



TUGAS ASINKRON 1 MINGGU 2 KELAS DAI-002
Explore Computer Vision in Microsoft Azure

Oleh :

KELOMPOK 4

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PERCOBAAN 1
Analyze images with the Computer Vision service

Create a resource ...

Get started

Search services and marketplace

1. Langkah pertama adalah membuat resource group pada portal Azure.

Cognitive Services ⚡ ...
Microsoft



Cognitive Services Add to Favorites

Microsoft

★ 4.3 (30 Azure ratings)

Create

2. Selanjutnya, pilih “Cognitive Services” dan klik “Create”. Resource ini dipilih karena meliputi fitur-fitur kognitif seperti Text Analytics, Translator Text, dll. Resource type ini nantinya kemudian akan menginformasikan dua hal penting yaitu “key” dan “endpoint”.

Create Cognitive Services

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

Resource group * ⓘ

[Create new](#)

Instance details

Region * ⓘ

Location specifies the region only for included regional services. This does not specify a region for included non-regional services. [Click here for more details.](#)

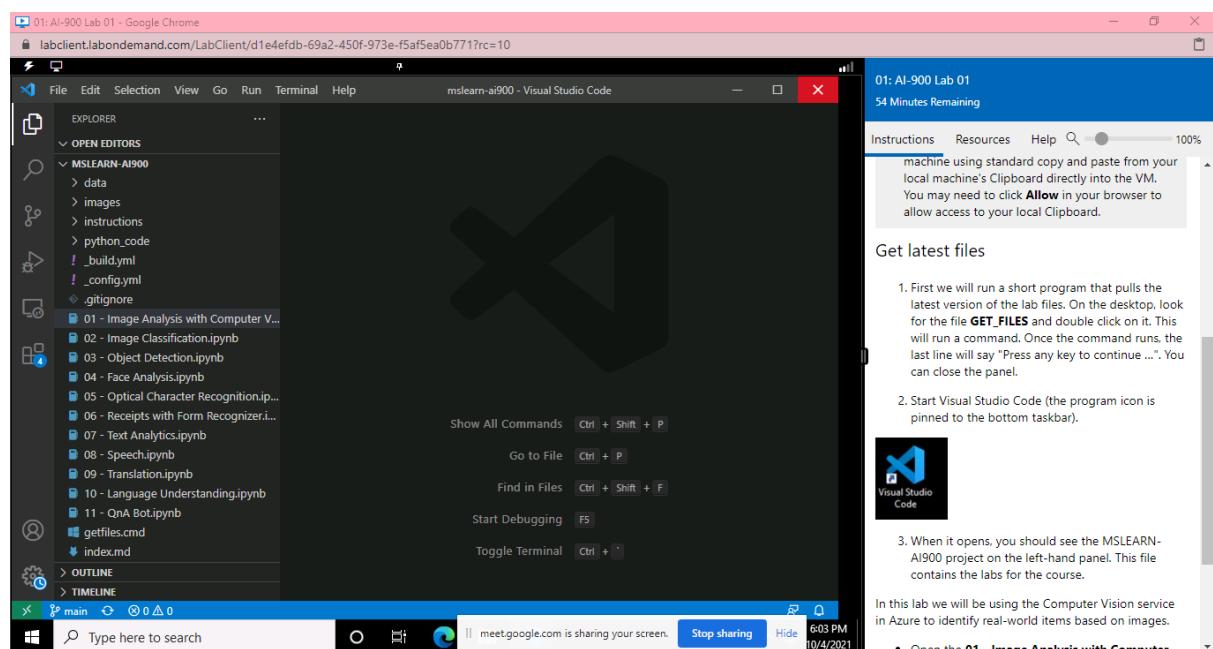
Name * ⓘ

Pricing tier * ⓘ

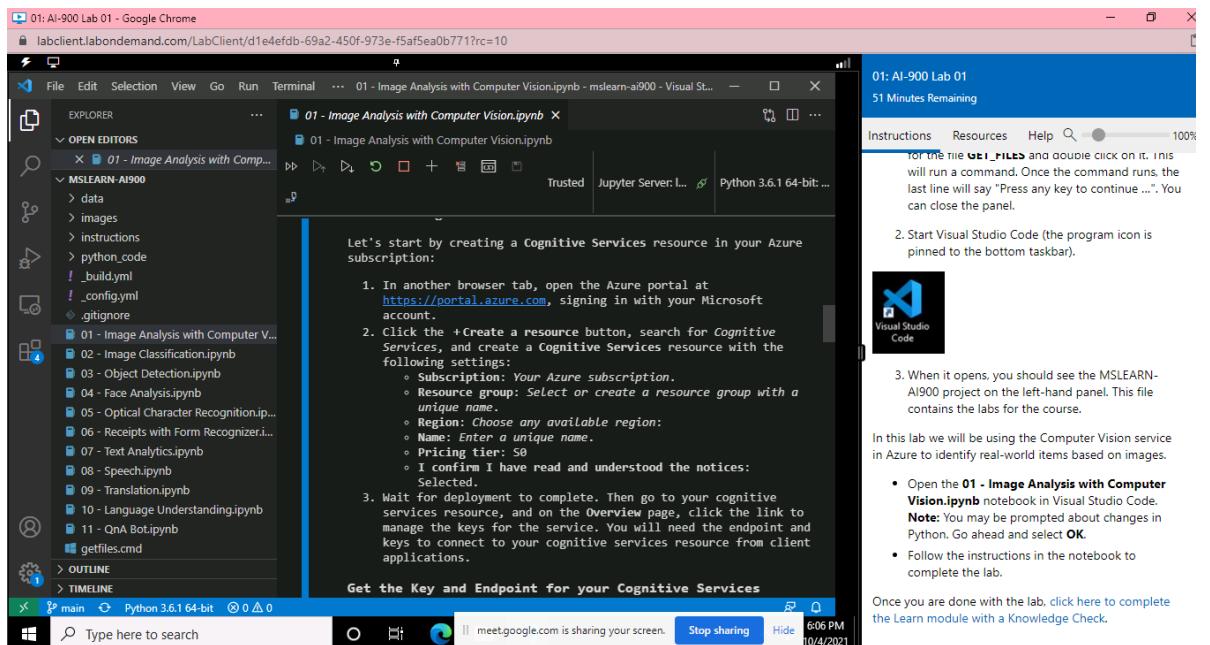
[View full pricing details](#)

By checking this box I acknowledge that I

3. Ketika sudah mengklik cognitive services, buat cognitive service. Masukkan detail informasi yang diminta.



4. Pada awal launch lab pada microsoft learn, virtual machine akan muncul dan ketika sudah masukan password, kemudian klik GET_FILES dan tunggu hingga selesai running. Jika sudah, maka klik Visual Studio Code dan tertampil seperti gambar diatas.



5. Klik Image Analysis with Computer Vision.ipynb pada panel kiri, dan muncul seperti gambar diatas, ikuti langkah-langkahnya. Ketentuan untuk membuat cognitive services pada gambar nomor 3

```

[2]: cog_key = '81f7cf1f1ee34367850a66a329630f59'
