

Drones-IoT-Visual-Recognition

Save Lives with Drones / IoT / Visual Recognition - Call for Code Hands on Lab

Introduction

This hands on lab uses drone aerial images, Watson Studio and Watson Visual Recognition to survey wildfire damaged neighborhoods and identify burned homes and intact homes.

The screenshot shows the IBM Watson Studio interface for a project titled "WildFire Burned Homes". The "Test" tab is selected. On the left, a "Filter" sidebar includes a "Threshold" slider set at 0.0 and a "Class" section with checkboxes for "Burned Home" and "Intact Home". The main area displays a grid of 10 aerial images. Each image has a "Clear results" button and two classification boxes: "Burned Home" and "Intact Home". Below each image are the scores for both classes. A yellow "Let's talk" button is located in the bottom right corner of the image grid.

Image ID	Burned Home Score	Intact Home Score
test-image-burnt-homes.jpeg	0.88	0.02
4EF8374C00000578-0-image-a-26_1533...	0.81	0.01
4EF83DA200000578-0-image-a-21_153...	0.71	0.02
4EF842BC00000578-6045685-Redding_i...	0.72	0.04
4EF83BB400000578-0-image-a-27_1533...	0.89	0.05
4EF8479D00000578-0-image-a-17_153...	0.61	0.12
4EF8313400000578-0-image-a-11_153...	0.90	0.00
test-image-intact-homes.jpg	0.91	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
- Train a model to identify objects in the images
- Score and count the identified objects

Prerequisites

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

- Create an [IBM Cloud account](#)
- Log into [IBM Cloud](#)

Estimated time

You can complete this task in no more than 15 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
 - [Contixo F8](#)
- Tello - Control a Tello Drone using Node-RED
- 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 three zip files of pictures recorded by drones. The lab will use these images to identify neighborhoods affected by the devastating 2018 West Coast wildfires. These images will be used as our training set.

- Aerial drone images of burned homes - [BurnedHomes.zip](#)
- Aerial drone images of intact homes - [AerialHomes.zip](#)
- Aerial drone images of forests, roads, rivers to be used for the negative class. [NotHomes.zip](#)

Source attribution: USA Today [article](#), various internet sources

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 - follow these [instructions](#)
- Create a Project
- Create a Visual Recognition model - follow these [instructions](#)
- Upload three zips to Cloud Storage
- Create a class *Burned Home* - drag a zipfile
- Create another class *Intact Home* - drag a zipfile
- Create a negative class *Not Homes* - 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 - follow these [instructions](#)

Step 5 - Implement this model in your Application

- Embed your model into an application using these code snippets

Let's get started - [Set up Watson Studio](#)

