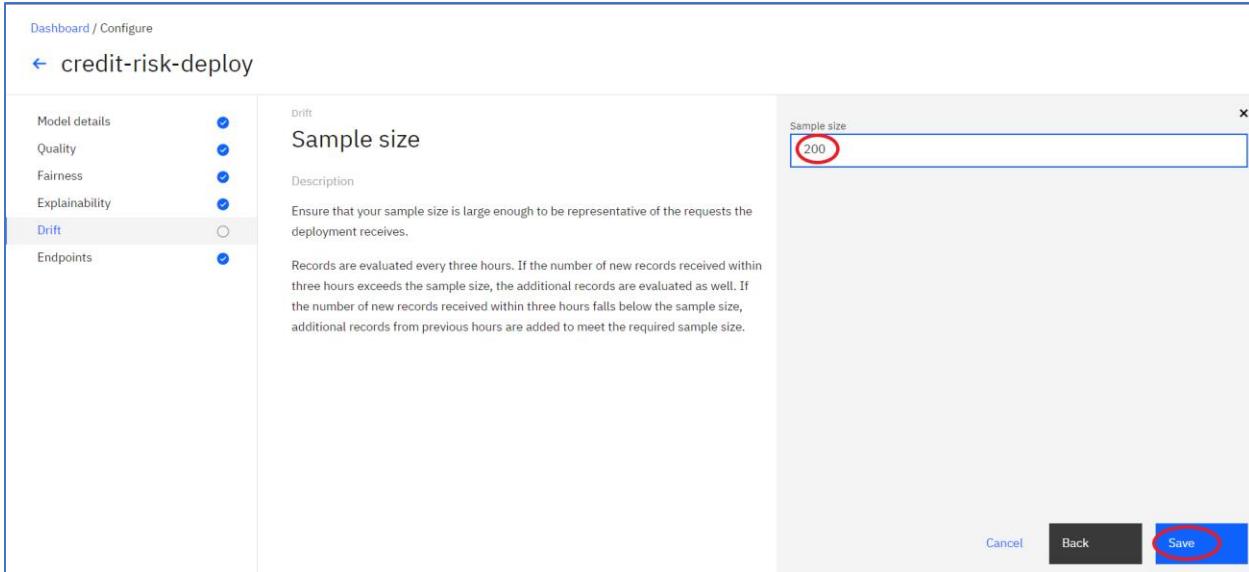
Ensure that your sample size is large enough to be representative of the requests the deployment receives.

Records are evaluated every three hours. If the number of new records received within three hours exceeds the sample size, the additional records are evaluated as well. If the number of new records received within three hours falls below the sample size, additional records from previous hours are added to meet the required sample size.

Sample size

200

Cancel Back Save



6. This completes the Drift configuration.

Submit Feedback and View Quality Metrics

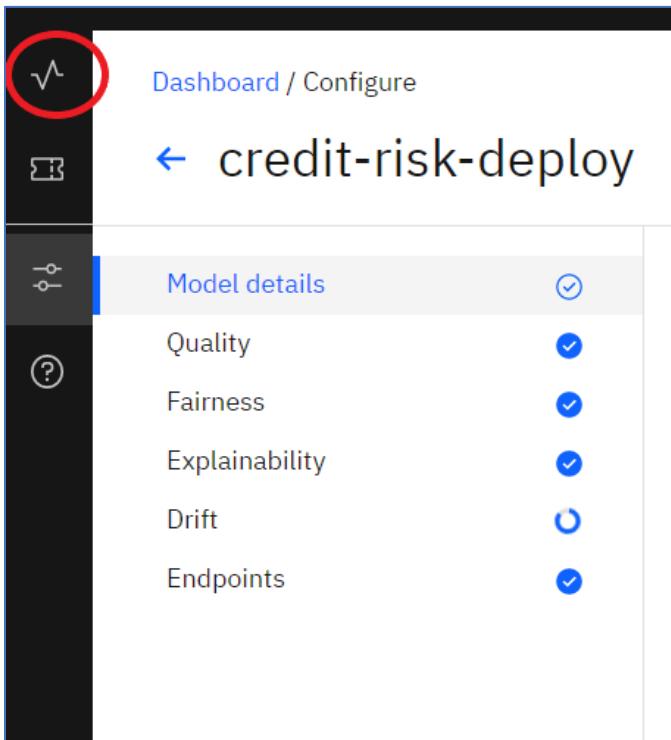
In order to measure quality, scored transactions including human labeled feedback must be provided.

1. Click on the  to display the **Insights Dashboard**.

Dashboard / Configure

credit-risk-deploy

| | | |
|---|----------------|-------------------------------------|
|  | Model details | <input checked="" type="checkbox"/> |
|  | Quality | <input checked="" type="checkbox"/> |
|  | Fairness | <input checked="" type="checkbox"/> |
|  | Explainability | <input checked="" type="checkbox"/> |
|  | Drift | <input type="radio"/> |
|  | Endpoints | <input checked="" type="checkbox"/> |



2. Click on vertical ellipse  and then click on **View Details**.

Insights Dashboard

| Model Monitors | Deployments | Quality Alerts | Fairness Alerts | Drift Alerts |
|----------------|----------------|----------------|-----------------|--------------|
| 1 | Monitored 1 | 0 | 0 | 0 |

 Quality and Fairness metrics update every hour. Drift metrics update every 3 hours.

| Watson Machine Learning | | ⋮ |
|-------------------------|-----|------------------------------------|
| credit-risk-deploy | | ⋮ |
| Issues | 0 | View details |
| | | Configure monitors |
| Quality | N/A | Remove deployment |

| Production | | |
|--------------------|--|--|
| Evaluation pending | | |

3. Click on **Area under ROC** and click on **Add feedback data**.

credit-risk-deploy

Model ID: 9d40ce8a-4c4a-47f9-951e-5d4c595a16a2 Created date: 3/24/2020 Configure monitors

Fairness
Sex
Age
Quality
Area under ROC (highlighted)
Area under PR
Accuracy
True positive rate (TPR)
False positive rate (FPR)
Recall
Precision
F1-Measure

Area under ROC

Area under recall and false positive rate curve. [Learn more.](#)

Time frame Date range

Hourly Daily Weekly Past 3 months Past week Yesterday Today Custom range

Schedule

Last Evaluation Not yet evaluated
Next Evaluation N/A
Check quality now
Add feedback data (highlighted)

- Watson OpenScale evaluates models for quality using labeled test data. Labeled test data is provided using the feedback endpoint or by file upload. We will use the file upload options. Click on **Upload feedback data**.