cog_endpoint = 'https://comvis290921.cognitiveservices.azure.com/'

print('Ready to use cognitive services at {} using key {}'.format(cog_endpoint, cog_key))
Ready to use cognitive services at https://comvis290921.cognitiveservices.azure.com/ using key 81f7cf1f1ee34367850a66a329630f59

()

Now that you've set up the key and endpoint, you can use the computer vision service to analyze an image.

Run the following cell to get a description for an image in the /data/vision/store_cam1.jpg file.

[-]: from azure.cognitiveservices.vision.computervision import ComputerVisionClient
from msrest.authentication import CognitiveServicesCredentials
from python_code import vision
import os
%matplotlib inline

# Get the path to an image file
image_path = os.path.join('data', 'vision', 'store_cam1.jpg')

# Get a client for the computer vision service
computervision_client = ComputerVisionClient(cog_endpoint, CognitiveServicesCredentials(cog_key))

```

6. Ketika pembuatan resource telah selesai, klik go to resource dan klik key and endpoints. Lalu copy paste kan key dan endpoint nya ke notebook Visual Studio Code seperti gambar diatas, kemudian klik RUN.

```
from azure.cognitiveservices.vision.computervision import ComputerVisionClient
from msrest.authentication import CognitiveServicesCredentials
from python_code import vision
import os
%matplotlib inline

# Get the path to an image file
image_path = os.path.join('data', 'vision', 'store_cami.jpg')

# Get a client for the computer vision service
computervision_client = ComputerVisionClient(cog_endpoint, CognitiveServicesCredentials(cog_key))

# Get a description from the computer vision service
image_stream = open(image_path, "rb")
description = computervision_client.describe_image_in_stream(image_stream)

# Display image and caption (code in helper_scripts/vision.py)
vision.show_image_caption(image_path, description)
```