Lab Objectives

In this lab 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

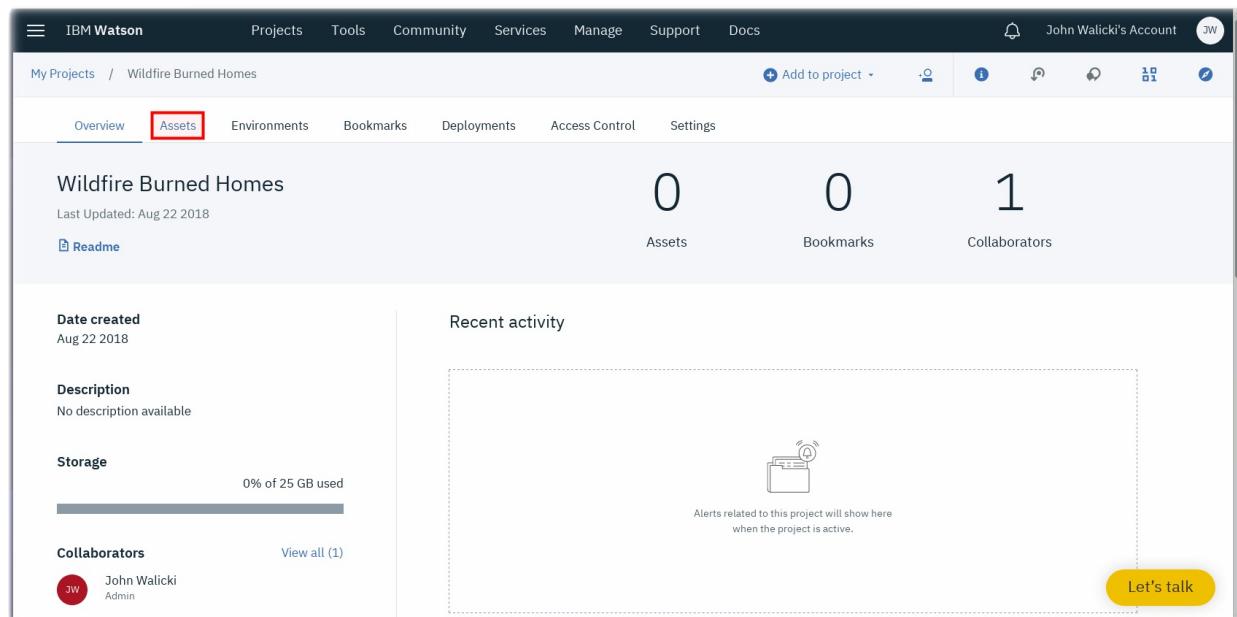
Watson Studio Projects

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

The first step is to add Assets to your Watson Studio Project

Add Assets to your Watson Studio Project

- Click on the **Assets** tab



The screenshot shows the IBM Watson Studio interface. At the top, there is a navigation bar with links for 'IBM Watson', 'Projects', 'Tools', 'Community', 'Services', 'Manage', 'Support', and 'Docs'. On the far right, it shows 'John Walicki's Account' with a profile icon. Below the navigation bar, the 'My Projects' section is displayed, with 'Wildfire Burned Homes' selected. The 'Assets' tab is highlighted with a red box. Other tabs include 'Overview', 'Environments', 'Bookmarks', 'Deployments', 'Access Control', and 'Settings'. The main content area for 'Wildfire Burned Homes' shows the following statistics: 0 Assets, 0 Bookmarks, and 1 Collaborator. Below these stats, there is a 'Recent activity' section which is currently empty. On the left side, there are sections for 'Date created' (Aug 22 2018), 'Description' (No description available), 'Storage' (0% of 25 GB used), and 'Collaborators' (John Walicki, Admin). A yellow 'Let's talk' button is located in the bottom right corner of the main content area.

Create a New Visual Recognition model

- Click on **New Visual Recognition model**

My Projects / Wildfire Burned Homes

IBM Watson Projects Tools Community Services Manage Support Docs

Add to project

Overview Assets Environments Bookmarks Deployments Access Control Settings

Load Files Catalog

What assets are you looking for?

Data assets

NAME	TYPE	SERVICE	CREATED BY	LAST MODIFIED	ACTIONS
You don't have any Data assets yet.					

Models

Natural Language Classifier models

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

Visual Recognition models

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

+ New Visual Recognition model

Drop files here or browse for files to upload.

Let's talk

Provision a new Watson Visual Recognition Service instance

- Your project needs to be associated with a Watson Visual Recognition Service instance
- Click on the **click here** link in the popup to provision a new service

Default Custom Model

Train Model

My classes (1) All images (0)

Drag and drop zip files from your project.

1 class | 0 incomplete classes | 0 unclassified images

Associate a service

Your project needs to be associated with a Watson Visual Recognition service.

To provision a new service or associate an existing one [click here.](#)

Search classes

Total file size: 0.0/250 MB

Create a class

Negative (recommended)

0 images

Let's talk

Create a Watson Visual Recognition Service

- Select the **Lite** plan and note the features
- Scroll to the bottom and click on the **Create** button

The screenshot shows the IBM Watson Visual Recognition service creation interface. At the top, there's a navigation bar with links for Projects, Tools, Community, Services, Manage, Support, and Docs. A user account is also visible. Below the navigation, the main title is "Visual Recognition". Underneath, there are two tabs: "Existing" and "New", with "New" being selected. A section titled "Visual Recognition" contains a brief description of the service's purpose: "Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a default model off the shelf, or create your own custom classifier. Develop smart applications that analyze the visual content of images or video frames to understand what is happening in a scene." To the right of this text are four feature boxes: "General Model", "Food Model", "Custom Model", "Explicit Model", "Face Model", and "Text Model (Private Beta*)". Each box provides a brief description of its function. Below these features, a "Pricing Plan" table compares the "Lite" and "Standard" plans across three columns: PLAN, FEATURES, and PRICING. The "Lite" plan is highlighted with a blue circle. The "Standard" plan is shown below it with an empty circle. The "Create" button at the bottom right is highlighted with a red box.