Dashboard / Configure

credit-risk-deploy

Model details Quality Fairness Explainability Drift Endpoints (highlighted)

Endpoints

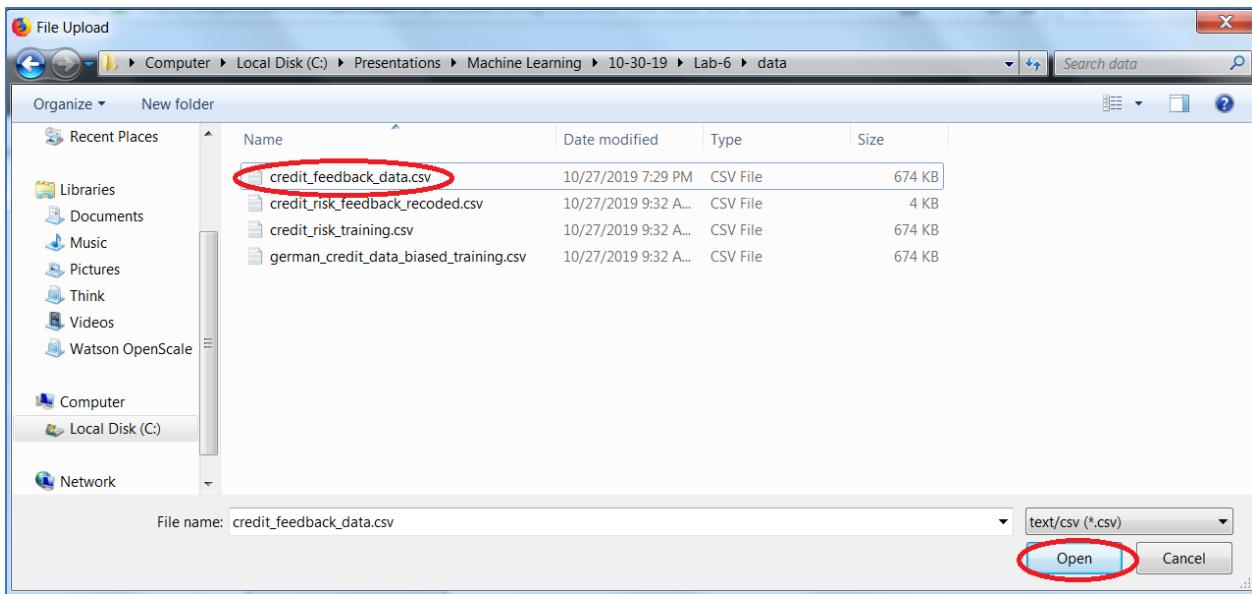
Description

Watson OpenScale evaluates models for fairness and drift using logged scoring requests (payloads) received by the model. Scoring requests are logged using the payload logging endpoint.

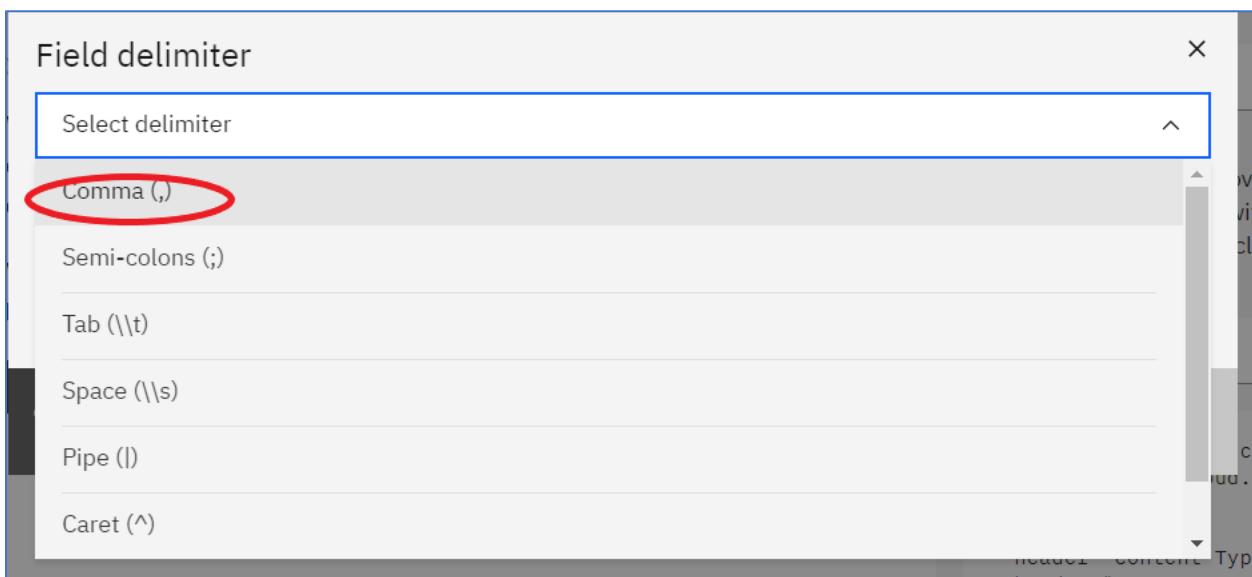
Watson OpenScale evaluates models for quality using labeled test data. Labeled test data is provided using the feedback endpoint or by file upload.