7. Code pada IDE python seperti gambar diatas dijalankan (klik tombol RUN).



8. Hasil dari code nomor 7 menghasilkan gambar seperti diatas

```

# Get the path to an image file
image_path = os.path.join('data', 'vision', 'store_cam1.jpg')

# Specify the features we want to analyze
features = ['Description', 'Tags', 'Adult', 'Objects', 'Faces']

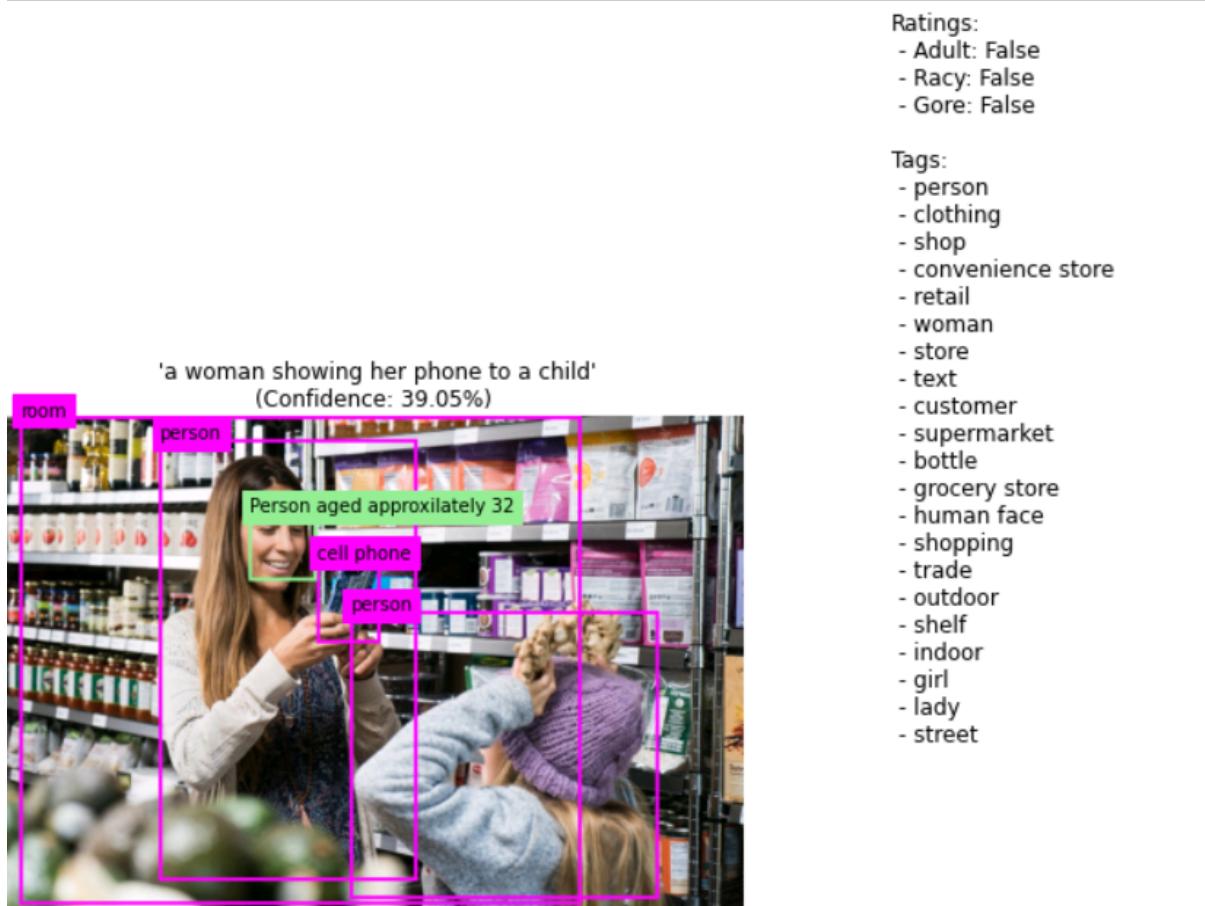
# Get an analysis from the computer vision service
image_stream = open(image_path, "rb")
analysis = computervision_client.analyze_image_in_stream(image_stream, visual_features=features)

# Show the results of analysis (code in helper_scripts/vision.py)
vision.show_image_analysis(image_path, analysis)

