

Drones-IoT-Visual-Recognition

Save Lives with Drones / IoT / Visual Recognition - Hands on Lab / Workshop

Introduction

This hands on lab uses drone aerial images, Watson Studio and Watson Visual Recognition to survey flood damaged neighborhoods, identify homes with survivors on rooftops and detect rescue boats. A lifesaving scenario might be to use drones to identify flood survivors and direct rescue boats to the victims using GPS and visual recognition.

The screenshot shows the IBM Watson Studio interface in the 'Test' tab for a project named 'Flooding'. On the left, there's a filter section with a threshold slider set at 0.0 and a class filter for 'Flooded Neighborhood', 'Rescue Boat', and 'Rooftop Survivors'. The main area displays four images with their respective classification results:

Image	Flooded Neighborhood	Rescue Boat	Rooftop Survivors
1_s.jpg	0.89	0.06	0.02
rescueboat.jpg	0.62	0.57	0.11
grande.jpg	0.89	0.02	0.00

Image	Flooded Neighborhood	Rescue Boat	Rooftop Survivors
screen-shot-2016-04-20-at-105252.jpg	0.89	0.08	0.00
tokyoflood.jpg	0.91	0.00	0.00
sjm-floodalert-0226-04.jpg	0.83	0.30	0.00

Learning objectives

After completing this tutorial you will be able to:

- Create a Visual Recognition model in Watson Studio running in IBM Cloud
- Capture images from a drone and zip them into a class (provided)
- Train a model to identify objects in the images

- Score the identified objects

Prerequisites

This tutorial can be completed using an IBM Cloud Lite account.

- Create an [IBM Cloud account](https://ibm.biz/ibmcloudoscondrone) at <https://ibm.biz/ibmcloudoscondrone>
- Log into [IBM Cloud](#)

Estimated time

You can complete this task in no more than 45 minutes.

Hands on Lab Overview

The outline below provides a high level overview of the steps included in the lab instructions.

Step 1 - Learn about Drones

There are many types of drones available that range from toys to industrial use cases. Many of the drones now include a camera that can store or stream aerial video to the ground. Using the livestream video frames, we can sample frames and send the images to Watson Visual Recognition for classification.

- Pocket toy drones
- Hobbyist drones
- Commercial drones

For this lab, we are not flying the drone indoors or venturing out into a field. If you are interested in purchasing a drone, the instructors can share some of their drone experiences and recommendations.

Step 2 - Capturing Images

One of the fun experiences of flying a drone is capturing video or pictures from a unique aerial perspective. You can use your drone to capture images of interesting objects that you want to train a visual recognition model to autonomously identify.

In this lab, we have created four zip files of pictures recorded by drones. The lab will use these images to identify neighborhoods affected by devastating flooding during Harvey, Katrina, upper MidWest and around the world. These images will be used as our training set.

- Grab them all [here](#)
- Aerial drone images of flooded neighborhoods - [flooded-neighborhood.zip](#)
- Aerial drone images of flooded homes with survivors on rooftops - [rooftop-survivors.zip](#)
- Aerial drone images of rescue boats navigating flooded landscapes - [rescueboats.zip](#)
- Aerial drone images of unaffected suburban neighborhoods to be used for the negative class - [suburban-neighborhood.zip](#)

Step 3 - Watson Studio

In this section, we will create a Watson Studio account, create a Project and Watson Visual Recognition model to identify images in several classes.

- Create a Watson Studio account
- Create a Project
- Create a Visual Recognition model
- Upload four zip files to Cloud Object Storage
- Create a class *Flooded neighborhood* - drag a zipfile
- Create another class *Rooftop Survivors* - drag a zipfile
- Create another class *Rescue Boat* - drag a zipfile
- Create a negative class using the *Suburban neighborhood* images - drag a zipfile
- Train your model - wait a few minutes

Step 4 - Test your model

In this section you will use sample images to confirm your model.

- Test your model

Step 5 - Implement this model in your Application

- Embed your model into an application using these code snippets
-

Watson Studio Set up and Configuration in IBM Cloud

Chapter Objectives

In this chapter you will set up Watson Studio with a new Project. You will learn:

- Watson Studio
- How to set up a new Watson Studio Project

Introduction

Watson Studio accelerates the machine and deep learning workflows required to infuse AI into your business to drive innovation. It provides a suite of tools for data scientists, application developers and subject matter experts, allowing them to collaboratively connect to data, wrangle that data and use it to build, train and deploy models at scale. Successful AI projects require a combination of algorithms + data + team, and a very powerful compute infrastructure.

- Learn more from the Experts - [Introducing IBM Watson Studio](#)

Watson Studio Setup

Log into Watson Studio

- If you created a **Watson Studio** service instance in a prior lab, you can relaunch Watson Studio by visiting <http://dataplatform.cloud.ibm.com>
- Skip the next **Create a Watson Studio service instance** section if you do not need to create a new Watson Studio instance. (Only one Watson Studio instance is allowed per IBM Cloud Lite account). Jump to the **Watson Studio Projects** section.
- If you want to learn how to navigate the [IBM Cloud Dashboard](#), click on [Services](#), then search for *studio* in the masthead.

