

Operating AI with Trust and Transparency

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Step 1: Create a Watson OpenScale service.

1. Open up a new tab and access bluemix.net
2. Click on Create resource.

The screenshot shows the IBM Cloud dashboard with the 'Create resource' button circled in red. The dashboard includes filters for Resource Group, Cloud Foundry Orgs, Cloud Foundry Space, Location, and Category, along with a search bar and account information.

3. Along the left side, click on AI.
4. Scroll down (if necessary) and click on Watson OpenScale.

The screenshot shows the AI service catalog with the 'Watson OpenScale' service circled in red. Other services listed include Watson Assistant, Compare and Comply, Discovery, Knowledge Catalog, Knowledge Studio, Language Translator, Machine Learning, Natural Language Understanding, Personality Insights, Speech to Text, Text to Speech, Tone Analyzer, Visual Recognition, and Watson Studio.

5. Once the Watson OpenScale page opens, keep the defaults and click Create.

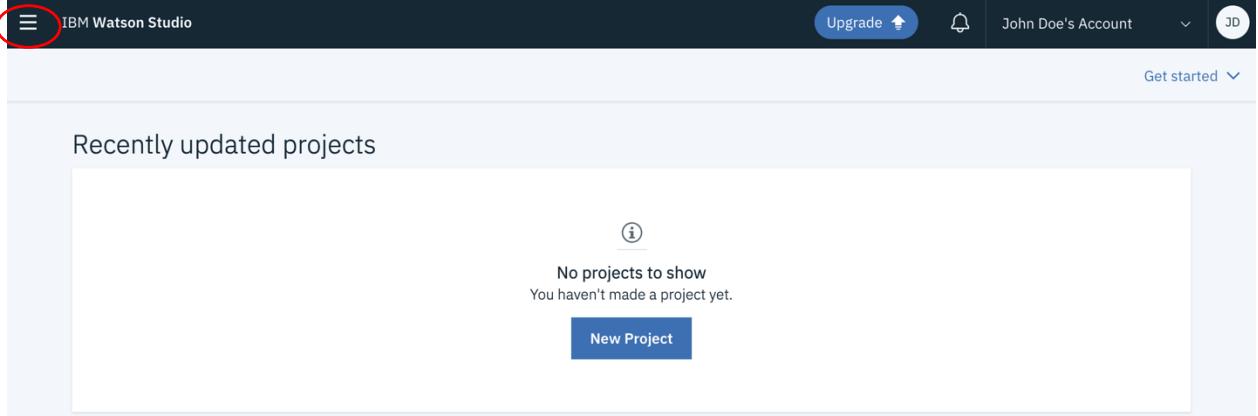
The screenshot shows the Watson OpenScale creation page. It includes fields for Service name (Watson OpenScale-xy), Choose a region/location to deploy in (Dallas), and Select a resource group (Default). The Features section lists several AI capabilities. At the bottom, there are links for View Docs, View API Docs, Terms, and a 'Create' button circled in red.

Step 2: Create a Watson Studio Project.

Watson OpenScale connects to a deployed machine learning model. We will use Watson Studio (a data science workbench) and Watson Machine Learning (a machine learning deployment engine). Note, Watson Machine Learning is not required to create and deploy a machine learning model for Watson OpenScale. OpenScale also supports Azure ML, AWS Sagemaker, as well as custom models.

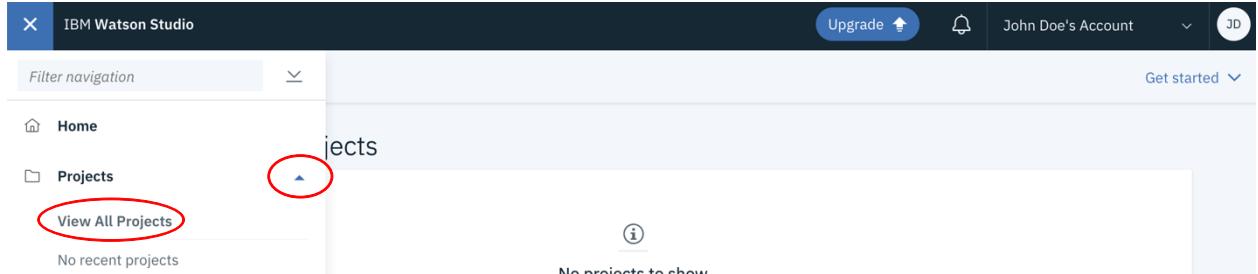
Before we begin, we need to create a Watson Studio Project. A Watson Studio Project is a collection of assets geared towards a specific data science goal. These assets can include machine learning models, runtimes, data files, and connections to 3rd party/open source databases.

1. Access [dataplateform.cloud.ibm.com](https://dataplatform.cloud.ibm.com).
2. Click on the Hamburger menu located in the top left of the screen.



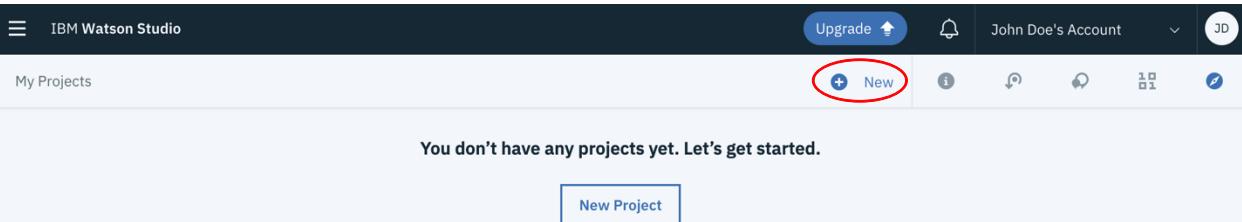
The screenshot shows the IBM Watson Studio interface. At the top, there's a dark header bar with the 'IBM Watson Studio' logo, an 'Upgrade' button, a notification bell, 'John Doe's Account', and a user icon. Below the header, a 'Get started' button is visible. The main content area is titled 'Recently updated projects'. It displays a message: 'No projects to show. You haven't made a project yet.' with an information icon. A blue 'New Project' button is centered below the message. The entire interface has a clean, modern design with a light gray background.

3. Click on Projects -> View all Projects.



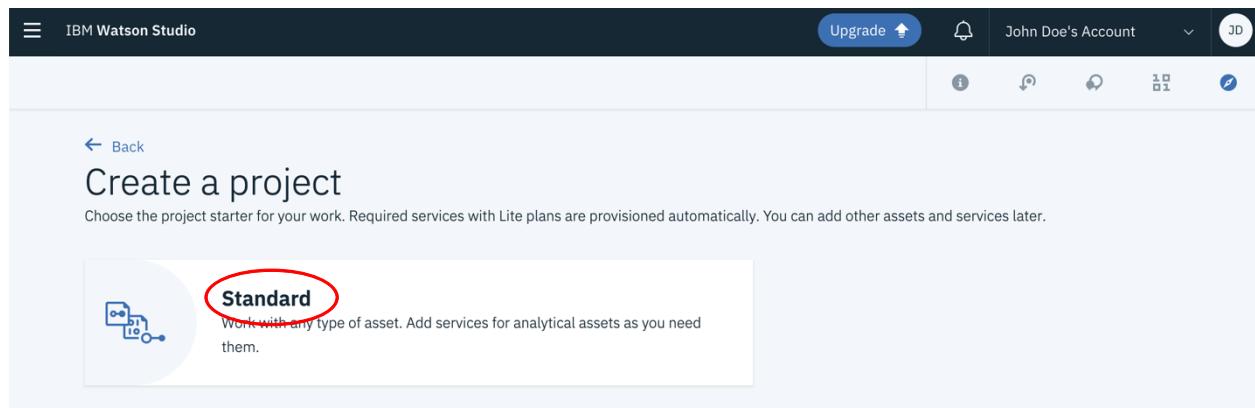
This screenshot shows the 'Projects' section of the IBM Watson Studio interface. On the left, there's a sidebar with a 'Filter navigation' dropdown and a tree view showing 'Home' and 'Projects'. Under 'Projects', the 'View All Projects' link is highlighted with a red circle. The main content area shows a message: 'No recent projects' with an information icon. To the right, another message says 'No projects to show' with an information icon. The overall layout is consistent with the previous screenshot, maintaining the same color scheme and design elements.

4. Click on New.



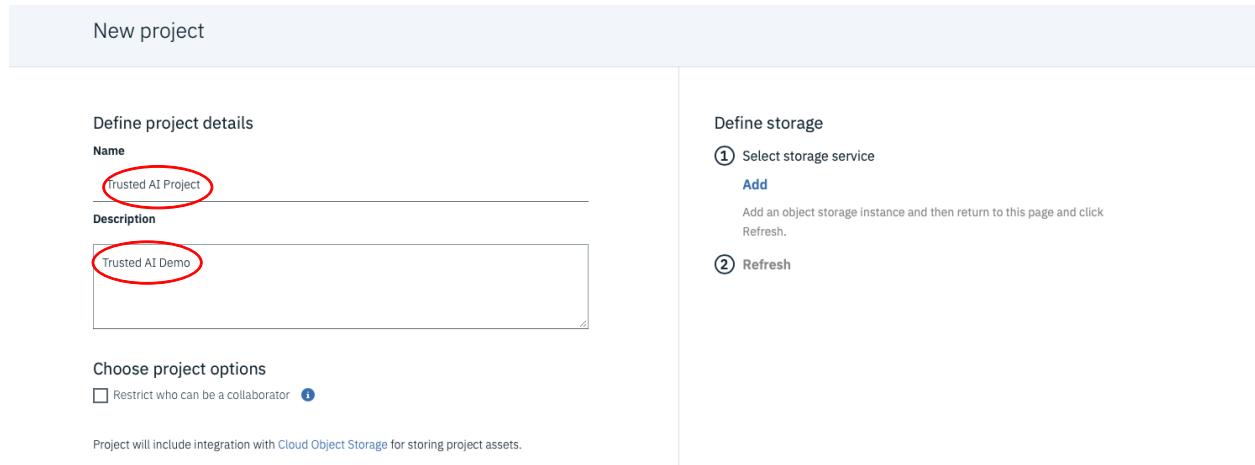
The screenshot shows the main 'My Projects' page of the IBM Watson Studio interface. At the top, the 'IBM Watson Studio' header is present along with the 'Upgrade', 'Bell', 'John Doe's Account', and user icon. In the top right corner, there's a navigation bar with several icons, one of which is highlighted with a red circle. Below the header, the text 'You don't have any projects yet. Let's get started.' is displayed. A blue 'New Project' button is located at the bottom of the main content area. The interface is designed to be user-friendly with clear calls-to-action and a consistent look across different sections.