PLAN	FEATURES	PRICING
<input checked="" type="radio"/> Lite	1,000 Events per month towards: Pre-trained model classification (General, Face, Food, Explicit) (images) Custom Model classification (images) Custom Model training (images) 2 Custom Models 1 Lite Plan instance per IBM Cloud Organization Free Exports to Core ML	Free
<input type="radio"/> Standard	Image Tagging Events Pay per Use Face Detection Events Pay per Use Training Events Pay per Use Custom Tagging Events Pay per Use Food Tagging Events Pay per Use Explicit Tagging Events Pay per Use	\$0.002 USD/GeneralTagging \$0.004 USD/FaceRecognition \$0.1 USD/Training \$0.002 USD/CustomTagging \$0.002 USD/FoodTagging \$0.002 USD/ExplicitTagging

Pricing Plan: Monthly Process shown above reflect the: [United States](#)

Let's talk

Cancel Create

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 Visual Recognition interface. At the top, there are navigation links: Projects, Tools, Community, Services, Manage, Support, and Docs. On the right, there is a user account section for "John Walicki's Account". The main content area is titled "Default Custom Model". It displays a warning message: "Model is not yet ready to train. Learn why." Below this, there is a "Train Model" button. The left side of the screen shows a list of "My classes": "Wildfire Burned Homes" (1 class) and "All images (0)". A "Create a class" button is available. A note about negative classes is present: "Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes." To the right, there are two sections: "1. Upload to project" (with a "Browse" button) and "2. Add from project" (which is currently empty). A yellow "Let's talk" button is located at the bottom right.

- Rename the model to **Count Burned Homes**

The screenshot shows the same IBM Watson Visual Recognition interface after renaming the model. The title now reads "Count Burned Homes". The rest of the interface remains largely the same, including the "Train Model" button, class list, and training sections. The yellow "Let's talk" button is still present at the bottom right.

Add Custom Classes to the Watson Visual Recognition Model

- Click on the + symbol to add a class

The screenshot shows the IBM Watson Visual Recognition interface. At the top, there's a navigation bar with links for Projects, Tools, Community, Services, Manage, Support, and Docs. On the right, it shows 'John Walicki's Account' and a profile icon. Below the navigation, the project name 'Count Burned Homes' is displayed, along with the associated service 'watson-vision-combined-cfc'. There are two tabs: 'My classes (1)' and 'All images (0)'. A message at the top right says 'Model is not yet ready to train. Learn why.' Below this, there's a section to 'Drag and drop zip files from your project.' and a search bar labeled 'Search classes'. On the left, there's a 'Create a class' button with a plus sign, which is highlighted with a red box. To its right, there's a 'Negative (recommended)' radio button group with '0 images' selected. On the right side of the interface, there are two sections: '1. Upload to project' (with a 'Browse' button) and '2. Add from project' (which is currently empty). A 'Train Model' button is located at the top right of the main content area.

- Name this class **Burned Home**
- Click the **Create** button

This screenshot shows the 'Create a class' modal window from the previous interface. The title of the modal is 'Create a class'. Inside, there is a text input field containing the text 'Burned Home'. Below the input field, there are two buttons: 'Cancel' and 'Create'. The 'Create' button is highlighted with a blue background. The rest of the interface is identical to the first screenshot, including the 'Train Model' button and the 'Let's talk' button at the bottom right.

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

The screenshot shows the 'Count Burned Homes' project page. At the top, there's a navigation bar with 'IBM Watson' and various links like 'Projects', 'Tools', 'Community', 'Services', 'Manage', 'Support', and 'Docs'. A user profile 'John Walicki's Account' is at the top right. Below the navigation, the project path is 'Projects / Wildfire Burned Homes / Count Burned Homes'. A warning message says 'Model is not yet ready to train. Learn why.' with a 'Train Model' button. On the left, there are tabs for 'My classes (2)' and 'All images (0)'. A search bar says 'Search classes'. In the center, it says 'Drag and drop zip files from your project.' and 'Total file size: 0.0/250 MB'. There are three cards: 'Create a class' (with a red box around the '+' icon), 'Burned Home' (0 images), and 'Negative (recommended)' (0 images). A tooltip for 'Negative (recommended)' says: 'Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes.' On the right, a sidebar has sections for '1. Upload to project' (with a 'Browse' button) and '2. Add from project' (with a note 'There are no .zip files in your project.' and a 'Let's talk' button).

