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

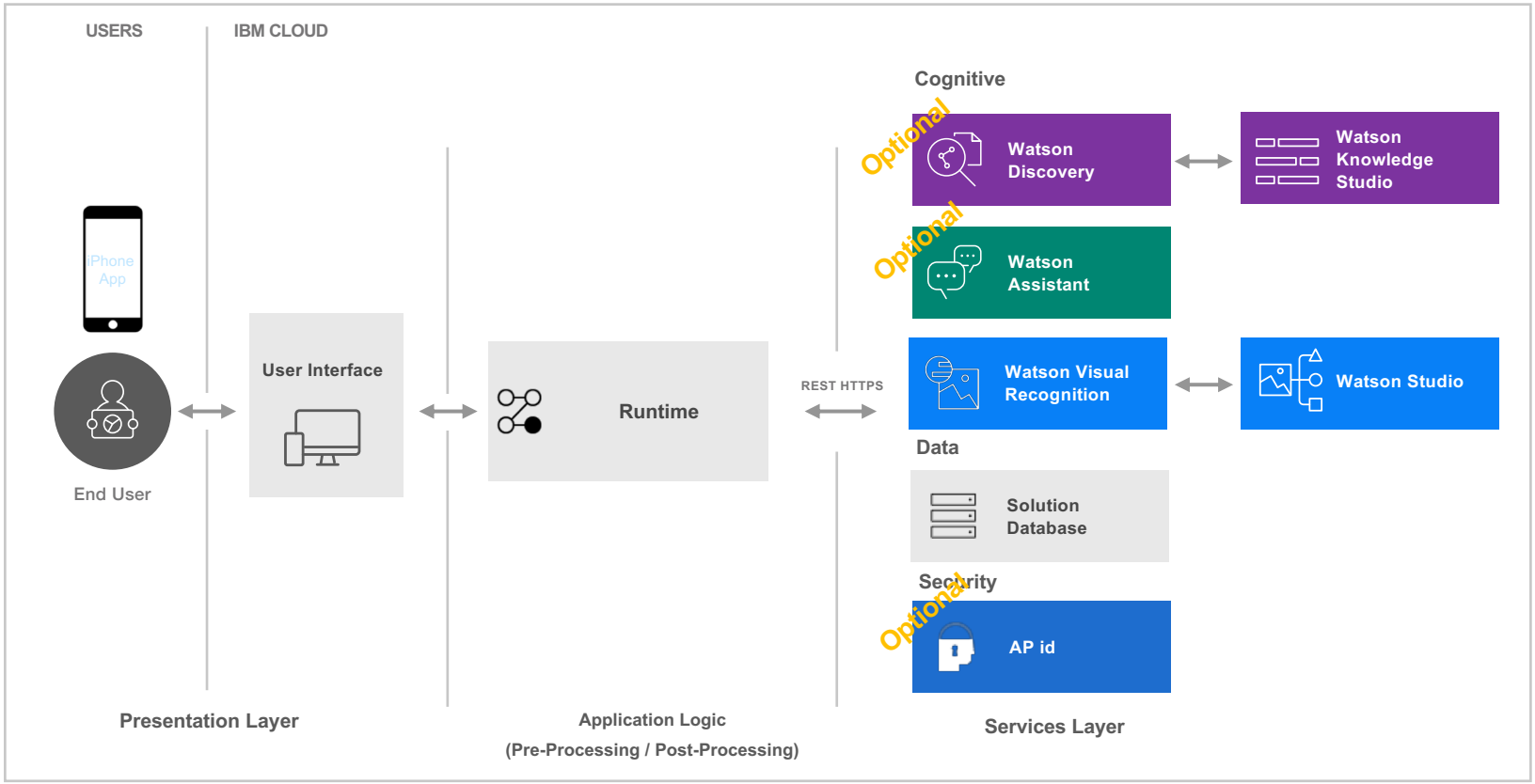
Preprocessing step might include :

- 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)