5. Click on Standard.



The screenshot shows the 'Create a project' interface. At the top, there's a navigation bar with 'IBM Watson Studio', 'Upgrade', 'John Doe's Account', and various icons. Below the bar, a back arrow and the text 'Create a project' are visible. A note says 'Choose the project starter for your work. Required services with Lite plans are provisioned automatically. You can add other assets and services later.' There are three options: 'Standard' (highlighted with a red circle), 'Analytics', and 'Machine Learning'. Each option has a small icon and a brief description.

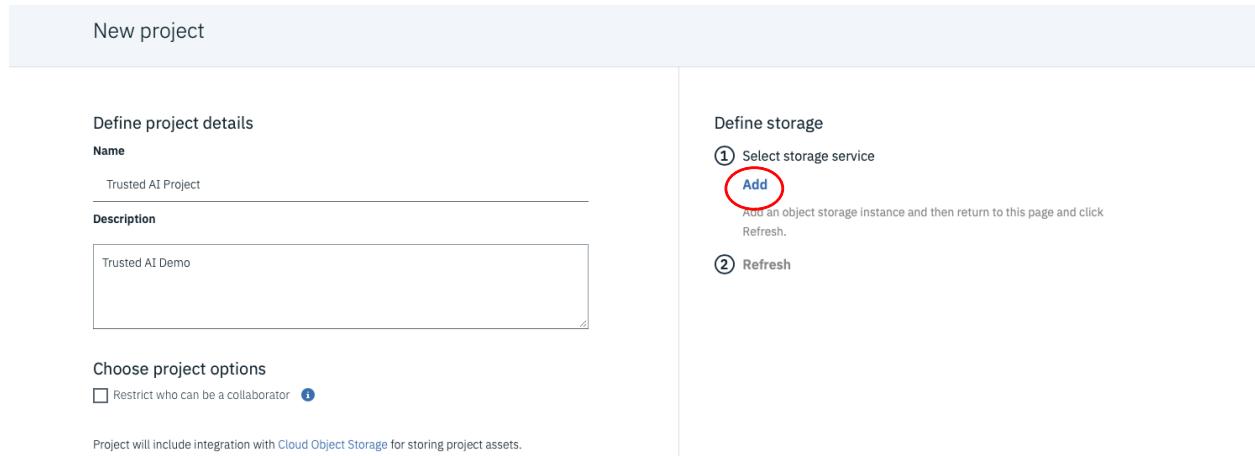
6. Give your project a Name, a Description (optional), and click Create.



The screenshot shows the 'New project' creation screen. It has two main sections: 'Define project details' on the left and 'Define storage' on the right. In 'Define project details', the 'Name' field contains 'Trusted AI Project' and the 'Description' field contains 'Trusted AI Demo', both of which are circled in red. In 'Define storage', step 1 'Select storage service' is shown with an 'Add' button, which is also circled in red. Step 2 'Refresh' is below it. A note at the bottom says 'Project will include integration with Cloud Object Storage for storing project assets.'

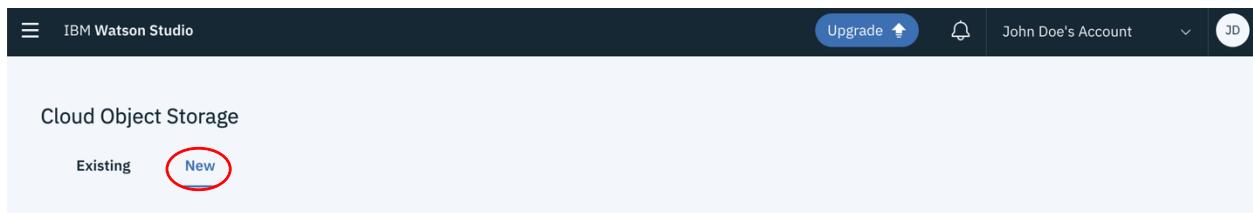
Cloud object storage is the default store for basic project assets. We will requisition a small instance for our project.

7. On the right side of the screen, click on Add under Define storage.



This screenshot is identical to the previous one, showing the 'New project' creation screen. The 'Name' field ('Trusted AI Project') and 'Description' field ('Trusted AI Demo') are circled in red. The 'Define storage' section on the right shows step 1 'Select storage service' with the 'Add' button circled in red. The note at the bottom remains the same: 'Project will include integration with Cloud Object Storage for storing project assets.'

8. Click on New.



9. Scroll down, click on Lite, and click Create.

This screenshot shows the 'Create' page for Cloud Object Storage. It lists two service plans: 'Standard' and 'Lite'. The 'Lite' plan is selected, indicated by a red circle around its radio button. Below the plan details, a note states: 'The Lite service plan for Cloud Object Storage includes Regional and Cross Regional resiliency, flexible data classes, and built in security.' At the bottom right, there are 'Cancel' and 'Create' buttons, with 'Create' also highlighted by a red circle.

9. Click on Confirm.

This screenshot shows a 'Confirm Creation' dialog box. It contains fields for 'Plan' (set to 'Lite'), 'Resource group' (set to 'Default'), and 'Service name' (set to 'cloud-object-storage-as'). At the bottom of the dialog are 'Cancel' and 'Confirm' buttons, with 'Confirm' highlighted by a red circle.

10. Once you are brought back to the New project page, click Refresh.

Define storage

- ① Select storage service

Add

Add an object storage instance and then return to this page and click Refresh.

- ② **Refresh**

The name of the storage service you have just created should appear under Storage.

Storage

cloud-object-storage-as

11. Click Create.

The screenshot shows the 'New project' creation interface in IBM Watson Studio. On the left, the 'Define project details' section is visible, containing fields for 'Name' (set to 'Trusted AI Project') and 'Description' (set to 'Trusted AI Demo'). On the right, the 'Storage' section lists a single entry: 'cloud-object-storage-as'. At the bottom of the screen, there are two buttons: 'Cancel' and 'Create'. The 'Create' button is highlighted with a red circle.

12. Click on the Settings tab.

The screenshot shows the IBM Watson Studio dashboard. At the top, there's a navigation bar with 'IBM Watson Studio' and various account-related icons. Below it, a secondary navigation bar includes 'My Projects' and 'Trusted AI Project'. The main content area has several tabs: 'Overview', 'Assets', 'Environments', 'Bookmarks', 'Deployments', 'Access Control', and 'Settings'. The 'Settings' tab is circled in red.

13. Scroll down and click on Add a service for Associated services.

14. Click on Watson.

This screenshot shows the 'Associated services' section within the 'Storage' tab of the IBM Watson Studio interface. It includes a table with columns for NAME, SERVICE TYPE, PLAN, and ACTIONS. A modal window titled 'Add service' is open, listing various service options like Amazon EMR Spark, IBM Analytics Engine, Spark, Streaming Analytics, and Dashboard. The 'Watson' option is highlighted with a red circle.

15. Click on Add under Machine Learning.

This screenshot shows the 'Machine Learning' section. It features a circular icon with a brain-like pattern and the heading 'Machine Learning'. Below it, a descriptive text reads: 'IBM Watson Machine Learning - make smarter decisions, solve tough problems, and improve user outcomes'. A blue 'Add' button is located at the bottom left, which is circled in red.

16. Ensure that the New tab is selected.

This screenshot shows the 'Machine Learning' interface. It has two tabs: 'Existing' and 'New'. The 'New' tab is highlighted with a red circle and has a blue underline, indicating it is the active tab.

17. Scroll down and click on Lite.

PLAN	FEATURES	PRICING
<input checked="" type="radio"/> Lite	<p>Service instance (5 models per instance) 5,000 predictions 50 capacity unit-hours: Compute Tier: k80 = 2 capacity units for 1 training hour Compute Tier: k80x2 = 4 capacity units for 1 training hour Compute Tier: k80x4 = 8 capacity units for 1 training hour Otherwise 1 capacity unit for 1 computation hour Max 8 k80 GPUs (Deep Learning Training)</p> <p>The lite plan instance of the IBM Watson Machine Learning service provides you with a maximum of 5 deployed models, 5,000 predictions per month, and 50 capacity unit-hours per month during which model can be trained, evaluated, and deployed to be available to accept prediction events, with a minimum of 1 minute per training job.</p>	Free

18. Click on Create.

Compute Tier: v100 = 8 capacity units for 1 training hour
Compute Tier: v100x2 = 16 capacity units for 1 training hour
Otherwise 1 capacity unit for 1 computation hour
HIPAA readiness option available in Dallas

19. Keep the defaults and Click Confirm.

x

Confirm Creation

Region

US South

Plan

Lite

Resource group

Default

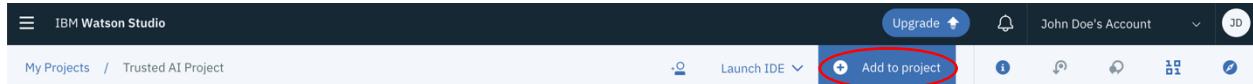
Service name

pm-20-zm

Step 3: Set up Jupyter Notebooks and Configure Watson OpenScale.

A Jupyter Notebook is a self-contained environment that combines documentation and code. This allows us to walk through code and document each step. We will use one Jupyter Notebook to build and deploy a machine learning model and then configure OpenScale to monitor that deployed model. A second notebook will be used to automatically feed data to OpenScale to monitor for bias.