```

9. Kemudian jalankan code diatas, klik RUN

```
VISION.SHOW_IMAGE_ANALYSIS(IMAGE_PATH, ANALYSIS)
```



10. hasil RUN dari code nomor 9 adalah seperti gambar diatas. terlihat gambar sudah di specify descriptionnya, tags nya, adult (dewasa)-nya, dan facesnya (wajah, untuk menentukan umur).

PERCOBAAN 2

Classify images with the Custom Vision service

Seperti percobaan lab sebelumnya, pada microsoft learn klik launch lab, dan menunggu virtual machine terbuat. ketika sudah terbuat, lakukan login dan klik GET_FILES. kalau sudah, klik Visual studio Code, dan klik 02 - Image Classification.ipynb dan lakukan langkah-langkah pada notebook tersebut. Di lab ini kita akan menggunakan layanan Custom Vision di Azure untuk mengidentifikasi sati item dunia nyata dalam sebuah gambar.

Custom Vision ...

Microsoft



Custom Vision A

Microsoft

★ 4.3 (44 Azure ratings)

[Create](#)

1. Masuk ke akun portal azure. Di Azure, pilih Custom Vision seperti pilihan pada gambar

Create ...

Custom Vision All In One

Create options

Both

Training

Prediction

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

Azure for Students

Resource group * ⓘ

cloud-shell-storage-southeastasia



[Create new](#)

Name * ⓘ

imgclass51021-kel4



Training Resource

Select pricing and location for Training Resource

Training location *

(Asia Pacific) Southeast Asia



Training pricing tier ([Learn More](#)) * ⓘ

Free F0 (2 Transactions per second, 2 Projects)



Prediction Resource

Select pricing and location for Prediction Resource

Prediction location *

(Asia Pacific) Southeast Asia



Prediction pricing tier ([Learn More](#)) * ⓘ

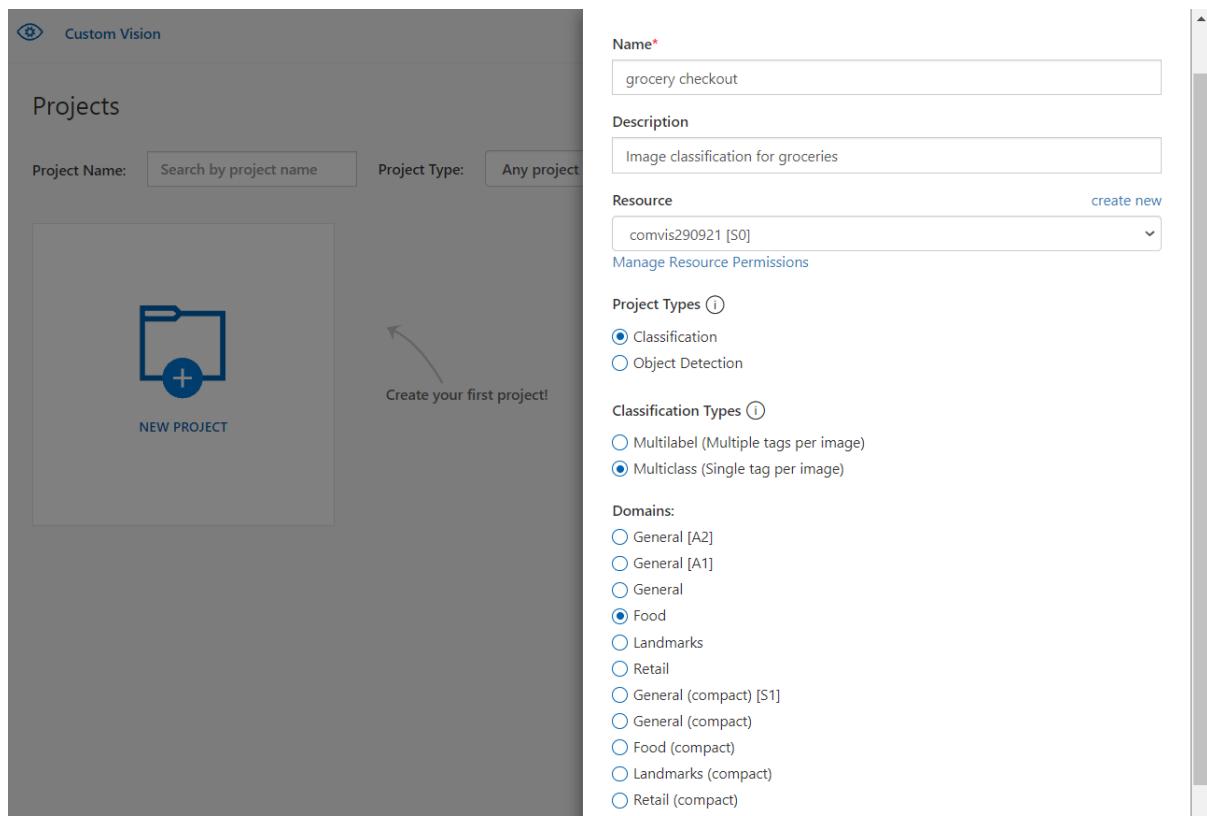
Standard S0 (10 Transactions per second)