Upload feedback data (highlighted)

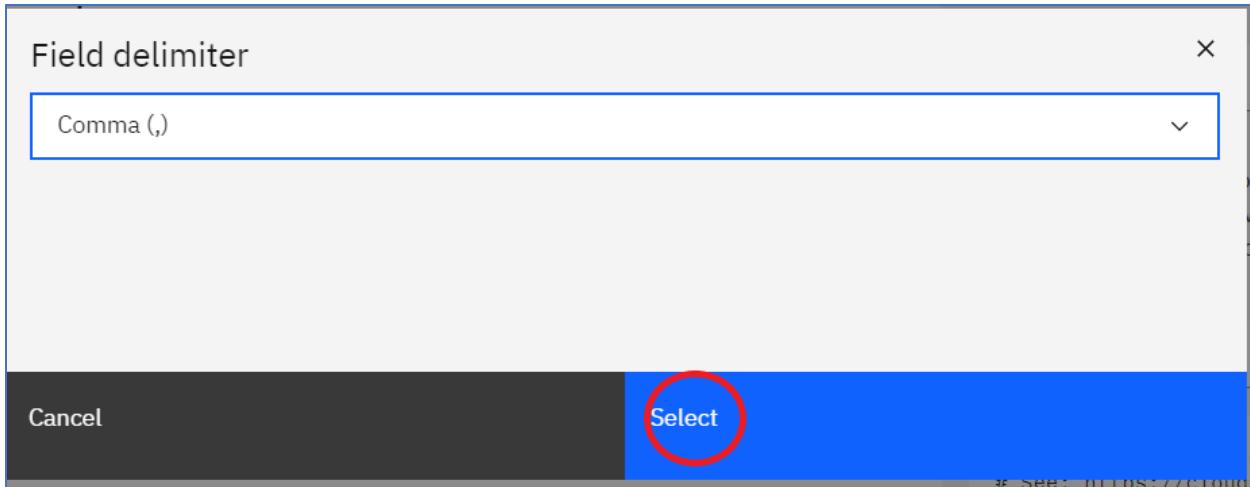
- Navigate to the feedback file **credit_feedback_data.csv**. Click on **Open**.



6. Select **Comma** as the **Delimiter**.



7. Click **Select**.



8. After the file is successfully uploaded, click on the icon.

The screenshot shows the Watson OpenScale interface for the 'credit-risk-deploy' model. On the left, there's a sidebar with icons for Dashboard, Configure, Model details, Quality, Fairness, Explainability, Drift, and Endpoints. The 'Endpoints' icon is highlighted with a red circle. The main area has a header 'Dashboard / Configure' and 'credit-risk-deploy'. Below the header, there's a section titled 'Endpoints' with a sub-section 'Description' explaining the payload logging endpoint. At the bottom right, a message indicates that 'credit_feedback_data.csv' was uploaded successfully with an 'OK' button.

9. Click on the icon to evaluate the quality and click on **View details**.

| Deployments Monitored | Quality Alerts | Fairness Alerts | Drift Alerts |
|-----------------------|----------------|-----------------|--------------|
| 1 | 0 | 0 | 0 |

1 Quality and Fairness metrics update every hour. Drift metrics update every 3 hours.

Watson Machine Learning

credit-risk-deploy

- Issues 0
- Quality F N/A N/A

10. Click on **Area under ROC** and click on **Check quality now**.

credit-risk-deploy

Model ID: 7865b8b8-5a2d-444a-8df9-34c3240473cf Created date: 10/27/2019 Configure monitors

Fairness

- Sex
- Age

Quality

- Area under ROC** (highlighted)
- Area Area under ROC
- Accuracy
- True positive rate (TPR)
- False positive rate (FPR)
- Recall
- Precision
- F1-Measure
- Logarithmic loss
- Drift
- Drop in accuracy
- Performance

Area under ROC

Area under recall and false positive rate curve. [Learn more](#).

Time frame

Hourly Daily Weekly Past 3 months Past week Yesterday Today Custom range

Date range

No data for selected time range

Schedule

Last Evaluation Not yet evaluated

Next Evaluation N/A

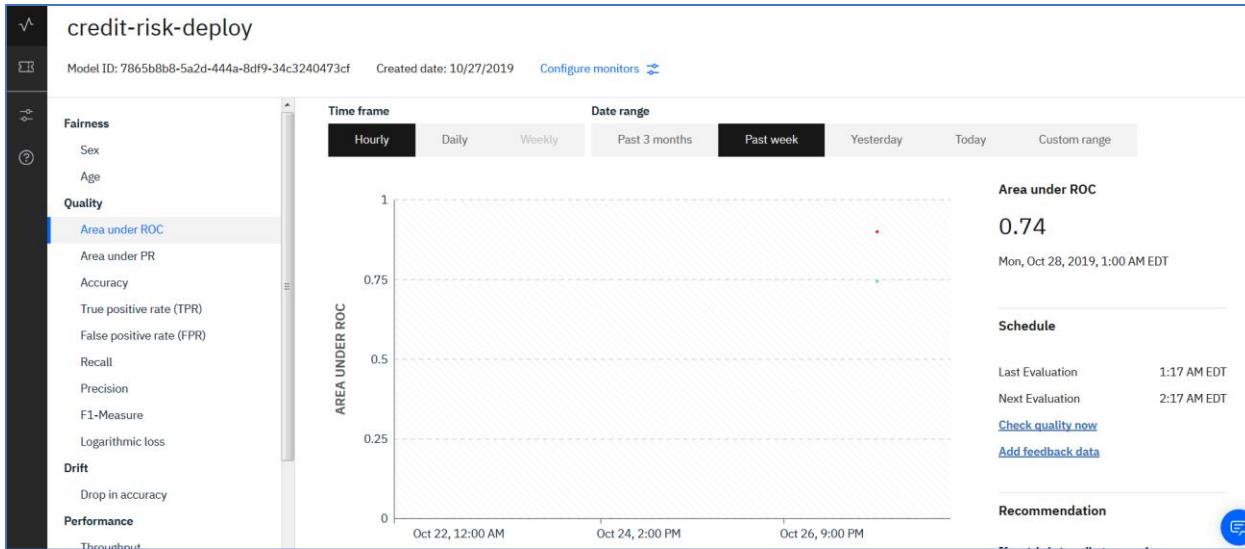
[Check quality now](#) (highlighted and circled)