- Name this class **Intact Home**
- Click the **Create** button

This screenshot shows the 'Create a class' dialog box open over the main project interface. The dialog has a title 'Create a class' and a text input field containing 'Intact Home'. Below the input field are 'Cancel' and 'Create' buttons. The main project interface in the background remains the same as the previous screenshot, showing the 'Count Burned Homes' project with its two existing classes.

Upload Zip Files to Watson Studio Project

- Three zip files have been prepared which contain aerial drone images
- These zip files are on the local lab workstation
- If you following these steps on the web, download the aerial drone zip files here:
 - [BurnedHomes.zip](#)
 - [AerialHomes.zip](#)
 - [NotHomes.zip](#)
- Click on the **Browse** button
- An operating system native File Dialog will open
- Multi-select the three zip files **BurnedHomes.zip**, **AerialHomes.zip**, **NotHomes.zip**
- Upload these zip files to your Watson Studio project

The screenshot shows the IBM Watson Studio interface for a project titled "Count Burned Homes". The top navigation bar includes links for IBM Watson, Projects, Tools, Community, Services, Manage, Support, and Docs. The user is logged in as "John Walicki's Account".

The main workspace displays the project details:

- Associated Service:** watson-vision-combined-cfc
- My classes (3)** and **All images (0)**
- Train Model** button
- Model is not yet ready to train. Learn why.** (with an information icon)
- Search classes** input field
- Total file size: 0.0/250 MB**
- Drag and drop zip files from your project.** (with a dashed drop zone)
- 1. Upload to project** section:
 - To add files to your project, drop .zip files here or **Browse** (button highlighted with a red box).
- 2. Add from project** section:
 - Drag .zip files from your project to the training area to add them to your model.
 - 0 selected**
 - There are no .zip files in your project.
- Create a class** button
- Burned Home**: 0 images
- Intact Home**: 0 images
- Negative (recommended)**: 0 images
- Use the negative class to train the model on images that do not depict the visual subject of any of the positive classes.**
- Let's talk** button

Drag the zip files to Custom Classes

- Grab the **BurnedHomes.zip** from the right navigation and drag it to the **Burned Home** class

The screenshot shows the IBM Watson Vision interface for the 'Count Burned Homes' project. On the left, there are four classes: 'Create a class' (empty), 'Burned Home' (0 images), 'Intact Home' (0 images), and 'Negative (recommended)' (0 images). On the right, a sidebar titled '1. Upload to project' shows a dashed area for dropping files and a 'Browse' button. Below it, '2. Add from project' shows a list of selected files: 'BurnedHomes.zip' (22 Aug 2018, 11:33:53 pm, 14.18 MB), 'AerialHomes.zip' (22 Aug 2018, 11:33:44 pm, 5.64 MB), and 'NotHomes.zip' (22 Aug 2018, 11:33:40 pm, 3.42 MB). The 'BurnedHomes.zip' file is highlighted with a red box.

This screenshot shows the same project after the 'BurnedHomes.zip' file has been added to the 'Burned Home' class. The 'Burned Home' class now has 0 images. A red arrow points from the 'BurnedHomes.zip' file in the 'Selected' list on the right to the 'Burned Home' class icon on the left.

- The images in the zip file will be added to the **Burned Home** class

The images in file BurnedHomes.zip have been added to class Burned Home.

Count Burned Homes

Associated Service : watson-vision-combined-cfc

My classes (3) **All Images (14)**

Drag and drop zip files from your project.

3 classes | 1 incomplete class | 0 unclassified images

Class	Images	Status
Burned Home	9/14 images loaded	Green circle
Intact Home	0 images	Grey circle
Negative (recommended)	0 images	Grey circle

Total file size: 14.2/250 MB

Train Model (i)

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

2. Add from project

Drag .zip files from your project to the training area to add them to your model.