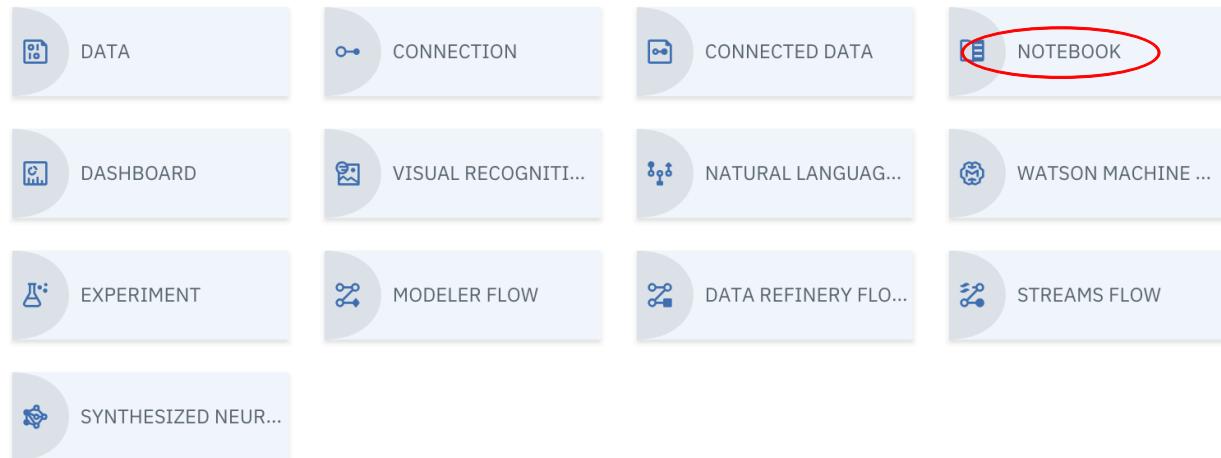
1. Click on Add to project.



2. Click on Notebook.

Choose asset type

AVAILABLE ASSET TYPES



3. Click on the From URL tab.
4. Enter a Name and Description (optional) for your notebook.
5. Under Notebook URL, enter:

https://raw.githubusercontent.com/cerebralace/WatsonPoT/master/Lab4/german_credit_lab.ipynb

My Projects / Trusted AI Project / Add Notebook

New notebook

Blank From file **From URL**

Name*
german_credit_lab
33 Characters Remaining

Description
Trusted AI demo
485 Characters Remaining

Notebook URL*
https://raw.githubusercontent.com/Mcronk/ThinkGov2019_Trusted/

Select runtime* Includes notebook environments ⓘ
Default Spark Python 3.5 XS (Driver with 1 vCPU and 4 GB RAM, 2 e)

The selected runtime uses one driver with 1 vCPU and 4 GB RAM, and 2 executors each with 1 vCPU and 4 GB RAM.
This runtime consumes 1.5 capacity units per hour.
Learn more about capacity unit hours and Watson Studio pricing plans.

6. Under Select runtime, click on the dropdown menu.

My Projects / Trusted AI Project / Add Notebook

New notebook

Blank From file **From URL**

Name*
german_credit_lab
33 Characters Remaining

Description
Trusted AI demo
485 Characters Remaining

Notebook URL*
https://raw.githubusercontent.com/Mcronk/ThinkGov2019_Trusted/

Select runtime* Includes notebook environments ⓘ
Default Spark Python 3.5 XS (Driver with 1 vCPU and 4 GB RAM, 2 e)

The selected runtime uses one driver with 1 vCPU and 4 GB RAM, and 2 executors each with 1 vCPU and 4 GB RAM.
This runtime consumes 1.5 capacity units per hour.
Learn more about capacity unit hours and Watson Studio pricing plans.

7. Choose Default Spark Python 3.5 XS

Services
Environments

- Default Spark Python 3.5 XS (Driver with 1 vCPU and 4 GB RAM, 2 executors with 1 vCPU and 4 GB RAM each)
 - Default Spark Scala 2.11 (Driver with 1 vCPU and 4 GB RAM, 2 executors with 1 vCPU and 4 GB RAM each)
 - Default Spark R 3.4 (Driver with 1 vCPU and 4 GB RAM, 2 executors with 1 vCPU and 4 GB RAM each)
 - Default Python 3.5 Free (1 vCPU and 4 GB RAM)
 - Default Python 3.5 XS (2 vCPU and 8 GB RAM)
 - Default Python 3.5 XS + Beta of DO (2 vCPU and 8 GB RAM)
 - Default R 3.4 XS (2 vCPU and 8 GB RAM)
 - Default Python 3.5 S (4 vCPU and 16 GB RAM)
 - Default R 3.4 S (4 vCPU and 16 GB RAM)

8. Click Create Notebook.

My Projects / Trusted AI Project / Add Notebook

New notebook

Blank From file From URL

<p>Name*</p> <input type="text" value="german_credit_lab"/> <p>33 Characters Remaining</p>	<p>Notebook URL*</p> <input type="text" value="https://raw.githubusercontent.com/Mcronk/ThinkGov2019_Trusted/"/>
<p>Description</p> <div style="border: 1px solid #ccc; padding: 5px;">Trusted AI demo</div> <p>485 Characters Remaining</p>	<p>Select runtime* Includes notebook environments ⓘ</p> <p>Default Spark Python 3.5 XS (Driver with 1 vCPU and 4 GB RAM, 2 e) ▾</p> <p>The selected runtime uses one driver with 1 vCPU and 4 GB RAM, and 2 executors each with 1 vCPU and 4 GB RAM. This runtime consumes 1.5 capacity units per hour. Learn more about capacity unit hours and Watson Studio pricing plans.</p>
Cancel Create Notebook	

Our notebook will create and deploy a machine learning model then configure Watson OpenScale and connect it to our cloud machine learning service. Before running our notebook, we need to enter credentials for the IBM Cloud API and our machine learning service.

9. Open up a new browser tab and access <https://cloud.ibm.com/iam#/users>

10. On the left side of the screen, click on IBM Cloud API keys.

The screenshot shows the 'Access (IAM)' interface with the 'Users' section selected. The 'IBM Cloud API keys' button is highlighted with a red oval.

11. Along the center of your screen, click on Create a Cloud API Key.

IBM Cloud API Keys

Create and manage your IBM Cloud API keys. Service API keys are managed by the individual services.

[Create an IBM Cloud API key +](#)

12. Give the API key a name and click Create.

Create API key

The screenshot shows the 'Create API key' form. The 'Name' field contains 'Trusted AI lab Key'. The 'Create' button is highlighted with a red oval.

13. Click on Copy.

API key successfully created

Copy the API key or click download to save it. You won't be able to see this API key again, so you can't retrieve it later.

API key

.....
Copy Download

14. Back in your notebook under Provision service and configure credentials (next to CLOUD_API_KEY = , replace “PASTE HERE” with the key you just copied. **You may need to click the pencil icon to ensure that you can edit your notebook.**

Your notebook should match the image below (with a different key between the quotes).

Provision services and configure credentials

If you have not already, provision an instance of IBM Watson OpenScale using the [OpenScale link in the Cloud catalog](#).

Your Cloud API key can be generated by going to the [Users section of the Cloud console](#). From that page, click your name, scroll down to the API Keys section, and click Create an IBM Cloud API key. Give your key a name and click Create, then copy the created key and paste it below.



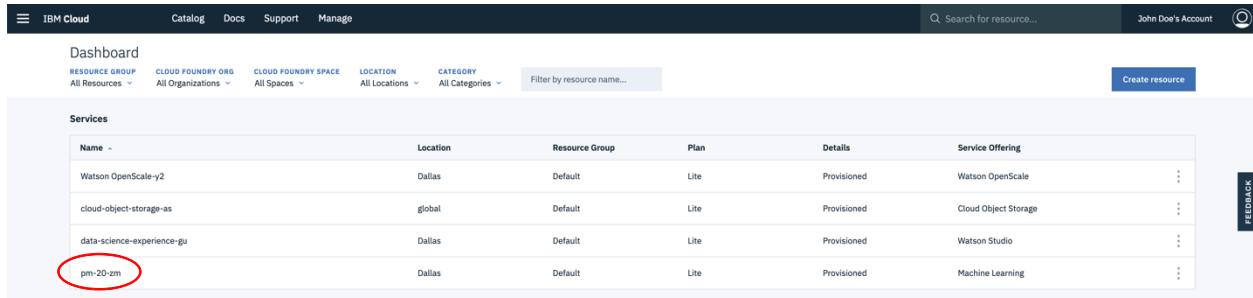
```
In [ ]: CLOUD_API_KEY = "qU17SmU-CikgYrm3RIwXU_ofbJvJSh19DxnewRpY0dgs"
```

15. Open up a new browser tab and access bluemix.net



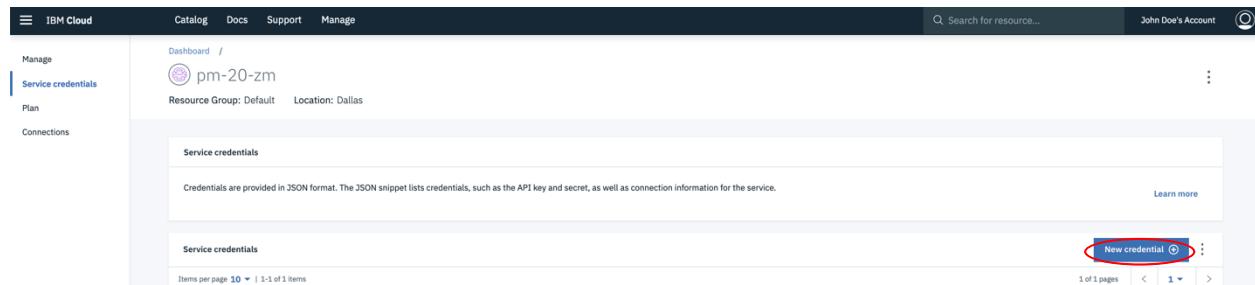
You will be brought to your dashboard page for Cloud resources.