- **Tip:** Here's a shortcut to locate your Watson Studio instance

The screenshot shows the IBM Cloud Resource list interface. At the top, there is a search bar with the word "studio". Below the search bar is a table header with columns: Name, Group, Location, Offering, Status, and Tags. A filter bar above the table includes fields for Name, Group, Location, Offering, Status, and Tags, each with a "Filter..." button. The main table lists resources under the "Services" category. One resource is visible: "Watson Studio-jaw" (Group: default, Location: Dallas, Offering: Watson Studio, Status: Provisioned). There are also collapsed sections for Devices, Kubernetes Clusters, Cloud Foundry Apps, and Cloud Foundry Services.

- Click on the Watson Studio instance to open and launch Watson Studio.

Create a Watson Studio service instance

- Create a **Watson Studio** service instance from the **IBM Cloud Catalog**
- Search on **Studio** in the IBM Cloud Catalog

The screenshot shows the IBM Cloud Catalog interface. At the top, there is a search bar with the word "Studio". Below the search bar is a sidebar titled "All Categories (4)" with links to Compute, Containers, Networking, Storage, AI (3), Analytics (1), Databases, Developer Tools, Integration, Internet of Things, Security and Identity, and Starter Kits. The main area is titled "AI" and contains three service cards: "Knowledge Studio" (Lite • IBM), "Natural Language Understanding" (Lite • IBM), and "Watson Studio" (Lite • IBM). The "Watson Studio" card has a detailed description: "Embed AI and machine learning into your business. Create custom models using your own data."

- Click on the **Watson Studio** service tile

The screenshot shows the IBM Cloud Catalog interface. At the top, there's a navigation bar with 'IBM Cloud' and links for 'Catalog', 'Docs', 'Support', and 'Manage'. A search bar and user profile information ('1421965 - John Walick...') are also at the top right. Below the navigation is a service tile for 'Watson Studio'. The tile includes a purple icon of a person at a desk, the service name 'Watson Studio', and a subtitle 'Lite • IBM'. To the left of the main content area, there's a brief description of Watson Studio: 'Watson Studio democratizes machine learning and deep learning to accelerate infusion of AI in your business to drive innovation. Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.' Below this description are links to 'View Docs' and 'Terms'. On the right side of the service tile, there are input fields for 'Service name' (set to 'Watson Studio-jk'), 'Choose a region/location to deploy in:' (set to 'US South'), and 'Select a resource group:' (set to 'default'). A 'FEEDBACK' button is located on the far right edge of the service tile. Below the service tile, there's a section titled 'Features' with two bullet points: 'Use what you know, learn what you don't' and 'Power on demand'. Under 'Use what you know, learn what you don't', it says: 'Start from a tutorial, start from a sample, or start from scratch. Tap into the power of the best of open source (RStudio, Jupyter Notebooks) and Watson services for flexible model creation. Use Python, R, or Scala. Stop downloading and configuring analysis environments and start getting insights.' Under 'Power on demand', it says: 'Enterprise-scale features on demand. From data exploration and preparation, to enterprise-scale performance. Manage your data, your analytical assets, and your projects in a secured cloud environment.' At the bottom of the service tile, there are links for 'Need Help?', 'Contact IBM Cloud Support', 'Estimate Monthly Cost', 'Cost Calculator', and a large blue 'Create' button.

- Click on the **Create** button
- After the Watson Studio service is created, click on **Get Started** or visit Watson Studio at <https://dataplatform.cloud.ibm.com/>

The screenshot shows the IBM Cloud service dashboard for 'Watson Studio'. The left sidebar has 'Manage' selected under 'Watson' and 'Plan'. The main content area shows the service tile for 'Watson Studio-ge'. It includes the service icon, name 'Watson Studio-ge', and details 'Resource Group: default' and 'Location: US South'. Below the service tile is a circular icon with the Watson Studio logo. The main title 'Watson Studio' is centered above a welcome message: 'Welcome to Watson Studio. Let's get started!'. A prominent blue 'Get Started' button is located at the bottom right of the main content area.