[Add feedback data](#)

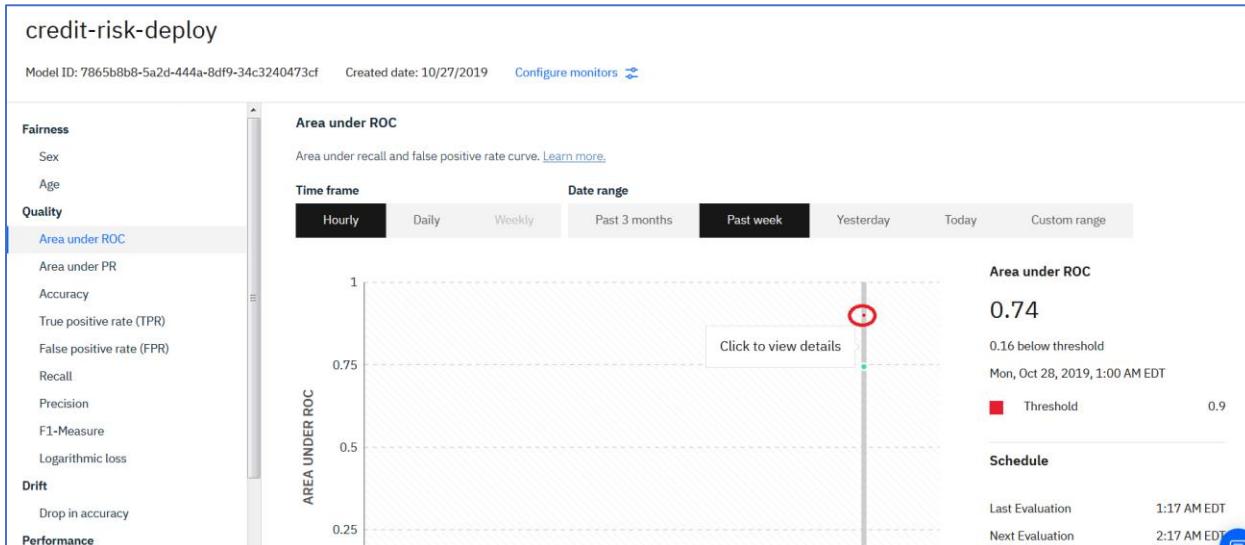
Recommendation

If metric is trending upwards Metric is improving. Model retraining is effective.

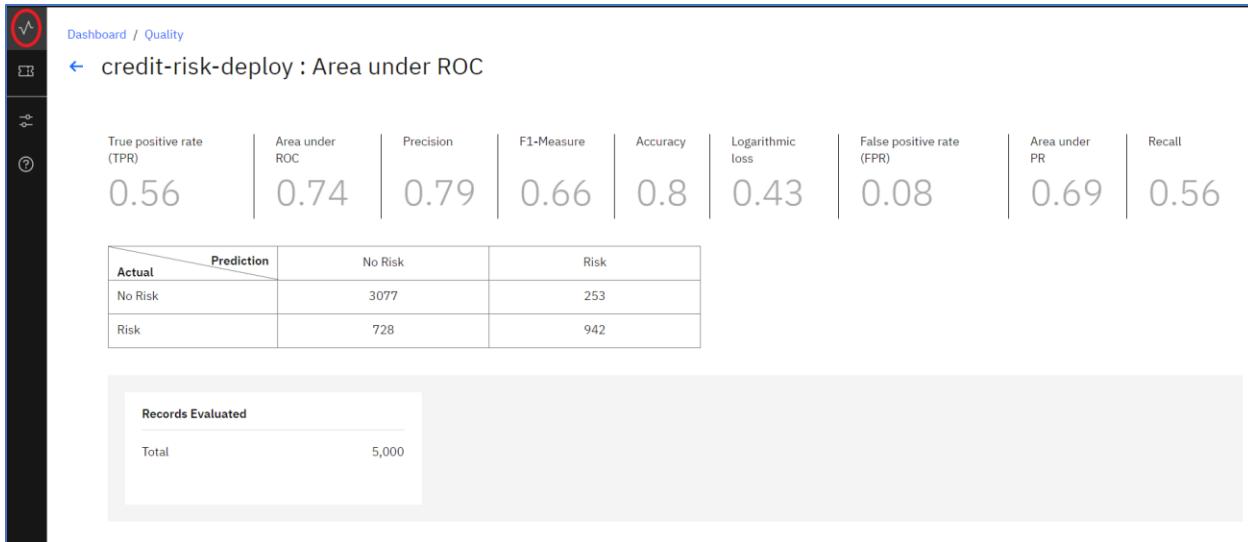
11. The screen is refreshed with the Area under ROC.