2. Kemudian pilih tombol create a resource, cari custom vision dan buat custom vision resource dengan pengaturan sebagai berikut:

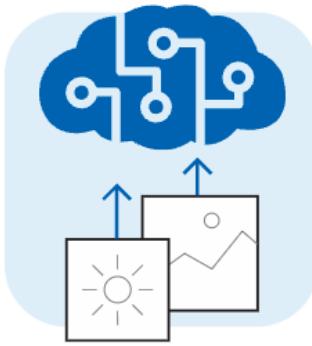
- **Create options:** Both
- **Subscription:** Azure for student, (karena kami menggunakan layanan untuk Azure pelajar)
- **Resource group:** cloud-shell-storage-southeastasia
- **Name:** imgclass51021-kel4
- **Training location:** (Asia Pacific) Southeast Asia
- **Training pricing tier:** F0
- **Prediction location:** (Asia Pacific) Southeast Asia
- **Prediction pricing tier:** F0

Kemudian klik create dan tunggu hingga resource dibuat dan perhatikan bahwa dua custom vision telah tersedia, yang satu untuk pelatihan dan satu lagi untuk prediksi



3. Pada custom vision portal buat proyek baru dengan pengaturan sebagai berikut :

- **Name:** Grocery Checkout
- **Description:** Image classification for groceries
- **Resource:** *comvis290921 [S0]*
- **Project Types:** Classification
- **Classification Types:** Multiclass (single tag per image)
- **Domains:** Food



Looks like you don't have any images here!

Go ahead and browse for images to upload to your project, tag them, and they will be ready to be trained.

Add images

JPG, .PNG, .BMP format, up to 6 MB per image

4. Klik tambahkan gambar dan kami memilih semua gambar apel yang sudah diekstrak sebelumnya kemudian unggah. Lalu berikan tag nama “apple” seperti gambar dibawah.