0 selected

- BurnedHomes.zip Loading file into model...
- AerialHomes.zip 22 Aug 2018, 11:33:44 pm 5.64 MB
- NotHomes.zip 22 Aug 2018, 11:33:40 pm 3.42 MB

Let's talk

- Grab the **AerialHomes.zip** from the right navigation and drag it to the **Intact Home** class

The images in file AerialHomes.zip have been added to class Intact Home.

Count Burned Homes

Associated Service : watson-vision-combined-cfc

My classes (3) **All Images (31)**

Drag and drop zip files from your project.

3 classes | 0 incomplete classes | 0 unclassified images

Class	Images	Status
Burned Home	14 images	Green circle
Intact Home	12/17 images loaded	Green circle
Negative (recommended)	0 images	Grey circle

Total file size: 19.8/250 MB

Train Model (i)

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

2. Add from project

Drag .zip files from your project to the training area to add them to your model.

0 selected

- BurnedHomes.zip 22 Aug 2018, 11:33:53 pm 14.18 MB
- AerialHomes.zip Loading file into model...
- NotHomes.zip 22 Aug 2018, 11:33:40 pm 3.42 MB

Let's talk

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

IBM Watson Projects Tools Community Services Manage Support Docs John Walicki's Account

The images in file NotHomes.zip have been added to class Negative (recommended).

Count Burned Homes

Associated Service : watson-vision-combined-cfc

My classes (3) All images (42)

Drag and drop zip files from your project.

3 classes | 0 incomplete classes | 0 unclassified images Total file size: 23.2/250 MB

	Burned Home	Intact Home	Negative (recommended)
14 images	17 images	9/11 images loaded	

Create a class

Train Model i

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

2. Add from project

Drag .zip files from your project to the training area to add them to your model.

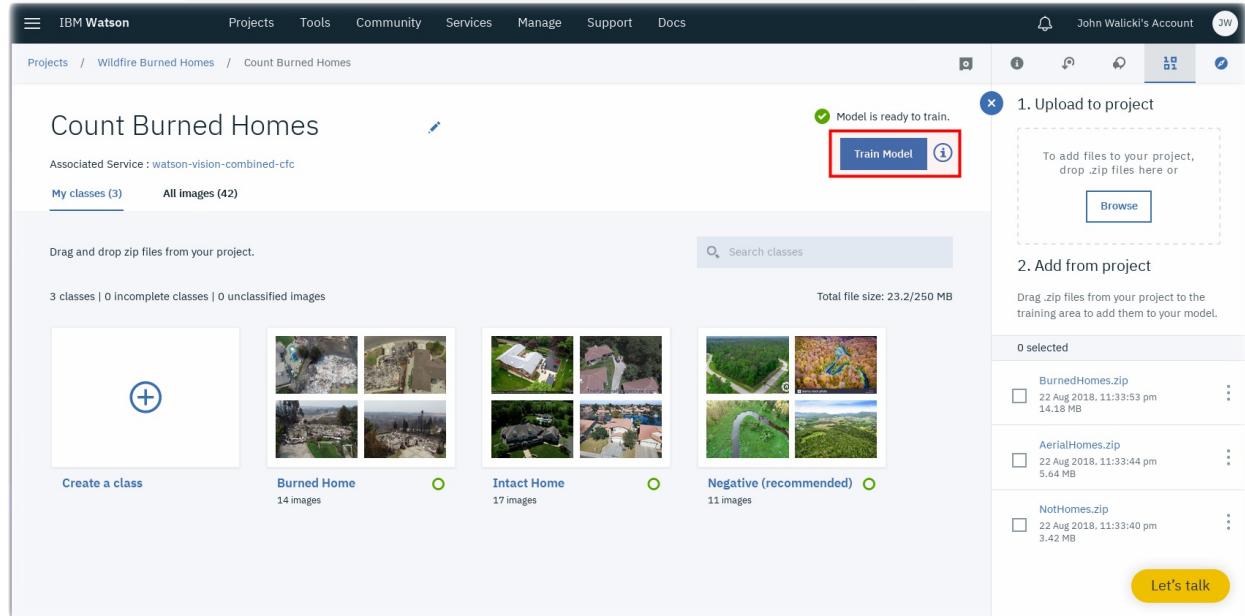
0 selected

- BurnedHomes.zip 22 Aug 2018, 11:33:53 pm 14.18 MB
- AerialHomes.zip 22 Aug 2018, 11:33:44 pm 5.64 MB
- NotHomes.zip 22 Aug 2018, 11:33:40 pm 3.42 MB