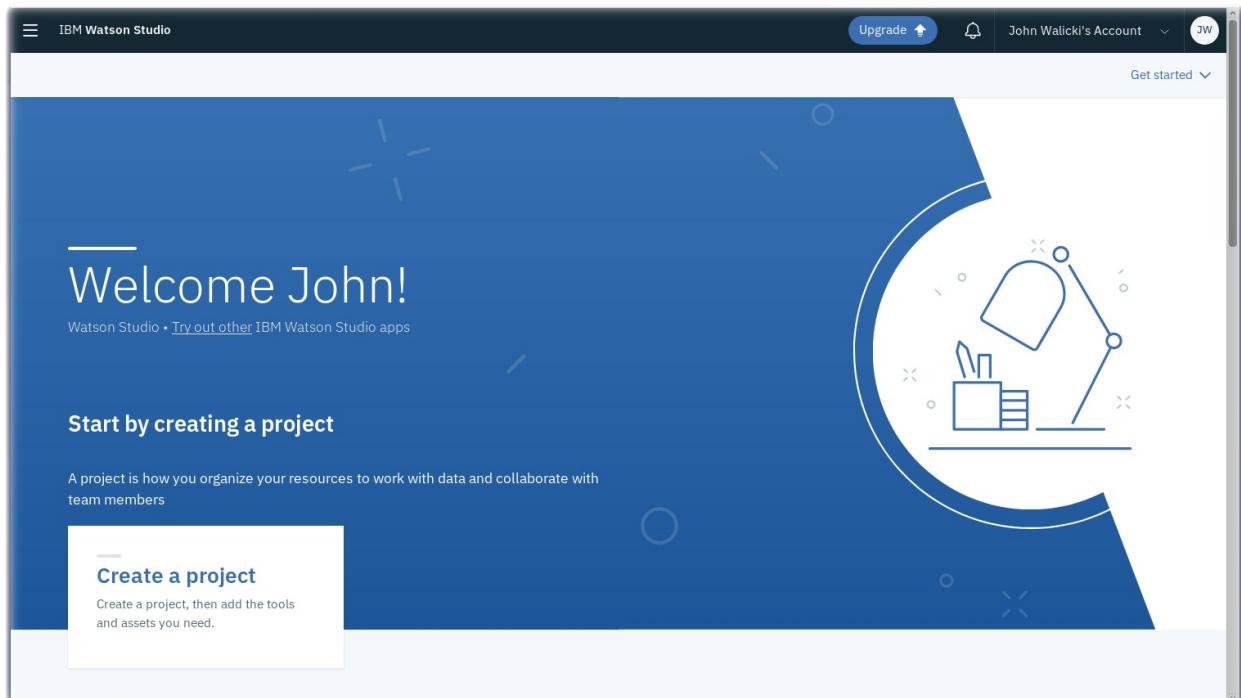
- Login with your IBM Cloud account
- Walk through the introductory tutorial to learn about Watson Studio

Watson Studio Projects

Projects are your workspace to organize your resources, such as assets like data, collaborators, and analytic tools like notebooks and models

Create a New Project

- Click on **Create a Project**



- Select the **Visual Recognition** tile and press the **Create Project** button

The screenshot shows the 'Create a project' interface in IBM Watson Studio. There are several project starter options listed:

- Standard**: Work with any type of asset. Add services for analytical assets as you need them.
- Import project**: Import a project from a file or a Git repository.
- Data Science**: Analyze data to discover insights and share your findings with others. Assets: Data • Notebooks.
- Visual Recognition**: Tag and classify visual content using the Watson Visual Recognition service. Assets: Data • Visual recognition model. This option is currently selected, as indicated by a blue bar at the bottom of its card.
- Deep Learning**: Build neural networks and deploy deep learning models. Assets: Data • Modeler flow • Model • Experiment.

A prominent 'Create Project' button is located at the bottom of the Visual Recognition card.

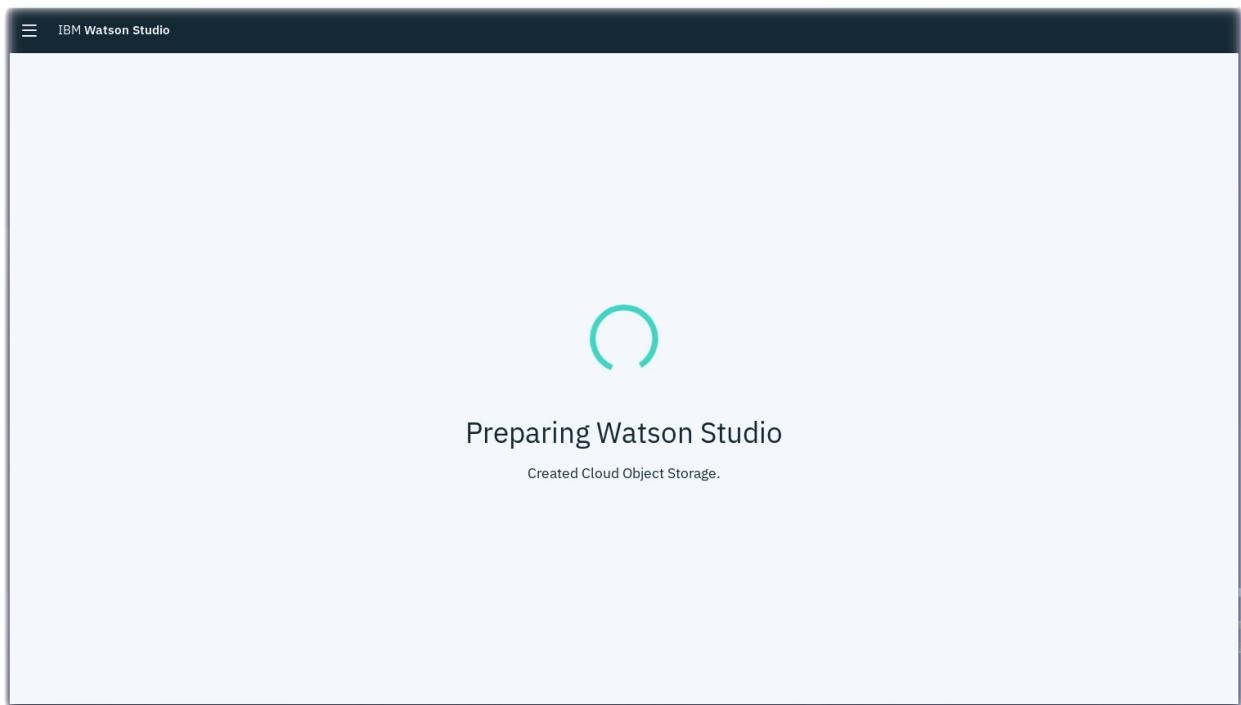
- Select a region for Visual Recognition