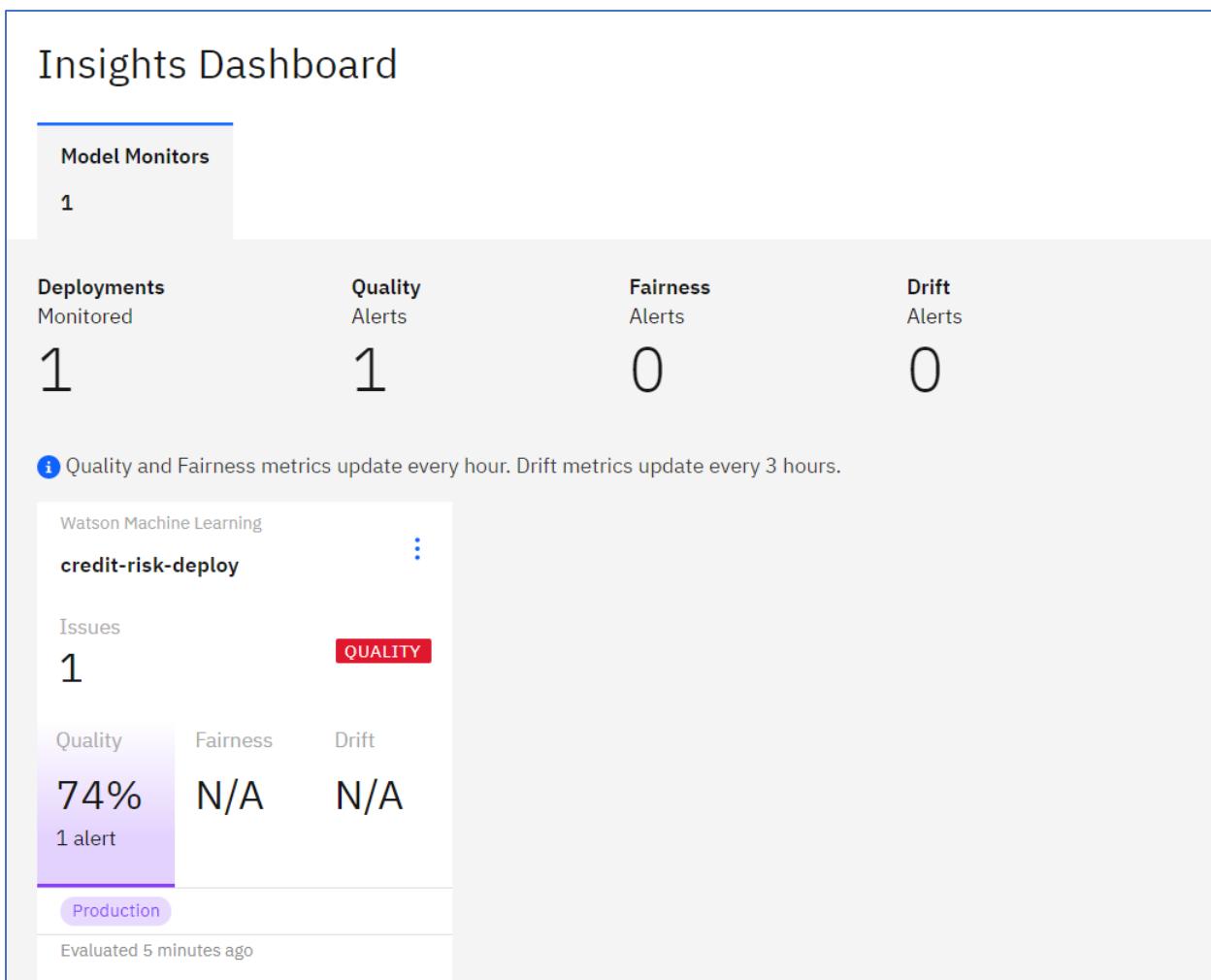
12. Click on the “red dot”.



13. The metrics are displayed. Click on the icon.



14. The Insights Dashboard is displayed, showing the quality alert triggered by uploading the feedback data and checking quality.



Score Transactions and View Fairness Metrics

In order to display Fairness metrics, we need to direct transactions to the deployed model. We will use the scoring.json file as sample data that Watson Studio will submit to the deployed model.

1. Return to Watson Studio by clicking on the **Watson Studio** browser tab.



2. You should be at the **Test** tab of the **credit-risk-deploy** page.

A screenshot of a Microsoft Edge browser window showing the "credit-risk-deploy" page in Watson Studio. The URL in the address bar is https://dataplatform.cloud.ibm.com/ml/deployments/203b492f-f9ca-4166-95c9-a93e3018f091/test?pr. The page has a header with "My Projects / Watson Studio Labs / credit-risk / credit-risk-deploy". Below the header, there are tabs for "Overview", "Implementation", and "Test", with "Test" being the active tab. A large input area titled "Enter input data" contains a JSON object with fields like "CheckingStatus", "LoanDuration", etc. A "Predict" button is visible below the input area. The browser's status bar shows "153 AM".

3. Clear out the contents of the **input data** area.
4. Navigate to where the scoring.json file and cut and paste the contents of the file into the **input data** area.

```
{"fields": ["CheckingStatus", "LoanDuration", "CreditHistory", "LoanPurpose", "LoanAmount", "ExistingSavings", "EmploymentDuration", "InstallmentPercent", "OthersOnLoan", "CurrentResidenceDuration", "OwnsProperty", "Age", "InstallmentPlans", "Housing", "ExistingCreditsCount", "Job", "Dependents", "Telephone", "ForeignWorker"], "values": [{"greater_200": 16, "outstanding_credit": 3526, "radio_tv": "100_to_500", "l_to_4": 4, "male": 1}], "radio_tv": "100_to_500", "l_to_4": 4, "male": 1}
```