Image upload X

Add Tags Uploading Summary

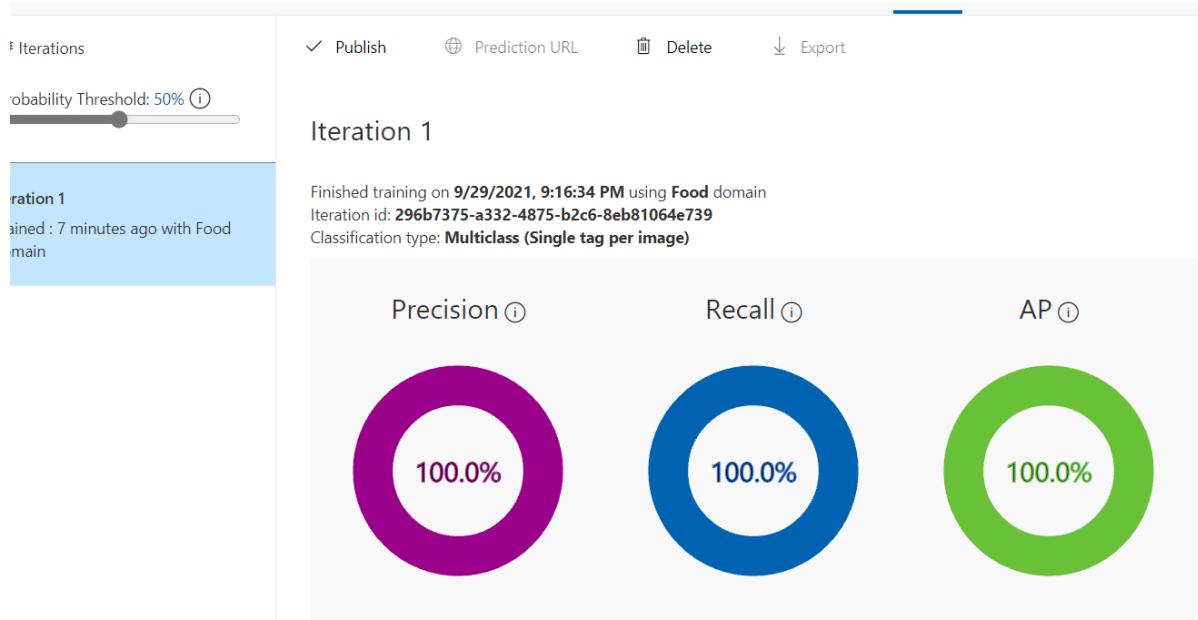
15 images will be added...

Add some tags to this batch of images...

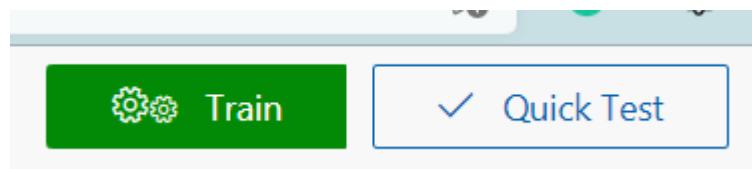
My Tags

apple

Upload 15 files



5. Selanjutnya, dalam custom vision project klik train untuk melatih model klasifikasi yang telah diberi tag lalu klik publish



6. Setelah melakukan training selanjutnya melakukan quick test untuk menguji hasil training

Quick Test

Image URL: <https://aka.ms/apple-image>

or

Browse local files

File formats accepted: jpg, png, bmp
File size should not exceed: 4mb

Using model trained in

Iteration: Iteration 1

Tag	Probability
apple	98.1%
orange	1.8%
banana	0%

7. Hasil quick test menunjukkan bahwa pada gambar tersebut terdeteksi terdapat objek apel dengan probabilitas tertinggi yaitu 98,1%

Publish Model

X

We only support publishing to a prediction resource in the same region as the training resource the project resides in.

Please check if you have a prediction resource and if the prediction resource is in the same region as the training resource.

Model name

grocerieskel4

Prediction resource

imgclass51021kel4-Prediction

Publish

Cancel

8. Supaya model dapat dimanfaatkan secara luas, maka kami melakukan publikasi model. Beri nama model dan pilih prediction resource yang sudah di buat sebelumnya

```
▶ M4  
project_id = '1a89172f-cfc5-4506-95ec-06548db7eea5'  
cv_key = 'f6c0ed4a778847a0b9c18210d9937414'  
cv_endpoint = 'https://  
imgclass51021kel4-prediction.cognitiveservices.azure.com/'  
  
model_name = 'grocerieskel4' # this must match the model  
name you set when publishing your model iteration (it's  
case-sensitive)!  
print('Ready to predict using model {} in project {}'.format  
(model_name, project_id))  
{}
```

Now you can use your key and endpoint with a Custom Vision client to connect to your custom vision classification model.

Run the following code cell to classify a selection of test images using your published model.