The screenshot shows a modal dialog titled 'Select a region for Visual Recognition'. It contains the following text and interface elements:

Select an IBM Cloud [region](#) to create this service in.
If an [instance already exists in the selected region](#), an additional service will not be provisioned.

A dropdown menu labeled 'Select a region' is open, showing 'US South' as the selected option. A 'Select' button is located at the bottom right of the dropdown.

- Watson Studio will spin for a few seconds while **Preparing Watson Studio** project. New instances of Watson Visual Recognition and Cloud Object Storage will be created.



- Give your Project a name : **Flooding**
- The new Cloud Object Storage instance will be prefilled.
- The new Watson Visual Recognition service instance will be prefilled.
- Press the **Create** button

The screenshot shows the "New project" dialog in IBM Watson Studio. The title bar says "IBM Watson Studio". The main area has a light gray header "New project" and a sub-header "Create a project for your custom model. A project is how you organize your resources to work with data and share assets with collaborators." Below this, there are two main sections: "Define project details" and "Choose project options".

Define project details:

- Name:** Flooding
- Description:** This hands on lab uses drone aerial images, Watson Studio and Watson Visual Recognition to survey flood damaged neighborhoods, identify homes with survivors on rooftops and detect rescue boats.

Choose project options:

- Restrict who can be a collaborator (i)

Project will include integration with [Cloud Object Storage](#) for storing project assets and [Watson Visual Recognition](#) for model training and deployment.

Additional tools and services can be added in Project Settings after project creation.

At the bottom right are "Cancel" and "Create" buttons.

You are ready to set up your Project with Watson Visual Recognition. Proceed to the next [step](#)

Chapter Objectives

In this chapter you will create a Visual Recognition model in a Watson Studio Project. You will learn:

- How to work within a new Watson Studio Project
- How to create a Visual Recognition model

Watson Studio Projects

Projects are your workspace to organize your resources, such as assets like data, collaborators, and analytic tools like notebooks and models.

Rename Visual Recognition Model

- The **Default Custom Model** name is not descriptive so let's rename it
- Click on the **pencil** icon to edit the name

The screenshot shows the IBM Watson Studio interface. At the top, there is a navigation bar with 'IBM Watson Studio', 'Upgrade', 'IBM', and other icons. Below the navigation bar, the URL 'Projects / Flooding / Default Custom Model' is visible. The main content area has a title 'Default Custom Model' with a pencil icon for editing. It also shows 'Associated Service : watson-vision-combined-dsx'. There are tabs for 'My classes (1)' and 'All images (0)'. A warning message 'At least 2 classes required' is displayed. On the left, there is a placeholder for dragging files with the text 'Drag and drop files from your project.' Below this, it says '1 class | 0 incomplete classes | 0 unclassified images'. On the right, there is a search bar 'Search classes' and a note about training data size 'New training data size: 0.0/250 MB'. On the far right, there are two sections: '1. Upload to project' (with a 'Browse' button) and '2. Add from project' (which is currently empty). A note at the bottom right says 'There are no .jpeg, .png, or .zip files in your project.'

- Rename the model to **Flooding**

Add Custom Classes to the Watson Visual Recognition Model

- Click on the + symbol to add a class

- Name this class **Flooded Neighborhood**
- Click the **Create** button

Associated Service : watson-vision-combined-dsx

My classes (1) All Images (0)

At least 2 classes required

Create a class

Flooded Neighborhood

0.0/250 MB

Cancel Create

Drag and drop files from your project.