16. Click on the Machine Learning service (the example in these instructions is called “pm-20-zm”)



17. Click on Service Credentials along the left side.

18. Click on new Credentials.



19. Click on Add.

Add new credential

Name: Service credentials-2

Role: Writer

Select Service ID (Optional)

Add Inline Configuration Parameters (Optional):

Provide service-specific configuration parameters in a valid JSON object

[Choose File...](#)

[Cancel](#) [Add](#)

20. Then click on View Credentials along the center.

KEY NAME	DATE CREATED	ACTIONS
wdp-writer	MAR 7, 2019 - 02:15:49 PM	View credentials

```
{
  "apikey": "#pm20-zm-459b-88e6-d27c72123769",
  "iamapikey_description": "Auto generated apikey during resource-key operation for Instance - crn:v1:bluemix:public:pm-20:us-south:a/1be735742ae2d50fe98e59a73c10b497:32ffd021-997f-459b-88e6-d27c72123769::",
  "iamapikey_name": "auto-generated-apikey-f803c8b0-007a-495b-940a-51b4e90c15df",
  "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Writer",
  "iam_service_id": "crn:v1:bluemix:public:iam:::instanceId:32ffd021-997f-459b-88e6-d27c72123769",
  "instance_id": "32ffd021-997f-459b-88e6-d27c72123769",
  "password": "ba521832-2310-4483-a26e-2a2f4e098c3",
  "url": "https://us-south.ml.cloud.ibm.com",
  "username": "7803c8b0-807a-495b-940a-51b4e90c15df"
}
```

21. Click on the pages icon to copy the credentials.

Credentials are provided in JSON format. The JSON snippet lists credentials, such as the API key and secret, as well as connection information for the service.

KEY NAME	DATE CREATED	ACTIONS
wdp-writer	MAR 7, 2019 - 02:15:49 PM	View credentials

```
[{"apikey": "PznZZ0g2MaGpAgvGV_C4b9a14zB9zU2qQW018_93pjb", "iam_apikey_description": "Auto generated apikey during :create:apikey operation for Instance - crn:v1:bluemix:public:pm-20:us-south:a/1be735742ae2d50fe98e59a73c10b40f:32ff0921-997f-459b-88e6-d27c72123769:", "iam_apikey_name": "auto-generated-apikey-f803c8d8-408a-495b-a6b5-53b4e90c15df", "iam_crn": "crn:v1:bluemix:public:iam::serviceRole:writer", "iam_serviceid_crn": "crn:v1:bluemix:public:iam:identity::a/b73735742ae2d50fe98e59a73c10b40f::servicedId:ServiceId-55db0345-f38f-43e9-94df-cf44c952edce", "instance_id": "32ff0921-997f-459b-88e6-d27c72123769", "password": "F803C8d8-007a-495b-940a-53b4e90c15df", "url": "https://us-south.ml.cloud.ibm.com", "username": "f803c8d8-007a-495b-940a-53b4e90c15df"}]
```

25. Back in your notebook, under Provision services and configure credentials, replace the WML_CREDENTIALS = brackets with what you have just copied. WML stands for Watson Machine Learning.

Provision services and configure credentials

If you have not already, provision an instance of IBM Watson OpenScale using the [OpenScale link in the Cloud console](#).

Your Cloud API key can be generated by going to the [Users section of the Cloud console](#). From that page, click **Create**, then copy the created key and paste it below.

```
In [ ]: CLOUD_API_KEY = "qUi7SmU-CikqYrm3RIwXU_ofbJvJSh19DxmewRpY0dqx"
```

Next you will need credentials for Watson Machine Learning. If you already have a WML instance, you may use those. Once your instance is created, click the **Service Credentials** link on the left side of the screen. Click the **New credentials** button. Copy and paste your WML credentials into the cell below.

```
In [ ]: WML_CREDENTIALS = {  
    "apikey": "key",  
    "iam_apikey_description": "description",  
    "iam_apikey_name": "auto-generated-apikey",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Writer",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam:identity:",  
    "instance_id": "instance_id",  
    "password": "password",  
    "url": "https://us-south.ml.cloud.ibm.com",  
    "username": "username"  
}
```

Your notebook should match the image below (with different credentials).

Provision services and configure credentials

If you have not already, provision an instance of IBM Watson OpenScale using the [OpenScale link in the Cloud catalog](#)

Your Cloud API key can be generated by going to the [Users section of the Cloud console](#). From that page, click your **Create**, then copy the created key and paste it below.

```
In [ ]: CLOUD_API_KEY = "qUi7SmU-CikqYrm3RIwXU_ofbJvJSh19DxmewRpY0dqx"
```

Next you will need credentials for Watson Machine Learning. If you already have a WML instance, you may use credentials from that instance. Once your instance is created, click the **Service Credentials** link on the left side of the screen. Click the **New credentials** button. Copy and paste your WML credentials into the cell below.

```
In [ ]: WML_CREDENTIALS = {  
    "apikey": "PzmZZDgGJWaGpAgyGYC_4b9a14zB9zU26QMo1B_93pjB",  
    "iam_apikey_description": "Auto generated apikey during resource-key operation for Instance",  
    "iam_apikey_name": "auto-generated-apikey-f803c86b-007a-495b-940a-53b4e90c15df",  
    "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Writer",  
    "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity::a/1be735742ae2d50fe98e59a73c10",  
    "instance_id": "32ffd021-997f-459b-88e6-d27c72123769",  
    "password": "ba521832-2310-4483-a266-2ac2f4e098c3",  
    "url": "https://us-south.ml.cloud.ibm.com",  
    "username": "f803c86b-007a-495b-940a-53b4e90c15df"  
}
```

Our notebook now has all the required credentials.

22. Select each cell in the notebook and hit SHIFT+ENTER to run.

Run your notebook cell by cell. Read through the notebook and observe the output. With the exception of the first cell installing packages, there should be no error output.

Identify transactions for Explainability

Transaction IDs identified by the cells below can be copied and pasted into the Explainability tab of the OpenScale dashboard.

```
In [64]: payload_data = subscription.payload_logging.get_table_content(limit=60)
payload_data.filter(items=['scoring_id', 'predictedLabel', 'probability'])

Out[64]:
```

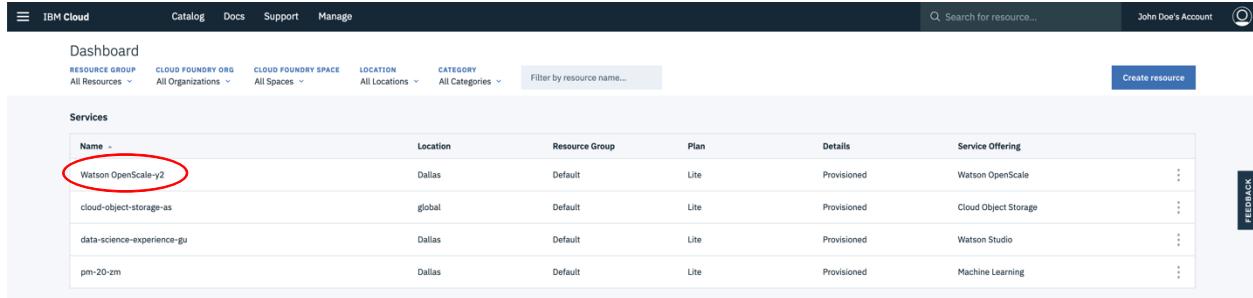
	scoring_id	predictedLabel	probability
0	e42459305c0c4dc185c6bc144d74806-423	No Risk	[0.8128085875806539, 0.18719141241934611]
1	e42459305c0c4dc185c6bc144d74806-567	No Risk	[0.9576935217341755, 0.0423064782658244]
2	e42459305c0c4dc185c6bc144d74806-951	No Risk	[0.9509147179413443, 0.04908528205865579]
3	e42459305c0c4dc185c6bc144d74806-663	No Risk	[0.9565610290260815, 0.04343897097391844]
4	e42459305c0c4dc185c6bc144d74806-424	No Risk	[0.81396200025809, 0.18603799974191007]
5	e42459305c0c4dc185c6bc144d74806-568	No Risk	[0.5729289479961321, 0.4270710520038678]
6	e42459305c0c4dc185c6bc144d74806-1	No Risk	[0.7093257286263136, 0.29067427137368634]
7	e42459305c0c4dc185c6bc144d74806-807	No Risk	[0.5765253746425008, 0.42347462535749925]
8	e42459305c0c4dc185c6bc144d74806-425	No Risk	[0.7136291870129947, 0.28637081298700523]
9	e42459305c0c4dc185c6bc144d74806-569	No Risk	[0.5485131522852063, 0.4514868477147938]
10	e42459305c0c4dc185c6bc144d74806-952	Risk	[0.09948668541411484, 0.9005133145858851]

Once the last cell has run successfully, continue with the steps below.

Step 4: Explore Watson OpenScale.