5. Click on **Predict**

credit-risk-deploy

Overview Implementation **Test**

Enter input data

```
{"fields": ["CheckingStatus", "LoanDuration",
"CreditHistory", "LoanPurpose", "LoanAmount",
"ExistingSavings", "EmploymentDuration",
"InstallmentPercent", "Sex", "OthersOnLoan",
"CurrentResidenceDuration", "OwnsProperty", "Age",
"InstallmentPlans", "Housing", "ExistingCreditsCount",
"Job", "Dependents", "Telephone", "ForeignWorker"],
"values": [{"greater_200": 16, "outstanding_credit": "radio_tv", "3526": "100_to_500", "1_to_4": 4, "male": "radio_tv"}]}
```

Predict

6. The result is displayed below.

credit-risk-deploy

Overview Implementation **Test**

Enter input data

```
{"fields": ["CheckingStatus", "LoanDuration",
"CreditHistory", "LoanPurpose", "LoanAmount",
"ExistingSavings", "EmploymentDuration",
"InstallmentPercent", "Sex", "OthersOnLoan",
"CurrentResidenceDuration", "OwnsProperty", "Age",
"InstallmentPlans", "Housing", "ExistingCreditsCount",
"Job", "Dependents", "Telephone", "ForeignWorker"],
"values": [{"greater_200": 16, "outstanding_credit": "radio_tv", "3526": "100_to_500", "1_to_4": 4, "male": "radio_tv"}]}
```

Predict

7. Click on the **Watson OpenScale** browser tab.

8. Click on the icon.

IBM Watson OpenScale X

Insights Dashboard

Model Monitors

1

Deployments
Monitored

1

Quality
Alerts

1

Fairness
Alerts

0

Drift
Alerts

0

 Quality and Fairness metrics update every hour. Drift metrics update every 3 hours.

Watson Machine Learning

credit-risk-deploy



Issues

1

QUALITY

Quality

74%

1 alert

Fairness

N/A

Drift

N/A

Production

Evaluated 1 minute ago

9. Click on **View details**.

Insights Dashboard

Model Monitors

1

Deployments
Monitored

1

Quality
Alerts

1

Fairness
Alerts

0

Drift
Alerts

0

i Quality and Fairness metrics update every hour. Drift metrics update every 3 hours.

Watson Machine Learning



credit-risk-deploy

Issues

1

[View details](#)

Quality

74%

1 alert

N/A N/A

Production

Evaluated 2 minutes ago

10. Click on **Check fairness now.**

Fairness

Fairness for Sex

The models propensity to deliver favorable outcomes to one group over another. [Learn more.](#)

Time frame Date range

Hourly Daily Weekly Past 3 months Past week Yesterday Today Custom range

No data for selected time range

Schedule

Last Evaluation 9:04 PM EST

Next Evaluation 10:04 PM EST

[Check fairness now](#)

[Make a scoring request](#)

11. The Fairness score for sex is 2% below the threshold and triggers an alert.

Fairness

Fairness for Sex

The models propensity to deliver favorable outcomes to one group over another. [Learn more.](#)

