

# **IBM Watson Visual Recognition APIs and Integration**

# Integrating Visual Recognition service in your application

**A computer Vision Application is not only Visual Recognition**

**Visual Recognition is included in application logic**

- Images follow a processing pipeline in which Visual Recognition is used in one or several steps

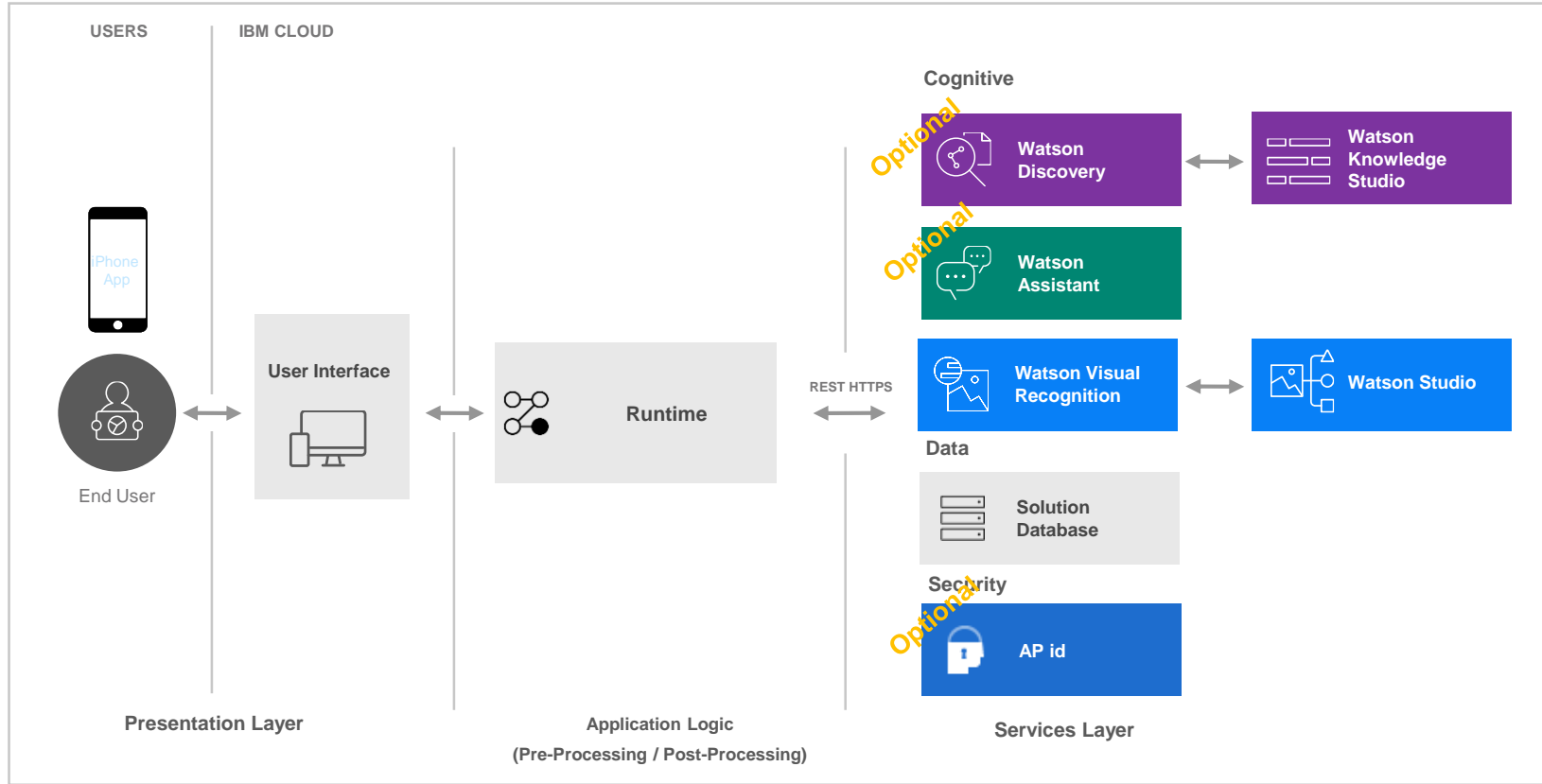
**Preprocessing step might include :**

- Image processing (zoom / resize / crop / filter / tile / edge detection / etc...)
- Video processing (frame extraction, scene detection...)
- Preprocessing could be similar to training image preparation

**Post Processing steps might include :**

- Result score sorting
- Send image to a more specific model
- Store result in Database
- ...