For the purpose of this lab we have used notebooks to showcase the API and speed along the configuration process. For documentation and tutorials on manual configuration, please visit <https://cloud.ibm.com/docs/services/ai-openscale?topic=ai-openscale-crt-ov#crt-ov>

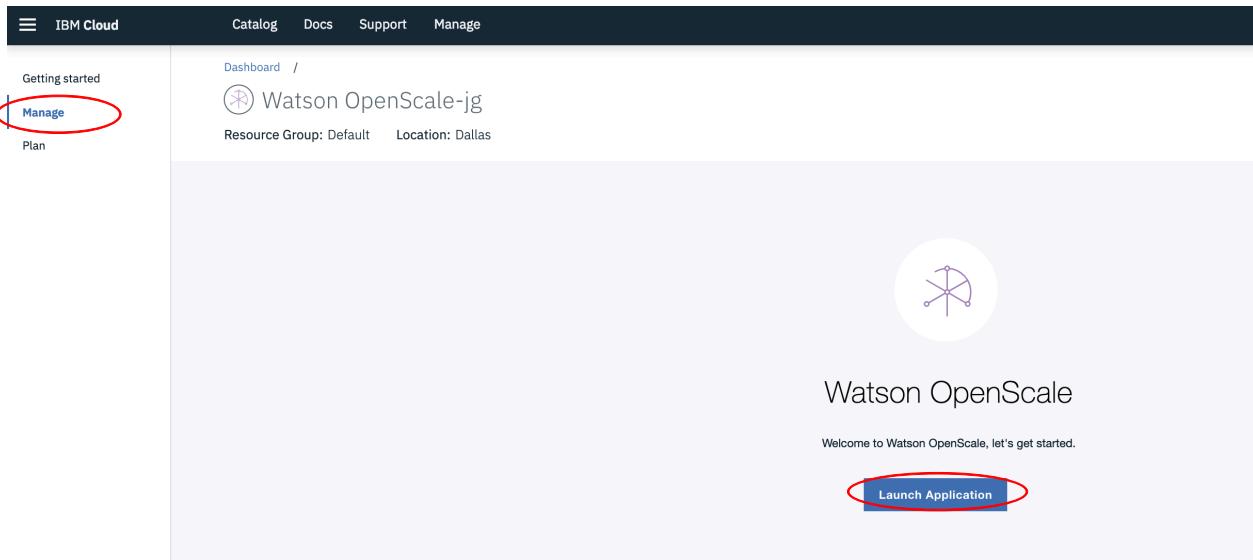
1. Return to <https://console.bluemix.net/dashboard/apps>
2. Click on the name of your Watson OpenScale service.



The screenshot shows the IBM Cloud dashboard. In the top navigation bar, the 'Manage' option is highlighted. Below the navigation, there are filters for RESOURCE GROUP, CLOUD FOUNDRY ORG, CLOUD FOUNDRY SPACE, LOCATION, and CATEGORY. A search bar says 'Search for resource...' and a 'Create resource' button is visible. The main area is titled 'Services' and contains a table with the following data:

Name	Location	Resource Group	Plan	Details	Service Offering
Watson OpenScale-y2	Dallas	Default	Lite	Provisioned	Watson OpenScale
cloud-object-storage-as	global	Default	Lite	Provisioned	Cloud Object Storage
data-science-experience-gu	Dallas	Default	Lite	Provisioned	Watson Studio
pm-20-zm	Dallas	Default	Lite	Provisioned	Machine Learning

3. Click on Manage along the bar on the left side.
4. Click on Launch Application.



The screenshot shows the Watson OpenScale application page. On the left sidebar, the 'Manage' link is highlighted with a red circle. The main content area shows the service name 'Watson OpenScale-jg' and its details: Resource Group: Default, Location: Dallas. A large circular icon with a stylized gear or compass symbol is centered above the service name. Below it, the text 'Watson OpenScale' is displayed, followed by a welcome message: 'Welcome to Watson OpenScale, let's get started.' At the bottom of the page, a blue button labeled 'Launch Application' is circled with a red circle.

You will be brought to your Watson OpenScale dashboard. This is meant to show summary information on all models connected to this instance of Watson OpenScale. At a glance we are able to check all our models for accuracy, fairness, and if there is any bias detected.

5. Click on your model card.

The screenshot shows the IBM Watson OpenScale dashboard. On the left is a dark sidebar with icons for navigation. The main area has a header "IBM Watson OpenScale" and a title "Insights". Below this are three summary cards:

Deployments Monitored	Accuracy Alerts	Fairness Alerts
1	0	1

Below these cards is a larger box labeled "Spark German Risk Deployment...". This box contains the following information:

- Issues:** 1 (with a red "BIAS" tag)
- Accuracy:** 79%
- Fairness:** 91% (with a note: "1 of 2 attributes reported")
- Evaluated:** a few seconds ago

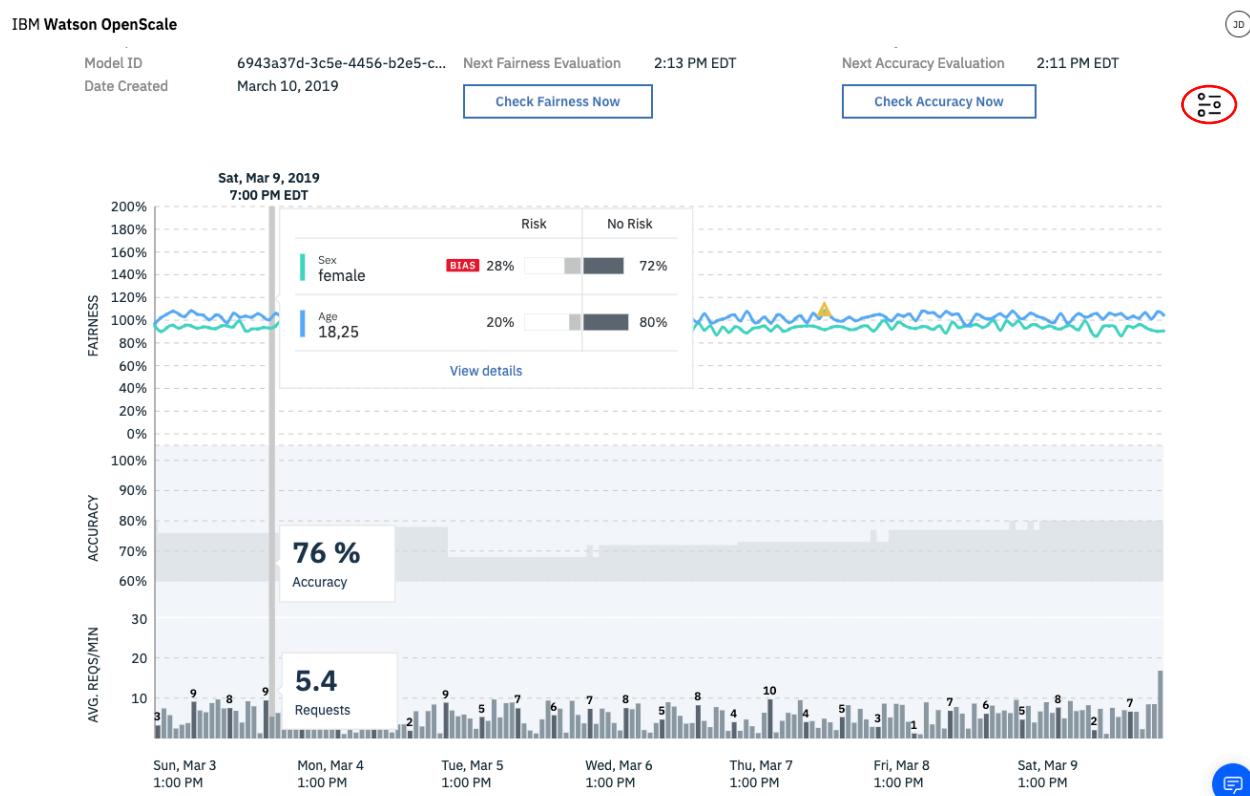
You will be brought to a model page.

The top of the screen shows model information and has buttons to immediately recalculate fairness and accuracy.

The screenshot shows the IBM Watson OpenScale interface. At the top left is the logo and name "IBM Watson OpenScale". On the far right is a circular icon with initials "JD". A vertical sidebar on the left contains icons for a checkmark, a gear, a document, and a question mark. The main title "Spark German Risk Deployment - Final" is centered at the top. Below the title, there are two sections of information: "Description" and "Model ID". Under "Description", "Model ID" is listed as 6943a37d-3c5e-4456-b2e5-c... and "Date Created" is March 10, 2019. To the right of these are evaluation times: "Fairness Evaluated" at 1:13 PM EDT, "Next Fairness Evaluation" at 2:13 PM EDT, "Accuracy Evaluated" at 1:11 PM EDT, and "Next Accuracy Evaluation" at 2:11 PM EDT. Below each time is a blue button labeled "Check [Metric] Now".

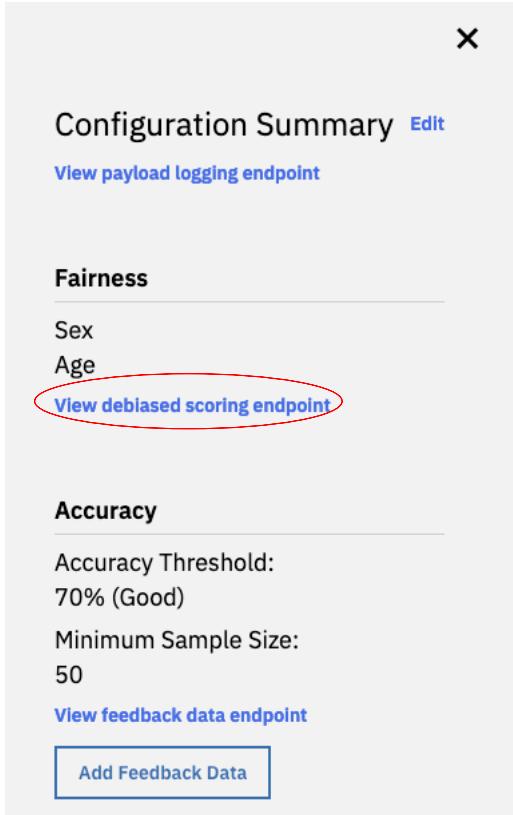
The lower half of the screen shows a time based graph tracking average requests per minute, accuracy, and fairness. Hovering over any part of the graph will allow you to drill down and see details for that set of transactions.

6. Click on the three dots to the far right of the screen.



A sidebar will open up that has links to manually configure Watson OpenScale fairness/bias thresholds and tracked features/inputs as well as links to the debiased scoring endpoint for your model.

7. Click on View debiased scoring endpoint.



This provides API specifications and calls for an endpoint that automatically mitigates any bias detected in your machine learning model. This allows external systems to use an unbiased version of a deployed machine learning model on a transaction by transaction basis.