1 class | 0 incomplete classes | 0 unclassified images

+

Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes.

Negative (0)

This class is recommended but not required.

Train Model

1. Upload to project

To add files to your project, drop .jpeg, .png, or .zip files here or

Browse

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

There are no .jpeg, .png, or .zip files in your project.

- Add a second custom class by clicking on the + symbol again

Associated Service : watson-vision-combined-dsx

My classes (2) All Images (0)

At least 2 classes required

Create a class

Search classes

New training data size: 0.0/250 MB

+

Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes.

Flooded Neighborhood...

Add 10 images to train this class.

Negative (0)

This class is recommended but not required.

Train Model

1. Upload to project

To add files to your project, drop .jpeg, .png, or .zip files here or

Browse

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

There are no .jpeg, .png, or .zip files in your project.

- Name this class **Rooftop Survivors**
- Click the **Create** button

- Add a third custom class by clicking on the + symbol again
- Name this class **Rescue boat**
- Click the **Create** button

Upload Zip Files to Watson Studio Project

- Four zip files have been prepared which contain aerial drone images
- If you following these steps on the web, download the aerial drone zip files here:
 - [flooded-neighborhood.zip](#)
 - [rescueboats.zip](#)
 - [rooftop-survivors.zip](#)
 - [suburban-neighborhood.zip](#)
- Click on the **Browse** button
- An operating system native File Dialog will open
- Multi-select the four zip files **flooded-neighborhood.zip**, **rescueboats.zip**, **rooftop-survivors.zip**, **suburban-neighborhood.zip**
- Upload these zip files to your Watson Studio project

The screenshot shows the IBM Watson Studio interface for a project named "Flooding". The left side of the screen displays the project structure: "Projects / Flooding / Flooding". The main area shows four classes: "Create a class", "Flooded Neighbor...", "Negative (0)", "Rescue Boat (0)", and "Rooftop Survivors...". Each class has a "Add 10 images to train this class." button. On the right, there are two sections: "1. Upload to project" and "2. Add from project". The "1. Upload to project" section contains a "Browse" button, which is highlighted with a red box. The "2. Add from project" section contains a message: "There are no .jpeg, .png, or .zip files in your project."

Associated Service : watson-vision-combined-dsx

My classes (4) **All images (0)**

Drag and drop files from your project.

4 classes | 3 incomplete classes | 0 unclassified images

New training data size: 0.0/250 MB

Create a class

Flooded Neighbor... Add 10 images to train this class.

Negative (0) This class is recommended but not required.

Rescue Boat (0) Add 10 images to train this class.

Rooftop Survivors... Add 10 images to train this class.

1. Upload to project
To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project
Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

Selected

- rooftop-survivors.zip** 31 Mar 2019, 2:51:00 pm
3.24 MB
- flooded-neighborhood.zip** 31 Mar 2019, 2:51:00 pm
3.58 MB
- rescueboats.zip** 31 Mar 2019, 2:51:00 pm
3.55 MB
- suburban-neighborhood.zip** 31 Mar 2019, 2:51:00 pm
2.37 MB

Drag the zip files to Custom Classes

- Grab the **rooftop-survivors.zip** from the right navigation and drag it to the **Rooftop Survivors** class

Associated Service : watson-vision-combined-dsx

My classes (4) **All images (0)**

Drag and drop files from your project.

4 classes | 3 incomplete classes | 0 unclassified images

New training data size: 0.0/250 MB

Create a class

Flooded Neighbor... Add 10 images to train this class.

Negative (0) This class is recommended but not required.

Rescue Boat (0) Add 10 images to train this class.

Rooftop Survivors... Add 10 images to train this class.

1. Upload to project
To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project
Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

Selected

- rooftop-survivors.zip** 31 Mar 2019, 2:51:00 pm
3.24 MB
- flooded-neighborhood.zip** 31 Mar 2019, 2:51:00 pm
3.58 MB
- rescueboats.zip** 31 Mar 2019, 2:51:00 pm
3.55 MB
- suburban-neighborhood.zip** 31 Mar 2019, 2:51:00 pm
2.37 MB

- The images in the zip file will be added to the **Rooftop Survivors** class

IBM Watson Studio

Projects / Flooding / Flooding

Flooding

Associated Service : watson-vision-combined-dsx

My classes (4) All images (15)

Drag and drop files from your project.

4 classes | 2 incomplete classes | 0 unclassified images

Create a class

Flooded Neighborhood (0) Add 10 images to train this class.

Negative (0) This class is recommended but not required.

Rescue Boat (0) Add 10 images to train this class.