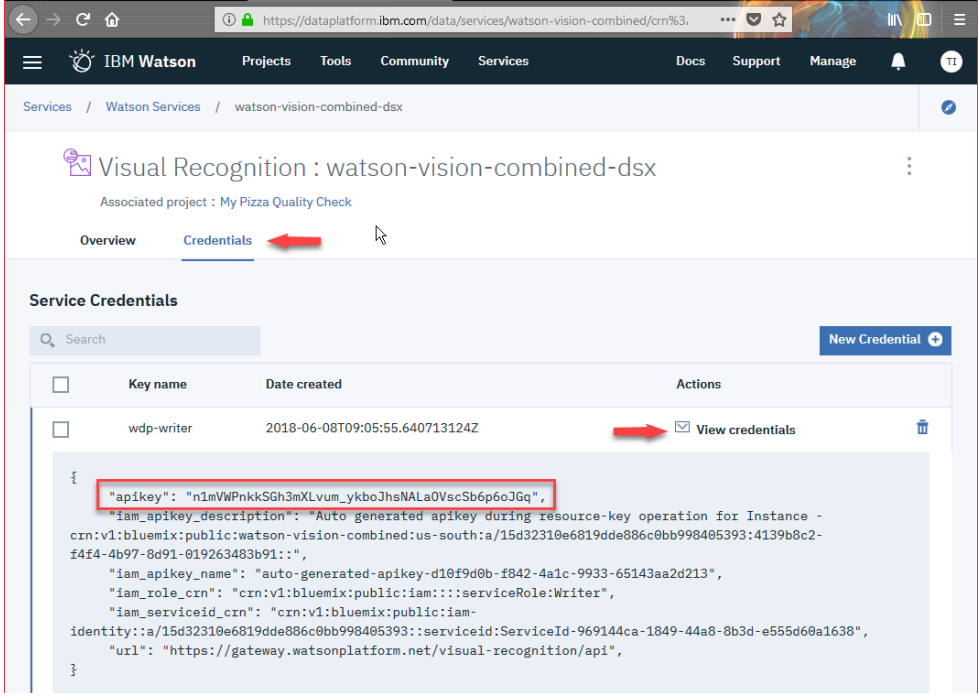
- Uses tokens to make authenticated requests to without embedding service credentials in every call.
- API keys are used as basic authentication to get token
- Token lifecycle is handled by SDKs

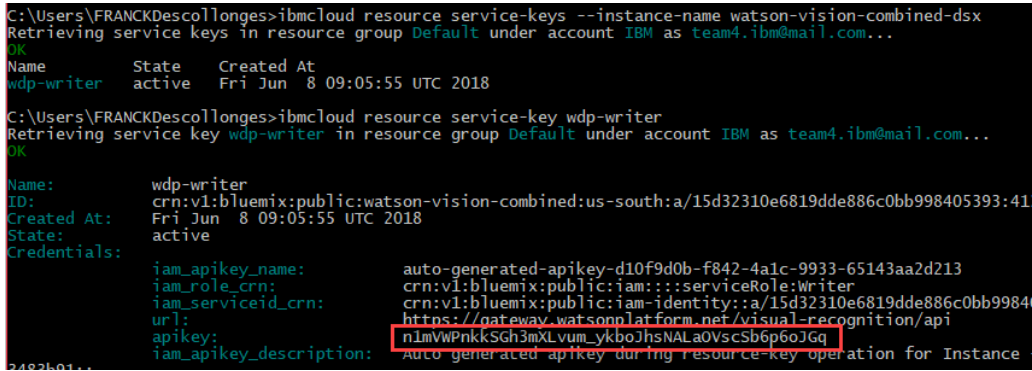
Get API key from CLI with IBM Cloud Developer Tools

- `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





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

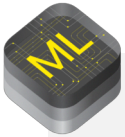
APIs allow to manipulate custom models i.e.

- 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=@golden-retriever.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 algorithm of the services for future usages.
- 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

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

User data

Show/Hide | List Operations | Expand Operations

DELETE	/v3/user_data	Delete labeled data