8. Click on OK to return to your model graph.

IBM Watson OpenScale

JD

Spark German Risk Deployment - Final : Fairness

Implementation of debiased scoring endpoint

Use the code snippet provided to get debiased responses from your deployed model.

[View API Specification](#) | [Download](#)

Deployment Name	Spark German Risk Deployment - Final
Datamart ID	90dacf5-5647-4a01-88e4-34631fc2c678
Feedback Table Name	Feedback_6943a37d-3c5e-4456-b2e5-ccc45ed4eb09
Deployment ID	eb12030e-73ec-4c5e-bb7e-91772bba10c5
Subscription ID	6943a37d-3c5e-4456-b2e5-ccc45ed4eb09
Binding ID	a04620c8-926c-480c-9e8f-563e74c4481a

Debiased Endpoint Code Snippet: Spark German Risk Deployment - Final [ⓘ](#)

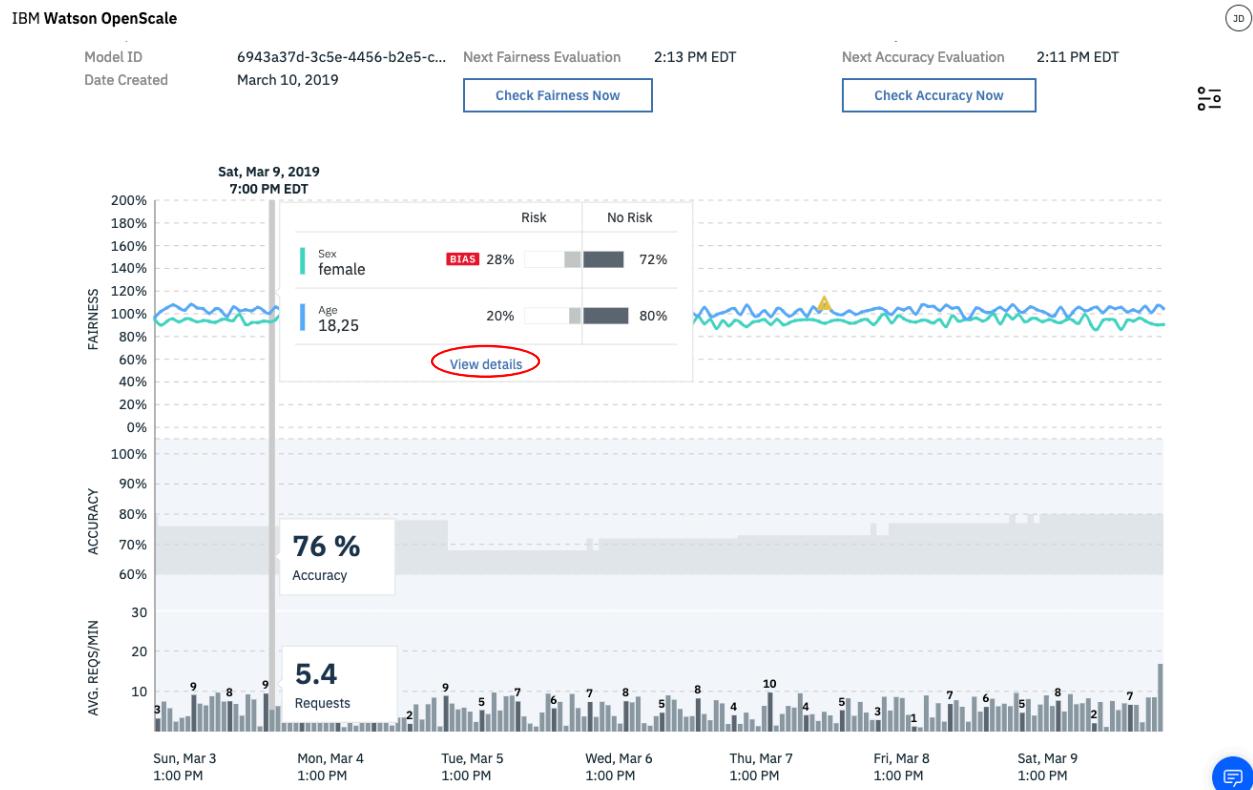
[cURL](#) [Java](#) [Python](#)

[Copy to clipboard](#)

```
# Replace "fields" - list of features column from payload logging - replace sample values with proper ones
# Replace "values" - payload logging data records - replace sample values with proper ones
curl -X POST "https://api.aiopenscale.cloud.ibm.com/v1/data_marts/90dacf5-5647-4a01-88e4-34631fc2c678/service_bindings/a04620c8-926c-480c-9e8f-5
```

OK

9. Hover over a more recent transaction and click View details.



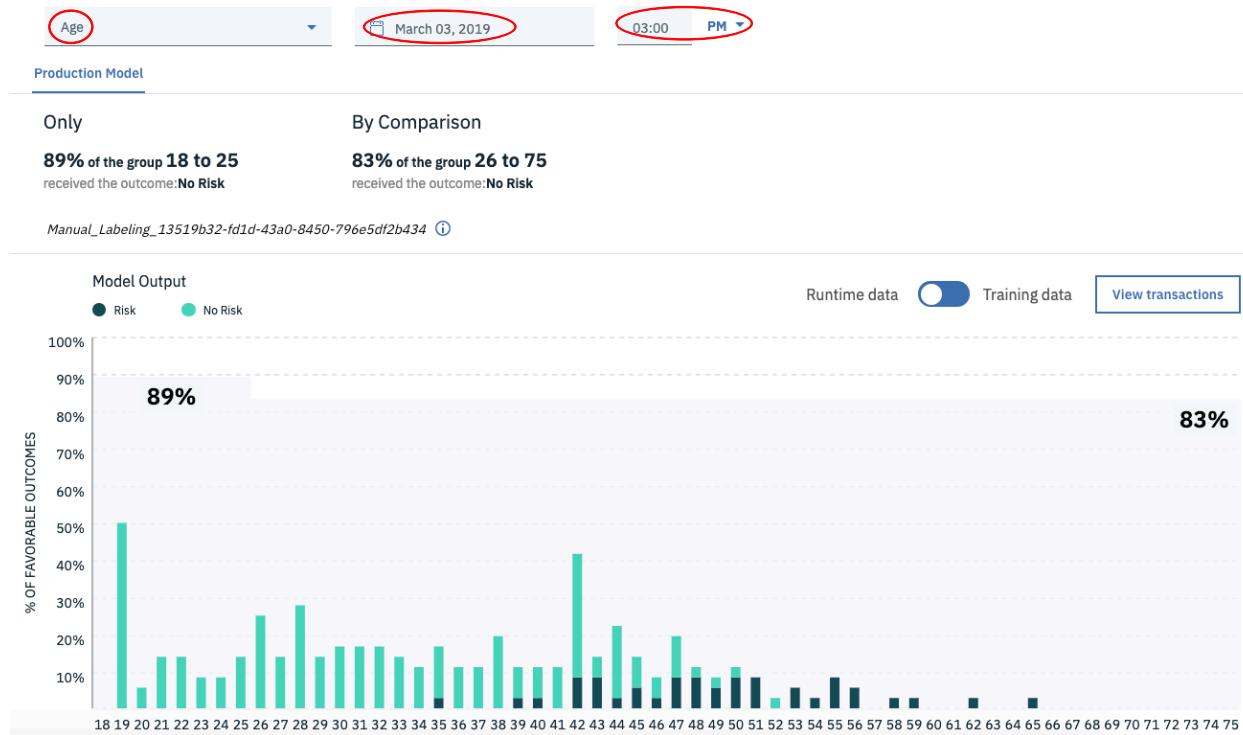
This page allows us to focus on fairness for a specific input feature (in this case we have set OpenScale to track the fairness of Age and Sex). Favorable outcomes were also set by our notebook with No Risk as the favorable outcome. A threshold can be configured to flag bias if fairness falls below that threshold.

Note that it may take 15 minutes time for the de-biased model to appear the first time.

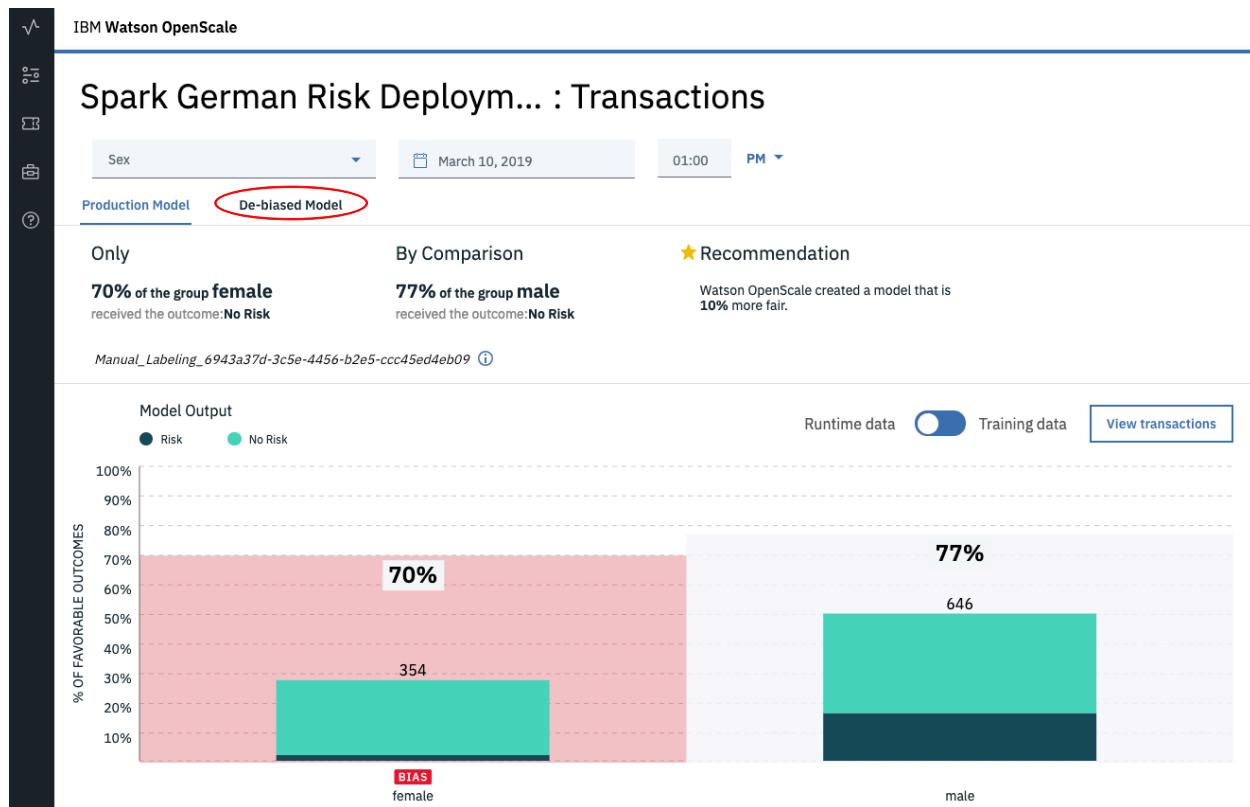
10. After waiting for 15 minutes, change Age to Sex.