Rooftop Survivors... (0) 6/15 images loaded

Search classes

New training data size: 0.6/250 MB

Train Model

Loading images

1. Upload to project

To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

- rooftop-survivors.zip Loading file into model...
- flooded-neighborhood.zip 31 Mar 2019, 2:51:00 pm 3.58 MB
- rescueboats.zip 31 Mar 2019, 2:51:00 pm 3.55 MB
- suburban-neighborhood.zip 31 Mar 2019, 2:51:00 pm 2.37 MB

- Grab the **flooded-neighborhood.zip** from the right navigation and drag it to the **Flooded Neighborhood** class

IBM Watson Studio

Projects / Flooding / Flooding

Flooding

Associated Service : watson-vision-combined-dsx

My classes (4) All images (36)

Drag and drop files from your project.

4 classes | 1 incomplete class | 0 unclassified images

Create a class

Flooded Neighborhood (21) 3/21 images loaded

Negative (0) This class is recommended but not required.

Rescue Boat (0) Add 10 images to train this class.

Rooftop Survivors... (0)

Search classes

New training data size: 3.9/250 MB

Train Model

Loading images

1. Upload to project

To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

- rooftop-survivors.zip 31 Mar 2019, 2:51:00 pm 3.24 MB
- flooded-neighborhood.zip Loading file into model...
- rescueboats.zip 31 Mar 2019, 2:51:00 pm 3.55 MB
- suburban-neighborhood.zip 31 Mar 2019, 2:51:00 pm 2.37 MB

- Grab the **rescueboats.zip** from the right navigation and drag it to the **Rescue Boat** class

IBM Watson Studio

Projects / Flooding / Flooding

The images in file rescueboats.zip have been added to class Rescue Boat.

Flooding

Associated Service : watson-vision-combined-dsx

My classes (4) All images (56)

Drag and drop files from your project.

4 classes | 0 incomplete classes | 0 unclassified images

New training data size: 10.5/250 MB

Create a class

Flooded Neighborhood...

Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes.

Negative (0)

This class is recommended but not required.

Rescue Boat (20)

Rooftop Survivors...

To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

- rooftop-survivors.zip 31 Mar 2019, 2:51:00 pm 3.24 MB
- flooded-neighborhood.zip 31 Mar 2019, 2:51:00 pm 3.58 MB
- rescueboats.zip 31 Mar 2019, 2:51:00 pm 3.55 MB
- suburban-neighborhood.zip 31 Mar 2019, 2:51:00 pm 2.37 MB

- Grab the **suburban-neighborhood.zip** from the right navigation and drag it to the **Negative** class

IBM Watson Studio

Projects / Flooding / Flooding

The images in file suburban-neighborhood.zip have been added to class Negative.

Flooding

Associated Service : watson-vision-combined-dsx

My classes (4) All images (69)

Drag and drop files from your project.

4 classes | 0 incomplete classes | 0 unclassified images

New training data size: 11.4/250 MB

Create a class

Flooded Neighborhood...

Negative (13)

This class is recommended but not required.

Rescue Boat (20)

Rooftop Survivors...

To add files to your project, drop .jpeg, .png, or .zip files here or **Browse**

2. Add from project

Drag .jpeg, .png, or .zip files from your project to the training area to add them to your model.

0 selected

- rooftop-survivors.zip 31 Mar 2019, 2:51:00 pm 3.24 MB
- flooded-neighborhood.zip 31 Mar 2019, 2:51:00 pm 3.58 MB
- rescueboats.zip 31 Mar 2019, 2:51:00 pm 3.55 MB
- suburban-neighborhood.zip Loading file into model...

Train your Watson Visual Recognition Custom Classifier

- Click on the **Train Model** button
- Wait a few (5-10) minutes for the model to train on the images

The screenshot shows the IBM Watson Studio interface for a 'Flooding' project. On the left, there's a navigation bar with 'Projects / Flooding / Flooding'. Below it, a section titled 'Flooding' shows 'My classes (4)' and 'All images (69)'. It includes sections for 'Create a class', 'Flooded Neighborhoods (20)', 'Negative (13)', 'Rescue Boat (20)', and 'Rooftop Survivors...'. On the right, a sidebar titled '1. Upload to project' has a 'Browse' button. Another sidebar titled '2. Add from project' lists several zip files: 'rooftop-survivors.zip', 'flooded-neighborhood.zip', 'rescueboats.zip', and 'suburban-neighborhood.zip'. A prominent red box highlights the 'Train Model' button at the top right of the main content area.

Congratulations

- Once the model has been trained, click on the **Click here** link or the **Trained** link to view and test your model.

The screenshot shows the same 'Flooding' project page as before, but now with a success message at the top: 'Training successful Your model training was successful. Click here to view and test your model.' A red box highlights the 'Trained' button, which is now green with a checkmark. The rest of the interface remains the same, with the 'Train Model' button still visible and the sidebar showing the same datasets.