# Integrating Visual Recognition service in your application



# Authentication

## IBM Cloud Identity and Access Management (IAM)

- Uses tokens to make authenticated requests to without embedding service credentials in every call.
- API keys are used as basic authentication to get token
- Token lifecycle is handled by SDKs

## Get API key from CLI with IBM Cloud Developer Tools

- `ibmcloud resource service-keys --instance-name {service-name}`
- `ibmcloud resource service-key {key-name}`

## Get API key from Visual Recognition Tooling in Watson Studio

- <https://dataplatform.ibm.com/data/services?target=watson>

The screenshot shows the IBM Watson Visual Recognition console. The breadcrumb navigation is 'Services / Watson Services / watson-vision-combined-dsx'. The page title is 'Visual Recognition : watson-vision-combined-dsx' with the associated project 'My Pizza Quality Check'. There are two tabs: 'Overview' and 'Credentials', with the latter selected and highlighted by a red arrow. Below the tabs is a 'Service Credentials' section with a search bar and a 'New Credential' button. A table lists the credentials, with one entry 'wdp-writer' created on 2018-06-08. A red arrow points to the 'View credentials' link for this entry. Below the table, the JSON for the credential is displayed, with the 'apikey' value highlighted by a red box.

```
{
  "apikey": "n1mVWPnkkSGh3mXLvum_ykboJhsNALa0VscSb6p6oJGq",
  "iam_apikey_description": "Auto generated apikey during resource-key operation for Instance - crn:v1:bluemix:public:watson-vision-combined:us-south:a/15d32310e6819dde886c0bb998405393:4139b8c2-f4f4-4b97-8d91-019263483b91::",
  "iam_apikey_name": "auto-generated-apikey-d10f9d0b-f842-4a1c-9933-65143aa2d213",
  "iam_role_crn": "crn:v1:bluemix:public:iam:::serviceRole:Writer",
  "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity::a/15d32310e6819dde886c0bb998405393::serviceid:ServiceId-969144ca-1849-44a8-8b3d-e555d60a1638",
  "url": "https://gateway.watsonplatform.net/visual-recognition/api",
}
```

```
C:\Users\FRANCKDescollonges>ibmcloud resource service-keys --instance-name watson-vision-combined-dsx
Retrieving service keys in resource group Default under account IBM as team4.ibm@mail.com...
OK
Name      State   Created At
wdp-writer active  Fri Jun 8 09:05:55 UTC 2018

C:\Users\FRANCKDescollonges>ibmcloud resource service-key wdp-writer
Retrieving service key wdp-writer in resource group Default under account IBM as team4.ibm@mail.com...
OK
Name:      wdp-writer
ID:        crn:v1:bluemix:public:watson-vision-combined:us-south:a/15d32310e6819dde886c0bb998405393:41
Created At: Fri Jun 8 09:05:55 UTC 2018
State:     active
Credentials:
iam_apikey_name: auto-generated-apikey-d10f9d0b-f842-4a1c-9933-65143aa2d213
iam_role_crn:    crn:v1:bluemix:public:iam:::serviceRole:Writer
iam_serviceid_crn: crn:v1:bluemix:public:iam-identity::a/15d32310e6819dde886c0bb998405393:41
url:             https://gateway.watsonplatform.net/visual-recognition/api
apikey:          n1mVWPnkkSGh3mXLvum_ykboJhsNALa0VscSb6p6oJGq
iam_apikey_description: Auto generated apikey during resource-key operation for Instance -
```

# Visual Recognition APIs

## API requests require a version parameter

- API changes are backwards-compatible, unless the release date changes
- Current version of Visual Recognition is 2018-03-19

## Visual Recognition is a REST API

- API Endpoint is `"https://gateway.watsonplatform.net/visual-recognition/api"`
- Parameters can be passed to the request as Form parameters or URL parameters
- **Example:** `curl -X POST -u "apikey:{apikey}" -F "images_file=@fruitbowl.jpg" -F "classifier_ids=food" -F "threshold=0.6"`  
`https://gateway.watsonplatform.net/visual-recognition/api/v3/classify?version=2018-03-19`

## Visual Recognition return a JSON string

# Visual Recognition APIs - Classify Images

You can classify one or several images per API call

- Send one image or a zip of several images
- 10MB per image maximum
- 100MB and 20 images per zip file maximum

## Available parameters :

- **accept-Language** : The language of the output class names (only for default model)
- **threshold** : The minimum score a class must have to be displayed in the response.
- **classifier\_ids** : List of classifiers to use (default, food, faces, {custom\_model\_id})
- **owners** : The categories of classifiers to apply. Could be “IBM” or “me”

Visual Recognition return a JSON string

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

```
{
  "images" : [ {
    "classifiers" : [ {
      "classifier_id" : "default",
      "name" : "default",
      "classes" : [ {
        "class" : "fruit",
        "score" : 0.788
      }, {
        "class" : "olive color",
        "score" : 0.973
      }, {
        "class" : "lemon yellow color",
        "score" : 0.789
      } ]
    } ],
    "image" : "fruitbowl.jpg"
  } ],
  "images_processed" : 1,
  "custom_classes" : 2
}
```

# Visual Recognition APIs – Work with custom model

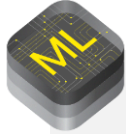
## APIs allow to manipulate custom models i.e.