Note: Don't worry too much about the details of the code. It uses the Computer Vision SDK for Python to get a class prediction for each image in the /data/image-classification/test-fruit folder

Resources:

[create new](#)

▼ imgclass51021kel4-Prediction

Subscription: Azure for Students

Resource Group: cloud-shell-storage-southeastasia

Resource Kind: Custom Vision Prediction

Key:

f6c0ed4a778847a0b9c18210d9937414

Endpoint:

<https://imgclass51021kel4-prediction.cognitiveservices.azure.com/>

9. Untuk memeriksa apakah program berjalan, jalankan kode seperti diatas, untuk yang menggunakan custom vision key dan endpointnya menggunakan endpoint prediction beserta key nya juga. Untuk project id dapat dilihat di project lalu klik gambar setting. Pastikan model name yang ditulis sudah tepat dengan yang kita buat karena itu merupakan hal yang sensitif.

```
from azure.cognitiveservices.vision.customvision.prediction
import CustomVisionPredictionClient
from msrest.authentication import ApiKeyCredentials
import matplotlib.pyplot as plt
from PIL import Image
import os
%matplotlib inline

# Get the test images from the data/vision/test folder
test_folder = os.path.join('data', 'image-classification',
'test-fruit')
test_images = os.listdir(test_folder)

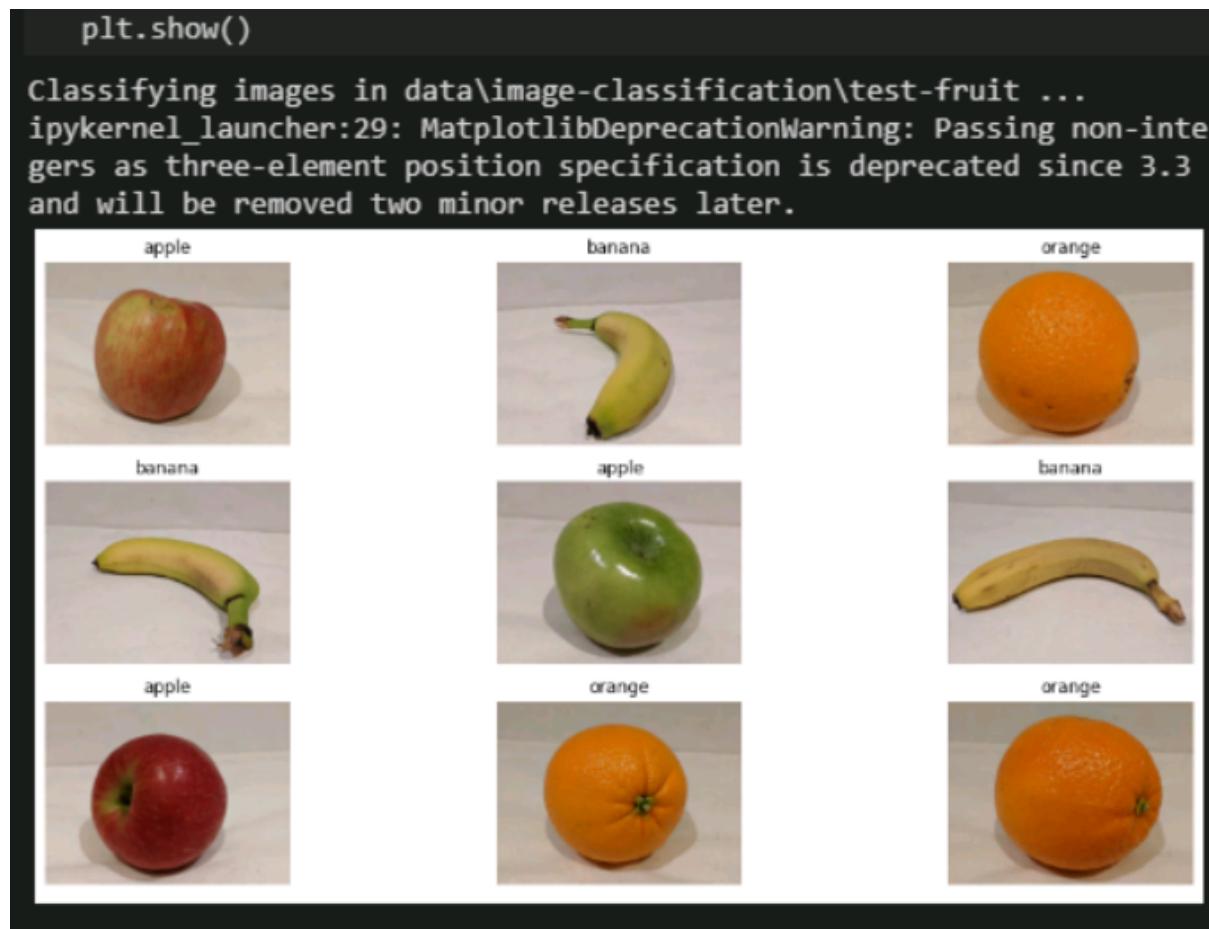
# Create an instance of the prediction service
credentials = ApiKeyCredentials(in_headers=
{"Prediction-key": cv_key})
custom_vision_client = CustomVisionPredictionClient(
endpoint=cv_endpoint, credentials=credentials)

# Create a figure to display the results
fig = plt.figure(figsize=(16, 8))