Time frame Date range

Hourly Daily Weekly Past 3 months Past week Yesterday Today Custom range

Fairness Score for Sex

93%

2% below threshold

Mon Oct 28, 2019, 1:00 AM EDT

Threshold 95%

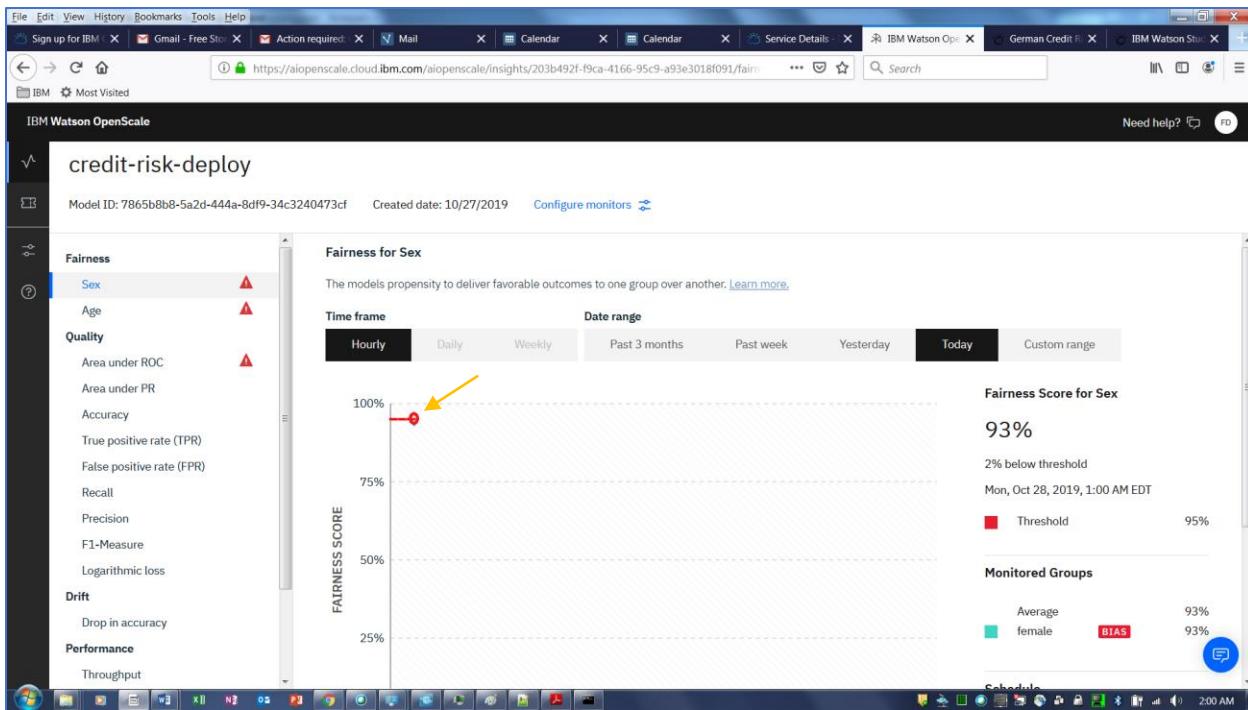
Monitored Groups

Average 93%

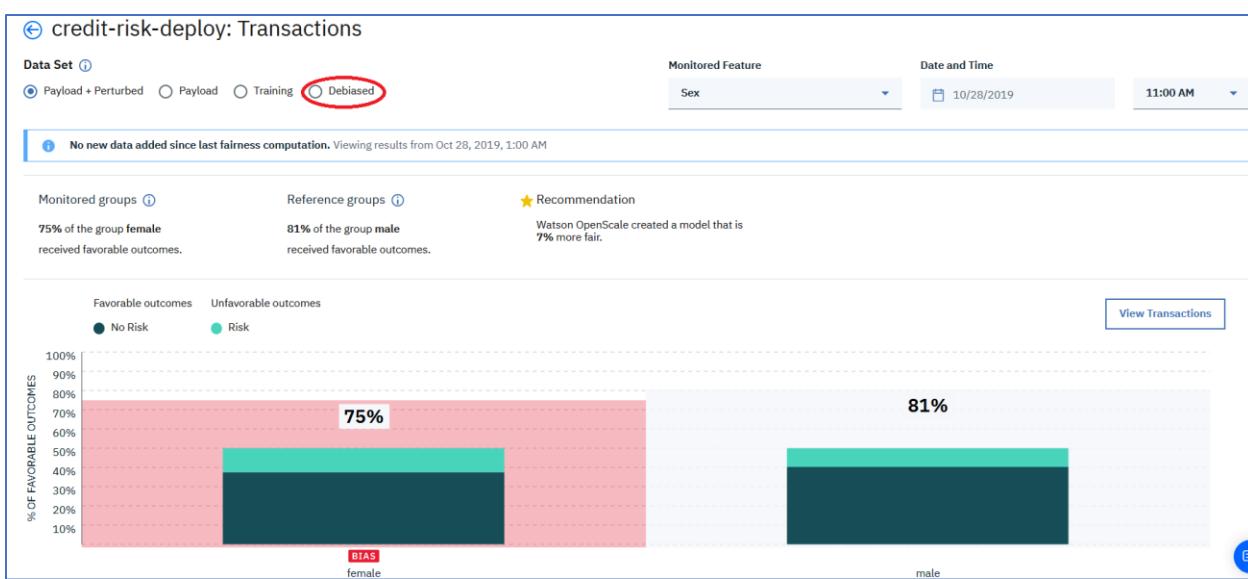
female 93%

Schedule

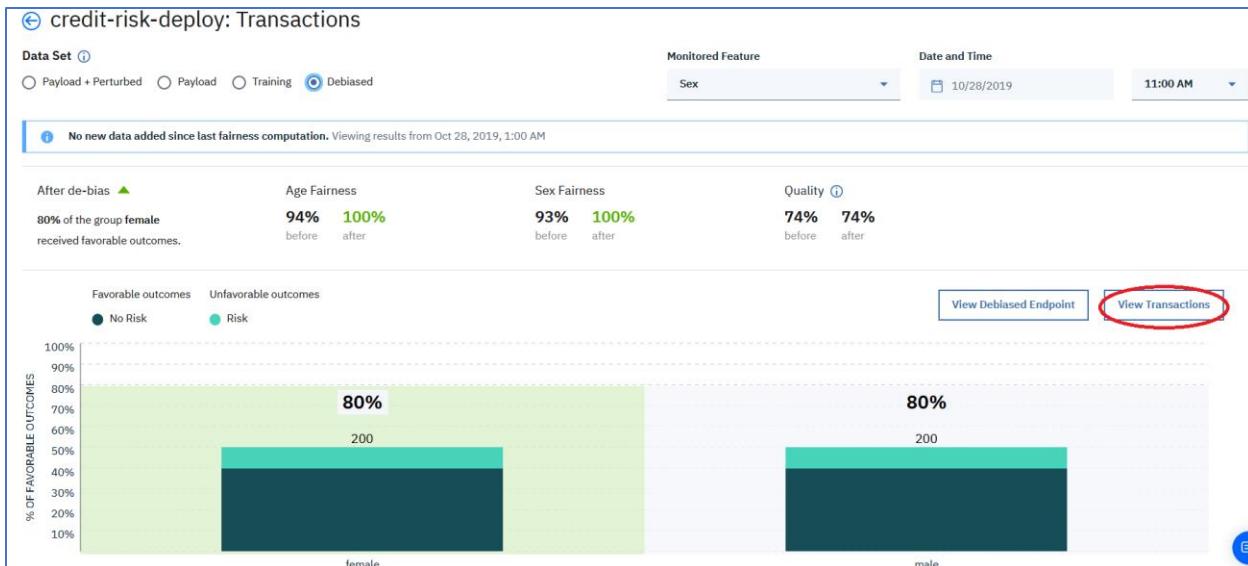
12. Click on the end of the timeline (should be a blue dot underneath) to view more details.