- Create a classifier
  - Use one zip file per class
  - Use {classname}\_positive\_examples as name of the parameter for a given zip file
  - For example,  
husky\_positive\_examples=@many\_husky.zip  
creates the class “husky”
- Update a classifier
  - Adding new positive classes
  - Adding new images to existing classes
  - You must supply at least one set of positive or negative examples
- Retrieve a list of custom classifiers
- Retrieve classifier details
  - Check if training is completed
  - Check last update of the model
- Delete a classifier

- Example : `curl -X POST -u "apikey:{apikey}" -F "beagle_positive_examples=@beagle.zip" -F "goldenretriever_positive_examples=@goldenretriever.zip" -F "husky_positive_examples=@many_husky.zip" -F "negative_examples=@cats.zip" -F "name=dogs" "https://gateway.watsonplatform.net/visual-recognition/api/v3/classifiers?version=2018-03-19"`

```
{
  "classifier_id" : "dogs_1477088859",
  "name" : "dogs",
  "status" : "training",
  "owner" : "b2a3c43c-f1ef-4186-a3d3-71073e4142c5",
  "created" : "2018-03-17T19:01:30.536Z",
  "updated" : "2018-03-17T19:01:30.536Z",
  "classes" : [ {
    "class" : "husky"
  }, {
    "class" : "goldenretriever"
  }, {
    "class" : "beagle"
  } ],
  "core_ml_enabled" : true
}
```

# Offline Visual Recognition with Core ML on iOS



## Core ML

Core ML is a new machine learning framework from Apple, which allows models to be run fast and efficiently, directly on the device.

**IBM Cloud provides tools and APIs to export Core ML model file**

**Include this Core ML model in your iOS Mobile Application**

## Advantages

- No internet access needed
- Update model IBM Cloud on request
- Near instantaneous response time
- Work with Augmented Reality application





# Integrate Visual Recognition with SDK

## Easy Visual Studio integration with your favorite development language and tools

- Accelerate your development
- Leverage existing development skills

## Wrap low level APIs

## Manage Authentication and token lifecycle

## List of provided SDK

- Java SDK
- Node.js SDK
- Python SDK
- Android SDK
- Swift SDK
- .NET SDK
- Unity SDK
- OpenWhisk SDK
- Salesforce SDK

# Privacy and Data Protection

## Logging and quality improvement

- All Watson services log requests and their results
- Logging is done only to improve the services for future users.
- The logged data is not shared or made public

## You can prevent Watson from logging data

- Set “**X-Watson-Learning-Opt-Out**” header to true for each request

## GDPR Compliance

- Visual Recognition provides helpers to create GDPR compliant applications
- Define/Create a unique Customer ID for each individual that provides data
- Label all Visual Recognition data with this customer ID
  - Use “**X-Watson-Metadata:{customer\_id}**” header where {customer\_id} is the unique id of your customer
- You can delete (on request) all customer data associated with a customer ID
  - It will delete all data with that customer\_id parameter across your entire Visual Recognition instance

# Watson API Explorer



Watson API Explorer

## Visual Recognition

The IBM Watson™ Visual Recognition service uses deep learning algorithms to identify scenes, objects, and faces in images you upload to the service. You can create and train a custom classifier to identify subjects that suit your needs.

For more information about this service, see the IBM® Cloud docs.

<https://console.bluemix.net/docs/services/visual-recognition/getting-started.html>

### General

Show/Hide | List Operations | Expand Operations

GET	/v3/classify	Classify an image
POST	/v3/classify	Classify images

### Face

Show/Hide | List Operations | Expand Operations

GET	/v3/detect_faces	Detect faces in an image
POST	/v3/detect_faces	Detect faces in images

### Custom

Show/Hide | List Operations | Expand Operations

GET	/v3/classifiers	Retrieve a list of classifiers
POST	/v3/classifiers	Create a classifier
DELETE	/v3/classifiers/{classifier_id}	Delete a classifier
GET	/v3/classifiers/{classifier_id}	Retrieve classifier details
POST	/v3/classifiers/{classifier_id}	Update a classifier

### Core ML

Show/Hide | List Operations | Expand Operations

GET	/v3/classifiers/{classifier_id}/core_ml_model	Retrieve a Core ML model of a classifier
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### User data

Show/Hide | List Operations | Expand Operations

DELETE	/v3/user_data	Delete labeled data
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