Review and Test

- Review the Classes and Model details
- Click on the **Test** tab

The screenshot shows the IBM Watson Studio interface. At the top, there's a navigation bar with 'IBM Watson Studio', 'Upgrade', 'IBM', and other icons. Below it, a breadcrumb navigation shows 'Projects / Flooding / Flooding'. The main content area has a title 'Flooding' and an associated service 'watson-vision-combined-dsx'. There are three tabs: 'Overview' (blue), 'Test' (red box), and 'Implementation'. A 'Edit and Retrain' button is also visible. The 'Summary' section contains a table with model details:

Model ID	Flooding_418020421
Status	Ready
Explanation	This model is ready for use.
Created on	3/31/2019, 3:30:34 PM
Updated on	3/31/2019, 3:30:34 PM
Number of classes	3
Number of images	69

The 'Classes' section shows a table with three rows:

CLASS	NUMBER OF EXAMPLES
Flooded Neighborhood	21
Rescue Boat	20
Rooftop Survivors	15

Test your model in the next [step](#)

Chapter Objectives

In this chapter you will use sample images to confirm your Visual Recognition model. You will learn:

- How to test your Visual Recognition model using sample images
- How to incorporate your Visual Recognition Custom Classifier model into your applications

Review and Test

- Review the Classes and Model details
- Click on the **Test** tab

The screenshot shows the IBM Watson Studio interface. At the top, there's a dark header bar with the text "IBM Watson Studio". Below it, a navigation bar shows "Projects / Flooding / Flooding". On the right side of the header, there are icons for "Upgrade", "IBM", and user profile. The main content area has a title "Flooding" and a sub-header "Associated Service : watson-vision-combined-dsx". There are three tabs: "Overview" (underlined), "Test" (highlighted with a red box), and "Implementation". To the right of the tabs is a blue button labeled "Edit and Retrain". Below these sections is a "Summary" table with the following data:

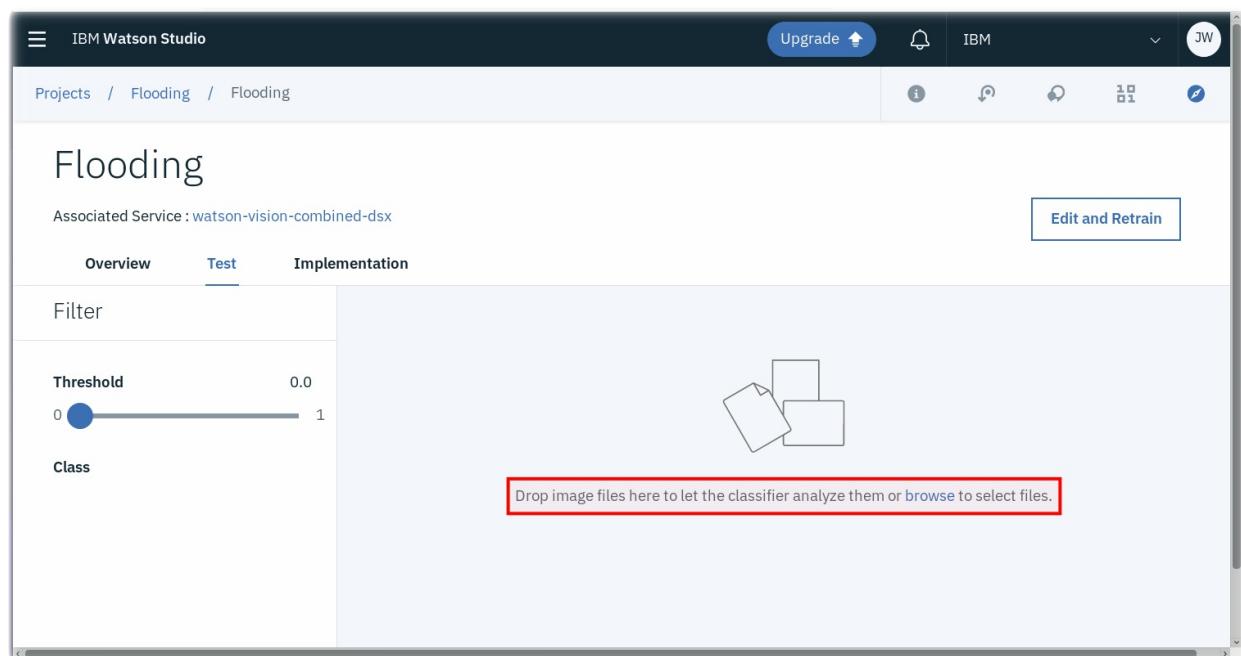
Summary	
Model ID	Flooding_418020421
Status	Ready
Explanation	This model is ready for use.
Created on	3/31/2019, 3:30:34 PM
Updated on	3/31/2019, 3:30:34 PM
Number of classes	3
Number of images	69

Below the summary is a "Classes" section with a table:

CLASS	NUMBER OF EXAMPLES
Flooded Neighborhood	21
Rescue Boat	20
Rooftop Survivors	15