11. Switch the date and time as close as possible to your current day and time.

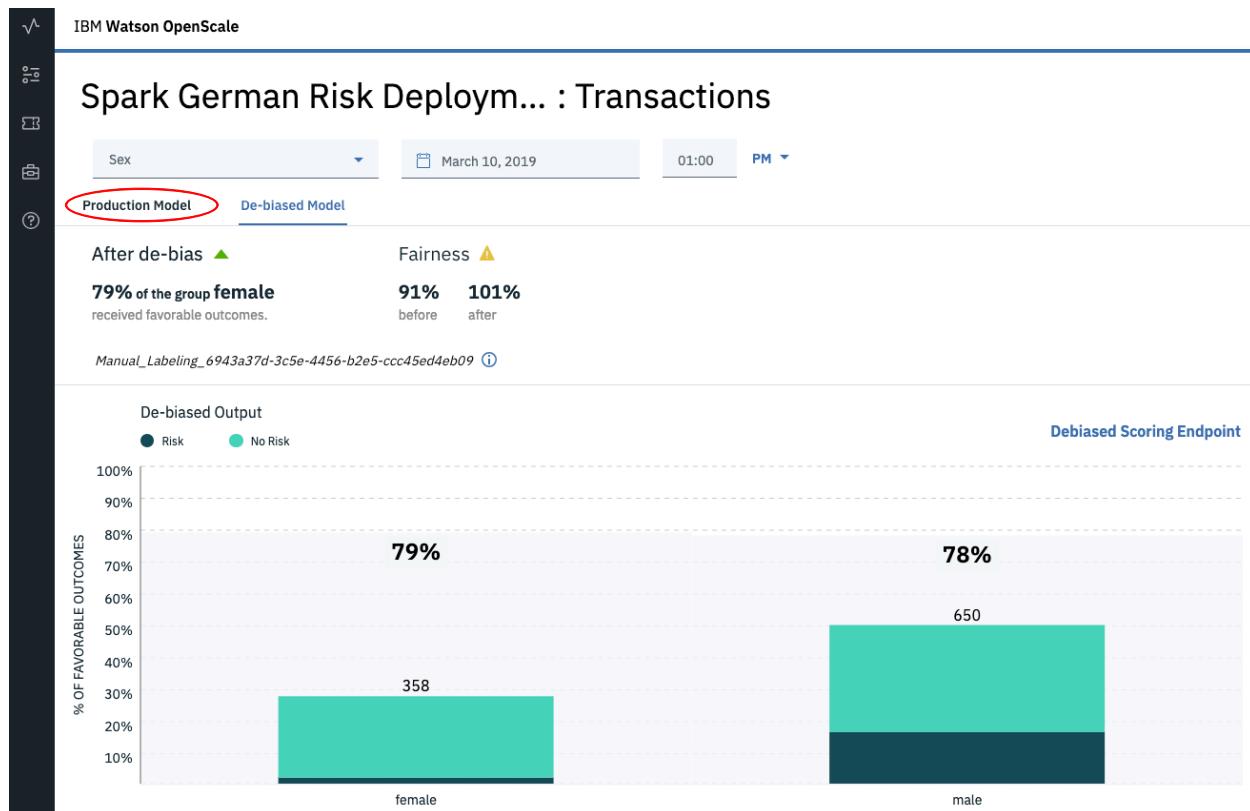
Spark German Risk Deploym... : Transactions



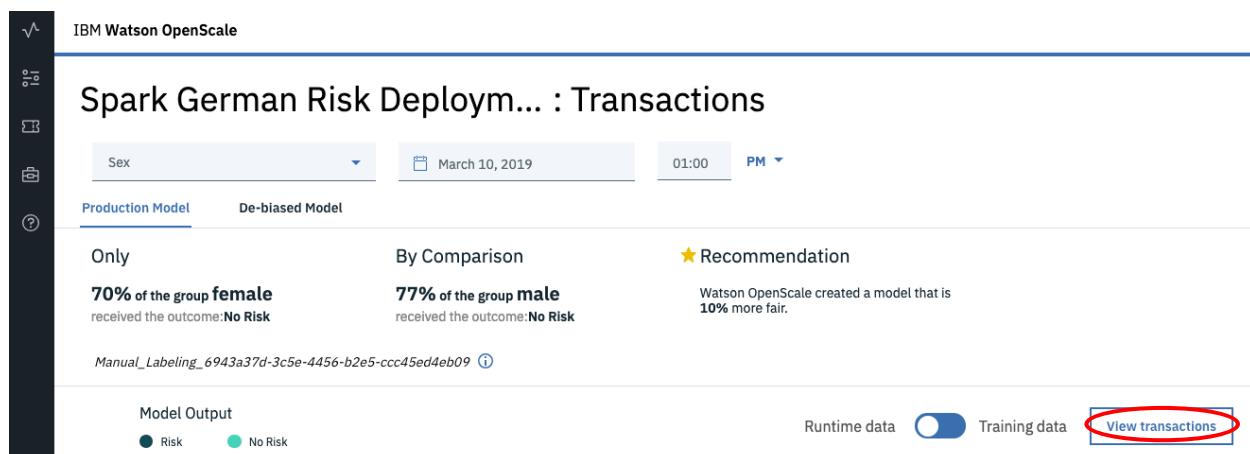
12. Switch to the De-biased model tab to observe the model OpenScale created to mitigate bias.



13. Once you have observed the change, click on the Production Model tab.



14. Click on View transactions.



This page allows us to observe transaction-by-transaction lists on the left side of the screen and aggregate Payloads on the right with comparisons between the current model and de-biased models.

15. Click on Explain next to a transaction.

IBM Watson OpenScale

Spark German Risk Deployment - Final: Transactions

March 10, 2019 01:00 PM

Sex

View
 All transactions Biased transactions

Payload Table Corrected Records

Payload_6943a37d-3c5e-4456-b2e5-ccc45ed4eb09

No Risk : Favorable Outcome

Model	Value	Percentage
Current Model	Blue Bar	69.9%
De-biased Model	Blue Bar	79.3%

Risk : Unfavorable Outcome

Model	Value	Percentage
Current Model	Dark Bar	30.1%
De-biased Model	Dark Bar	20.7%

Review the transactions that were received for the selected time period. Click an Explain link to determine the features that contributed to each outcome.

TRANSACTION ID	SEX	BIAS DETECTED	OUTCOME	ACTION
c304f74f62cc1193c6747c3c6eb1d7c0-159	female	0	0	Explain
c304f74f62cc1193c6747c3c6eb1d7c0-1	male	0	0	Explain
c304f74f62cc1193c6747c3c6eb1d7c0-160	male	1	1	Explain
c304f74f62cc1193c6747c3c6eb1d7c0-22	female	0	0	Explain
c304f74f62cc1193c6747c3c6eb1d7c0-161	female	1	1	Explain

This shows how our model made a decision based on how different input features were weighted and lists the minimum changes necessary to switch the model decision.

IBM Watson OpenScale

Explain a transaction

f6346cb26edf4fc10b4...

Details 1

Transaction	f6346cb26edf4fc10b45a8cea4e7a4ad-930	Minimum factors supporting this outcome <small>1</small>
Deployment	Spark German Risk Deployment - Final	LoanDuration 43
Model Name	Spark German Risk Model - Final	InstallmentPlans bank
		Job unemployed

Risk CONFIDENCE No Risk

Risk	CONFIDENCE	No Risk
45%	55%	

Factors contributing to Risk confidence level Factors contributing to No Risk confidence level

LoanDuration: 43.00	25%	11%	OthersOnLoan: none
---------------------	-----	-----	--------------------

You have completed base lab.