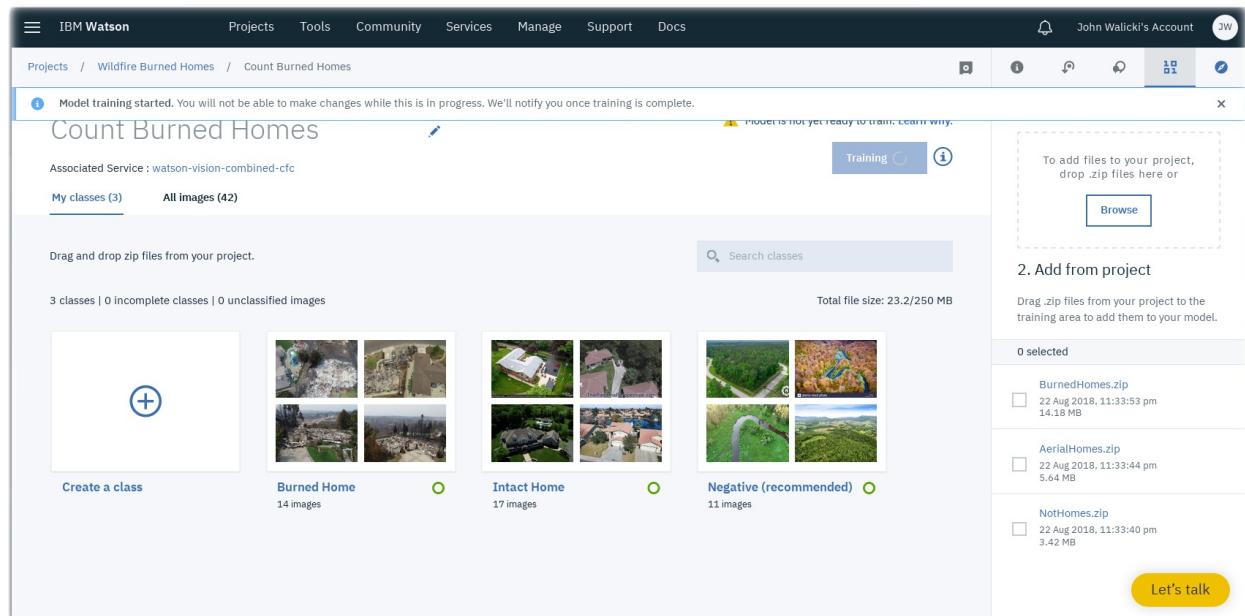
Let's talk

Train your Watson Visual Recognition Custom Classifier

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



The screenshot shows the IBM Watson Visual Recognition interface. At the top, there's a navigation bar with links for Projects, Tools, Community, Services, Manage, Support, and Docs. On the right, it shows "John Walicki's Account" and a profile icon. The main area is titled "Count Burned Homes". It displays four categories of images: "Burned Home" (14 images), "Intact Home" (17 images), "Negative (recommended)" (11 images), and a "Create a class" button. A progress bar at the top right indicates "Model is ready to train." Below the progress bar is a large blue "Train Model" button, which is highlighted with a red box. To the right of the progress bar, there are two sections: "1. Upload to project" (with a "Browse" button) and "2. Add from project" (listing three zip files: BurnedHomes.zip, AerialHomes.zip, and NotHomes.zip). A yellow "Let's talk" button is located at the bottom right.



This screenshot shows the same interface as above, but with a message at the top left stating "Model training started. You will not be able to make changes while this is in progress. We'll notify you once training is complete." The "Training" button is highlighted with a red box. The rest of the interface remains the same, including the image categories and the "Add from project" section.