Test Watson Visual Recognition Custom Classifier with sample images

- Visit the [Test Data directory](#) and **download** the testdata.zip file. This zip file contains PNG and JPG images
- Unlike the training datasets, you will need to **unzip** the images onto your local hard drive
- Inspect a few of the drone images of flood zones using a local image viewing utility or file browser
- These images were not part of the training set and will be used to validate the visual recognition model
- Return to the **Test** tab in the Watson Studio Flooding project
- There are two techniques to upload the images into the **Test** page
 - Drag the individual images from your local file browser into the Test page
 - Click on the **browse** link to open a file selection dialog



- The trained custom classifier model will analyze the images
 - Inspect the **Confidence scores** returned by the Watson Visual Recognition Custom Classifier

IBM Watson Studio

Projects / Flooding / Flooding

Associated Service : watson-vision-combined-dsx

Upgrade IBM 100% JW

Edit and Retrain

Overview Test Implementation

Filter

Threshold 0.0

Class

- Flooded Neighborhood
- Rescue Boat
- Rooftop Survivors

Clear results

Image	Category	Probability
1_s.jpg	Rescue Boat	0.89
1_s.jpg	Rooftop Survivors	0.06
1_s.jpg	Flooded Neighborhood	0.02
rescueboat.jpg	Rescue Boat	0.62
rescueboat.jpg	Rooftop Survivors	0.57
rescueboat.jpg	Flooded Neighborhood	0.11
grande.jpg	Flooded Neighborhood	0.89
grande.jpg	Rescue Boat	0.02
grande.jpg	Rooftop Survivors	0.00
screen-shot-2016-04-20-at-105252.jpg	Flooded Neighborhood	0.89
screen-shot-2016-04-20-at-105252.jpg	Rescue Boat	0.08
screen-shot-2016-04-20-at-105252.jpg	Rooftop Survivors	0.00
tokyoflood.jpg	Rooftop Survivors	0.91
tokyoflood.jpg	Rescue Boat	0.00
tokyoflood.jpg	Flooded Neighborhood	0.00
sjm-floodalert-0226-04.jpg	Rescue Boat	0.83
sjm-floodalert-0226-04.jpg	Flooded Neighborhood	0.30
sjm-floodalert-0226-04.jpg	Rooftop Survivors	0.00

Implement Watson Visual Recognition custom model in your Applications

- You can incorporate this Watson Visual Recognition Custom Classifier model into your applications using a variety of programming languages - Java, Node, Python, Ruby, Core ML
- Click on the **Implementation** tab to review the Code snippets

The screenshot shows the IBM Watson Studio interface with the 'Flooding' project selected. The 'Implementation' tab is active. On the left, a sidebar lists 'Code Snippets' with options for Java, Node, Python, Ruby, and Core ML. The main area contains code snippets for classifying images against the 'Flooding' model. The 'API endpoint' section shows the URL: `https://gateway.watsonplatform.net/visual-recognition/api`. The 'Authentication' section shows a curl command: `curl -u "apikey:{apikey}" "https://gateway.watsonplatform.net/visual-recognition/api/v3/classify?url=https://watson-developer-cloud.github.io/doc-tutorial-downloads/visual-recognition/fruitbowl.jpg&version=2018-03-19&classifier_ids=Flooding_418020421"`. The 'Classify an image (GET)' and 'Classify an image (POST)' sections also show similar curl commands.

Use the code snippets below to classify images against your model. For reference, the full API specification is available [here](#)

In the IBM Cloud Dashboard, search for and open your instance of *Watson Visual Recognition* and navigate into the Service Credentials section. Copy your **apikey** for use in the curl examples below.

- **API endpoint**

```
https://gateway.watsonplatform.net/visual-recognition/api
```

- **Authentication**

```
curl -u "apikey:{apikey}" "https://gateway.watsonplatform.net/visual-recognition/api/v3/classify?url=https://watson-developer-cloud.github.io/doc-tutorial-downloads/visual-recognition/fruitbowl.jpg&version=2018-03-19&classifier_ids=Flooding_418020421"
```

- **Classify an image (GET)**

```
curl -u "apikey:{apikey}" "https://gateway.watsonplatform.net/visual-recognition/v3/classify?threshold=0.5&version=2018-01-24"
```



- **Classify an image (POST)**

```
curl -X POST -u "apikey:{apikey}" -F "images_file=@fruitbowl.jpg" -F "threshold=0.5" https://gateway.watsonplatform.net/visual-recognition/v3/classify?version=2018-01-24
```



Congratulations

You have completed the Drone Visual Recognition Lab and have surveyed flood damaged neighborhoods, identified homes with survivors on rooftops and detected rescue boats.

Visual Recognition - Additional References

- [Call for Code Visual Recognition](#)
- [Identify Cities from Space](#)
- [Locate and count items with object detection](#)
- [Classify vehicle damage images](#)