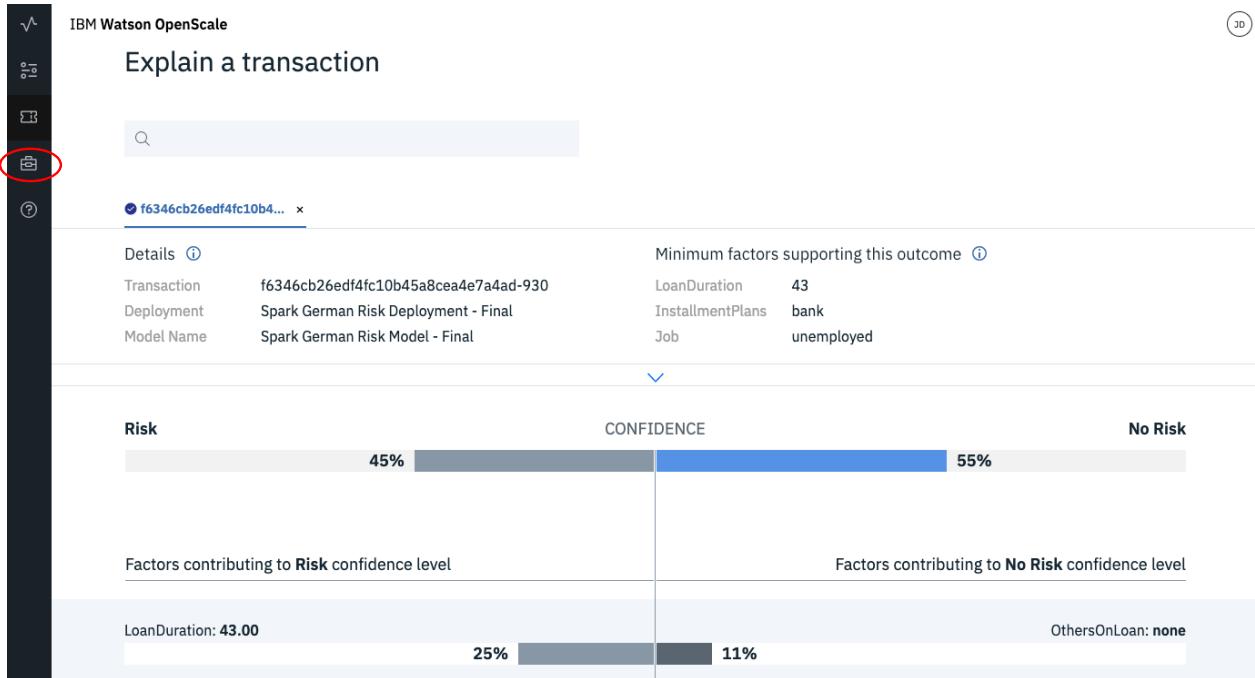
For training on topics including machine learning, data science, and blockchain, please visit: <https://www.ibm.com/industries/federal/analytics>

For an additional optional lab, continue on to step 4 on the next page.

Step 5: Synthesize a Neural Network. (Optional)

Watson OpenScale and Watson Studio are able to automatically synthesize Neural Networks with a high a degree of performance.

1. Click on the briefcase icon.



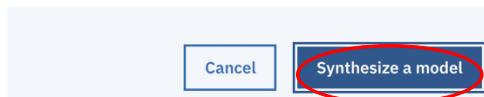
The screenshot shows the IBM Watson OpenScale interface. On the left, there's a sidebar with icons for search, refresh, and a briefcase (highlighted with a red circle). The main area is titled "Explain a transaction". It shows a transaction ID (f6346cb26edf4fc10b45a8cea4e7a4ad-930) and details like Deployment (Spark German Risk Deployment - Final) and Model Name (Spark German Risk Model - Final). To the right, it lists "Minimum factors supporting this outcome": LoanDuration (43), InstallmentPlans (bank), and Job (unemployed). Below this is a risk confidence bar from "Risk" to "No Risk" (45% to 55%). The bottom section shows factors contributing to the confidence levels: "Factors contributing to Risk confidence level" (LoanDuration: 43.00, 25%) and "Factors contributing to No Risk confidence level" (OthersOnLoan: none, 11%).

2. Click on Synthesize a model.

Try NeuNetS

NeuNetS (beta) allows you to synthesize models using Watson OpenScale technology in Watson Studio.

[Sign up for the free Watson Studio Lite plan](#)



3. Click on Synthesize a model.

The screenshot shows the 'NeuNetS : Neural Network Synthesis BETA' page. At the top, there are two main sections: '1 Upload your data' and '2 NeuNetS does the rest'. Below these sections, there is a 'Getting Started' area with a 'Synthesize a Model' button, which is circled in red. There is also a 'View Documentation' link.

4. Under Trained model connection, click Select.

The screenshot shows the 'Define classifier details' section on the left and the 'Trained model connection' section on the right. In the 'Trained model connection' section, there are two options: 'TEXT SMS Spam Classification' and 'IMAGE CIFAR-10'. Below these options is a 'Select' button, which is circled in red. A note at the bottom states: '□ Your training data will be used by IBM for research, testing, and offering development related to Watson OpenScale. If you do not want IBM to use your training data, check the box, and IBM will not use the training data associated with this submission.'

5. Click on the new connection tab.
6. Under Cloud Object Storage instance select your cloud storage from the dropdown.
7. Under Bucket Containing results data enter “neunets-XXXX-results” where the Xs are your initials in lowercase (e.g. neuneuts-mpc-results).
8. Click Create.

Existing connections [New connection](#)

Connection name
New COS connection - 7 Mar 2019

Connection name is restricted to upper and lowercase letters, numbers, underscores, dashes, periods and spaces. Once created, the new connection will be visible as a data asset in your project.

Restrict connection access to selected bucket
⚠️ Unrestricted connections have access to buckets beyond the selected bucket. Be careful not to delete any buckets that may be used for project or catalog storage.

Cloud Object Storage instance
[cloud-object-storage-as](#)

Bucket containing results data
 Existing New
[neunets-mpc-results](#)

Bucket name is restricted to lowercase letters from a to z, numbers, or dashes, between 3 and 64 characters in length.

[Cancel](#) [Create](#)

9. Back on the Synthesize text or image classifier page, enter a name and description.

10. Select your Machine Learning service under Machine Learning Service Instance.

Define classifier details

Name CIFAR_10_Model

Description CIFAR NeuNet

Project

Add synthesized text or image classifier to an existing project.

Machine Learning Service Instance pm-20-ez

Data type i

Image Text From sample i

TEXT
SMS Spam Classification
The Text SMS Spam Classification data set includes SMS messages that are classified as spam or legitimate messages.

IMAGE
CIFAR-10
CIFAR-10 is a labeled subset of the 80 million tiny images dataset, referenced in the technical report "Learning Multiple Layers of Features from Tiny Images", Alex Krizhevsky, 2009

Trained model connection i

Results: New COS connection - 7 ... / neunets-mpc-results Update

Your training data will be used by IBM for research, testing, and offering development related to Watson OpenScale. If you do not want IBM to use your training data, check the box, and IBM will not use the training data associated with this submission.

Cancel Begin Synthesis

11. Select from Sample along the right side and click CIFAR 10.

12. Click Begin Synthesis.

Synthesize text or image classifier BETA

Define classifier details

Name

Description

Project

Add synthesized text or image classifier to an existing project.

Machine Learning Service Instance

Data type i

Image Text From sample i

TEXT
SMS Spam Classification
The Text SMS Spam Classification data set includes SMS messages that are classified as spam or legitimate messages.

IMAGE
CIFAR-10
CIFAR-10 is a labeled subset of the 80 million tiny images dataset, referenced in the technical report "Learning Multiple Layers of Features from Tiny Images", Alex Krizhevsky, 2009

Trained model connection i

Results: New COS connection - 7 ... / neunets-mpc-results Update

Your training data will be used by IBM for research, testing, and offering development related to Watson OpenScale. If you do not want IBM to use your training data, check the box, and IBM will not use the training data associated with this submission.

Cancel Begin Synthesis Begin Synthesis

Your model may take a long time to synthesize.

13. Click on Confusion matrix and observe further results.

The screenshot shows the IBM Watson Studio interface for the 'CIFAR_10_Model' project. At the top, there's a navigation bar with 'IBM Watson Studio', 'Upgrade', 'John Doe's Account', and various icons. Below the bar, the project path is 'My Projects / Trusted AI Project / CIFAR_10_Model'. On the left, a progress timeline shows 'Job accepted', 'Preprocessing', 'Synthesizing' (with a checkmark), and 'Completed'. To the right of the timeline are buttons for 'Download model' and 'Deploy model to Watson Machine Learning'. The main area is divided into sections: 'Status' (synthesizing complete, download/deploy available), 'Performance' (Accuracy 90.8%, Precision 0.907, Recall 0.908), and 'Training data' (Content type: image, Source bucket: synthesized-neural-network-sample-cifar10, Number of classes: 10). On the far right, there are 'Label statistics' and 'Confusion matrix' tabs, with 'Confusion matrix' circled in red. It displays 'Total training samples: 48000' and 'Total classes: 10'. Below these are filters for 'View validation samples' and 'Sort highest to lowest'. A chart titled 'Lowest training samples per class' shows that all 10 classes have 4800 samples. At the bottom, it says 'Showing 5 of 10 total classes' and has links for 'Show full training data' and 'Download all'.

14. Click on Deploy model to Watson Machine Learning

The screenshot shows the IBM Watson Studio interface for a project named 'CIFAR_10_Model'. At the top, there's a navigation bar with 'IBM Watson Studio', 'Upgrade', 'John Doe's Account', and other icons. Below the navigation is a breadcrumb trail: 'My Projects / Trusted AI Project / CIFAR_10_Model'. The main content area has a title 'CIFAR_10_Model' with a refresh icon. Below the title is a progress bar with four steps: 'Job accepted' (checkmark), 'Preprocessing' (checkmark), 'Synthesizing' (checkmark), and 'Completed' (circle). To the right of the progress bar are two buttons: 'Download model' and 'Deploy model to Watson Machine Learning', with the latter being highlighted by a red oval. On the left side, there are sections for 'Status' (synthesizing complete, can download or deploy) and 'Performance' (Accuracy 90.8%, Precision 0.907, Recall 0.908). On the right side, there are 'Label statistics' and a 'Confusion matrix' section. The confusion matrix table is as follows:

		Truck	Automobile	Ship	Horse	Frog	Actual totals	
Actual	Predicted	Truck	0.97	0.01	0.01	0.00	0.00	1200
		Automobile	0.02	0.96	0.01	0.00	0.00	1200
Ship	0.01	0.01	0.96	0.00	0.00	1200		
Horse	0.00	0.00	0.01	0.94	0.00	1200		
Frog	0.00	0.00	0.00	0.00	0.93	1200		
Predicted totals	1244	1200	1214	1265	1201	12000		

This is now a Watson Machine Learning Model and can be deployed and made available to API calls or external systems.

You completed the optional lab.