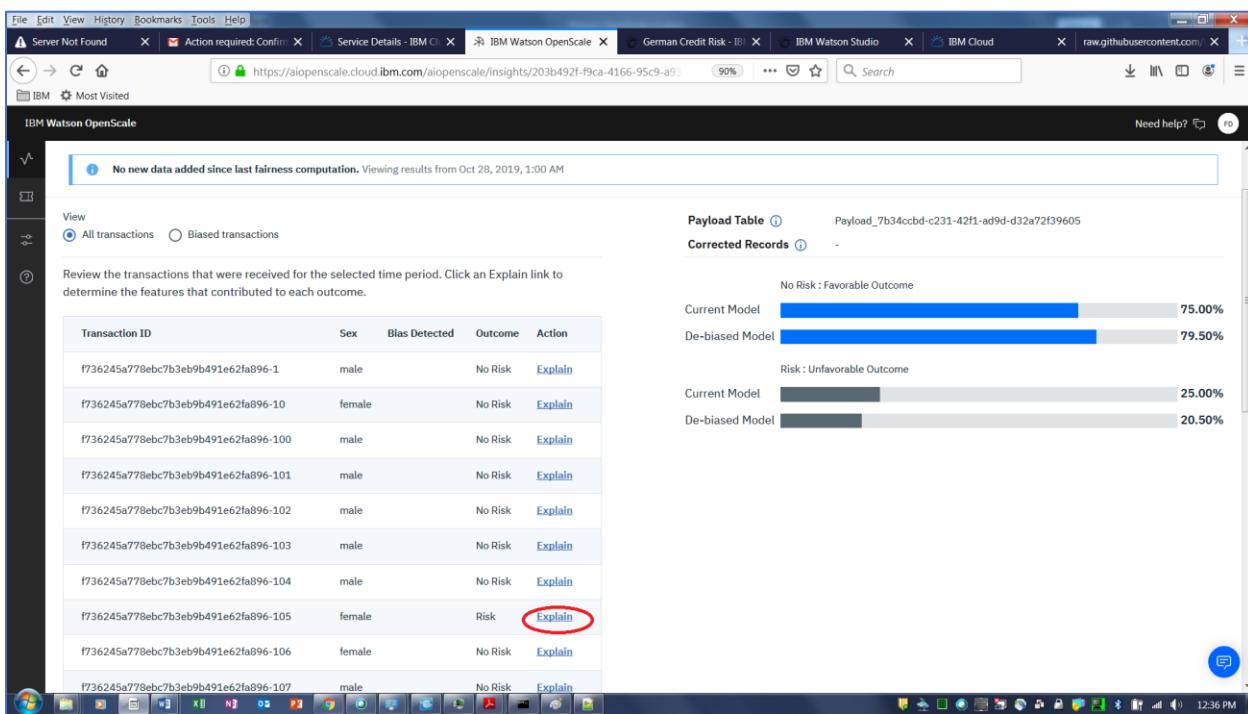
13. The discrepancy between Male and Female results are sufficient to trigger a bias alert.
Click on **Debiased**.



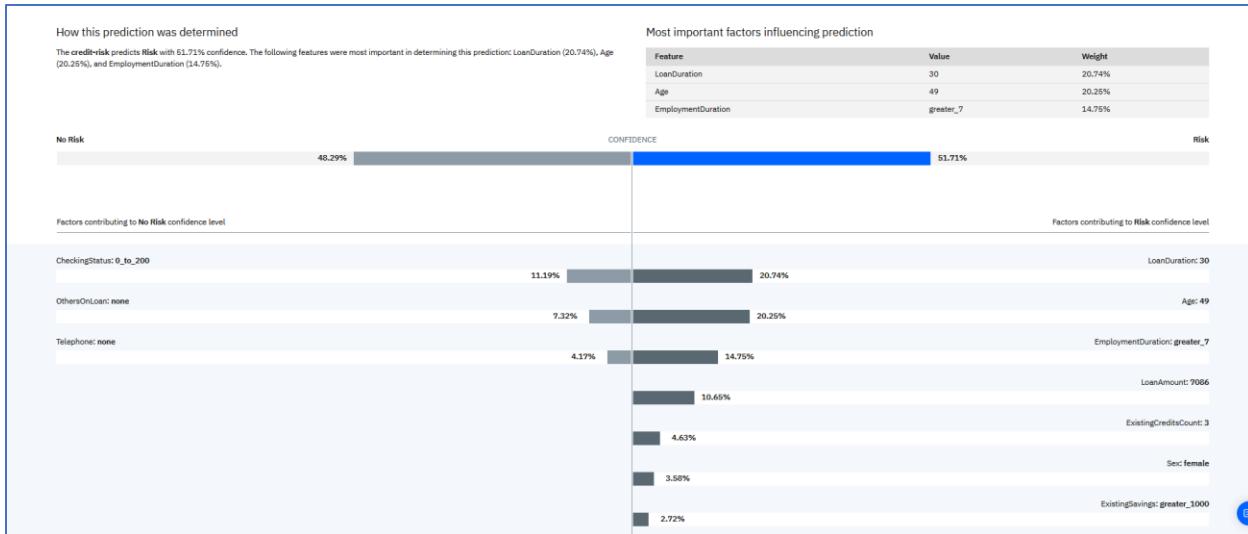
14. The results show that applying a debiasing scheme will reduce the bias to zero. The endpoint for invoking the debiasing algorithm can be obtained by clicking on View Debiased Endpoint. For now, click on **View Transaction** to display a list of transactions.



15. Click **Explain** next to a transaction to get an explanation of the factors that caused the deployed model to make the prediction it did for that transaction. I picked the first transaction that resulted in a Risk prediction.



16. The results show two ways of explaining the prediction. One is using a LIME approach that provides factors “for” and “against” the decision. The second method is called **Contrastive Explanation**. It provides the minimum changes in features that would result in a different decision. It also provides the maximum changes in features that would leave the result the same.



Congratulations! You have completed the Lab!!!

- ✓ Imported a machine learning model
- ✓ Deployed the model
- ✓ Provisioned Watson OpenScale
- ✓ Configured the payload logging database and Machine Learning provider
- ✓ Scored Data
- ✓ Prepared the Deployed Model for Monitoring
- ✓ Configured Payload Logging
- ✓ Configured Quality Monitoring
- ✓ Configured Fairness Monitoring
- ✓ Configured Drift Monitoring
- ✓ Submitted Feedback and Viewed Quality Metrics
- ✓ Scored Data and Viewed Fairness Metrics
- ✓ Explained a Transaction.