Congratulations

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

The screenshot shows the IBM Watson Project interface for the 'Count Burned Homes' project. At the top, a green success message says 'Training successful Your model training was successful' with a link to 'Click here'. Below it, the project name 'Count Burned Homes' is displayed along with its associated service 'watson-vision-combined-cfc'. On the left, there are tabs for 'My classes (3)' and 'All images (42)'. The main area shows four categories of images: 'Burned Home' (14 images), 'Intact Home' (17 images), and 'Negative (recommended)' (11 images). A 'Create a class' button is also present. On the right, a sidebar titled '2. Add from project' lists three uploaded zip files: 'BurnedHomes.zip' (22 Aug 2018, 11:33:53 pm, 14.18 MB), 'AerialHomes.zip' (22 Aug 2018, 11:33:44 pm, 5.64 MB), and 'NotHomes.zip' (22 Aug 2018, 11:33:40 pm, 3.42 MB). A 'Train Model' button is located at the top right of the main content area.

Review and Test

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

The screenshot shows the IBM Watson Project interface for the 'Count Burned Homes' project, with the 'Test' tab selected. At the top, a green success message says 'Training successful Your model training was successful' with a link to 'Click here'. Below it, the project name 'Count Burned Homes' is displayed along with its associated service 'watson-vision-combined-cfc'. On the left, there are tabs for 'Overview', 'Test' (which is highlighted with a red box), and 'Implementation'. The main area is divided into two sections: 'Summary' and 'Classes'. The 'Summary' section contains a table with the following data:

Model ID	CountBurnedHomes_1382538940
Status	Ready
Explanation	This model is ready for use.
Created on	8/22/2018, 11:42:04 PM
Number of classes	2
Number of images	42

The 'Classes' section contains a table with the following data:

CLASS	NUMBER OF EXAMPLES
Burned Home	14
Intact Home	17

A 'Search Summary' and 'Search Classes' bar are located at the top of each section. A 'Let's talk' button is located at the bottom right of the 'Classes' section.

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

Lab Objectives

In this lab 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 interface for a custom classifier named 'Count Burned Homes'. The 'Test' tab is highlighted with a red box. The page displays summary information and class details.

Summary

Model ID	CountBurnedHomes_1382538940
Status	Ready
Explanation	This model is ready for use.
Created on	8/22/2018, 11:42:04 PM
Number of classes	2
Number of images	42

Classes

CLASS	NUMBER OF EXAMPLES
Burned Home	14
Intact Home	17

Test Watson Visual Recognition Custom Classifier with sample images

- Visit this [UK Daily Mail article](#) and **download** a few of these drone images of devastated California neighborhoods
- Load the images into the **Test** page by browsing / dragging the images into the Test page

Associated Service : watson-vision-combined-cfc

Overview Test Implementation

Filter

Threshold 0.0

Class

Drop image files here to let the classifier analyze them or [browse](#) to select files.

Let's talk

- Inspect the scores returned by the Watson Visual Recognition Custom Classifier

Associated Service : watson-vision-combined-cfc

Overview Test Implementation

Filter

Threshold 0.0

Class

Burned Home

Intact Home

Clear results

4EF842BC00000578-6045685-Redding_is...	Burned Home	0.72
	Intact Home	0.04

Let's talk

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
- Click on the **Implementation** tab to review the Code snippets

Associated Service : watson-vision-combined-cfc

Overview Test Implementation

Code Snippets

cURL

Java

Node

Python

Core ML

API endpoint

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

Authentication

```
curl -u "apikey:{apikey}" 'https://gateway.watsonplatform.net/visual-recognition/api/{method}'
```

Classify an image (GET)

```
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=CountBurnedHomes_1382538940'
```

Classify an image (POST)

```
curl -X POST -u "apikey:{apikey}" -F "images_file=@fruitbowl.jpg" -F "threshold=0.6" -F "classifier_ids=CountBurnedHomes_1382538940" 'https://gateway.watsonplatform.net/visual-recognition/api/v3/classify?version=2018-03-19'
```

Edit and Retrain

Let's talk

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

- **API endpoint**

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

- **Authentication**

```
curl -u "apikey:{apikey}" "https://gateway.watsonplatform.net/visual-recognition/api/...
```

- **Classify an image (GET)**

```
curl -u "apikey:{apikey}" "https://gateway.watsonplatform.net/visual-recognition/api/...
```

- **Classify an image (POST)**

```
curl -X POST -u "apikey:{apikey}" -F "images_file=@fruitbowl.jpg" -F "threshold=0.6" -F
```

Congratulations

You have completed the Drone Visual Recognition Lab and have surveyed wildfire damaged neighborhoods and identified burned homes and intact homes.

Visual Recognition - Additional References

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