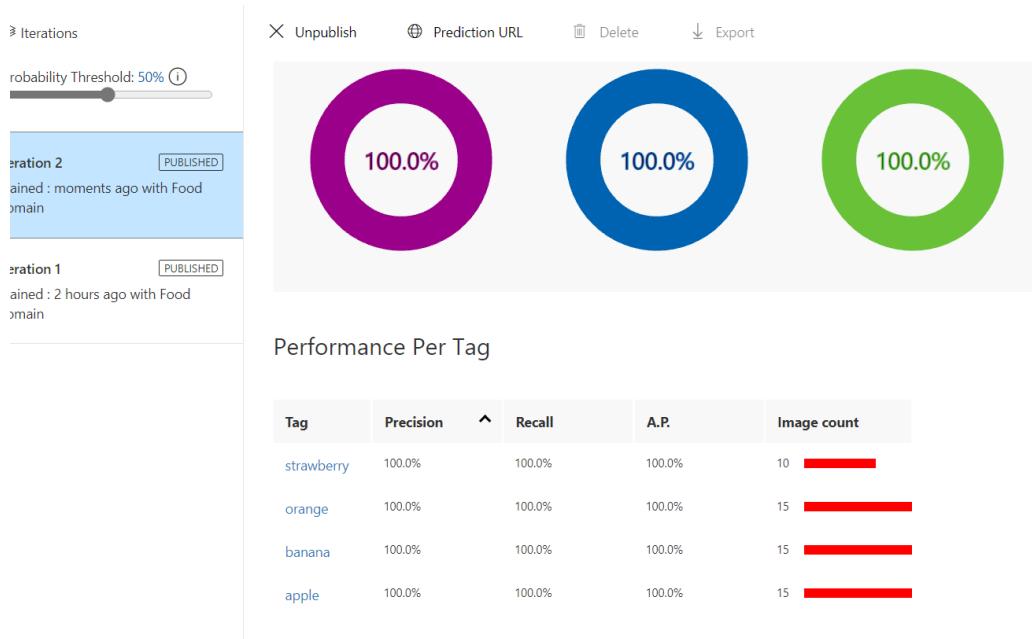
# Get the images and show the predicted classes for each one
print('Classifying images in {} ...'.format(test_folder))
```

```
for i in range(len(test_images)):
    # Open the image, and use the custom vision model to
    # classify it
    image_contents = open(os.path.join(test_folder,
test_images[i]), "rb")
    classification = custom_vision_client.classify_image
(project_id, model_name, image_contents.read())
    # The results include a prediction for each tag, in
    # descending order of probability - get the first one
    prediction = classification.predictions[0].tag_name
    # Display the image with its predicted class
    img = Image.open(os.path.join(test_folder, test_images
[i]))
    a=fig.add_subplot(len(test_images)/3, 3,i+1)
    a.axis('off')
    imgplot = plt.imshow(img)
    a.set_title(prediction)
plt.show()
```

10. Selanjutnya, jalankan code yang tersedia



11. Maka akan muncul klasifikasi gambar yang sudah sesuai dengan jenis nya



12. Setelah percobaan persis seperti di module telah selesai, kami mencoba melakukan sedikit modifikasi. Kami mencoba menambahkan 1 buah baru yaitu strawberry. Langkah percobaan pun diulangi. Dengan modifikasi tambahan seperti jumlah data-set yang berbeda (hanya menggunakan 10 foto strawberry), kami pun men-train model. Hasilnya ada pada gambar di atas.

Quick Test

X



Image URL

Enter Image URL



or

Browse local files

File formats accepted: jpg, png, bmp
File size should not exceed: 4mb

Using model trained in

Iteration

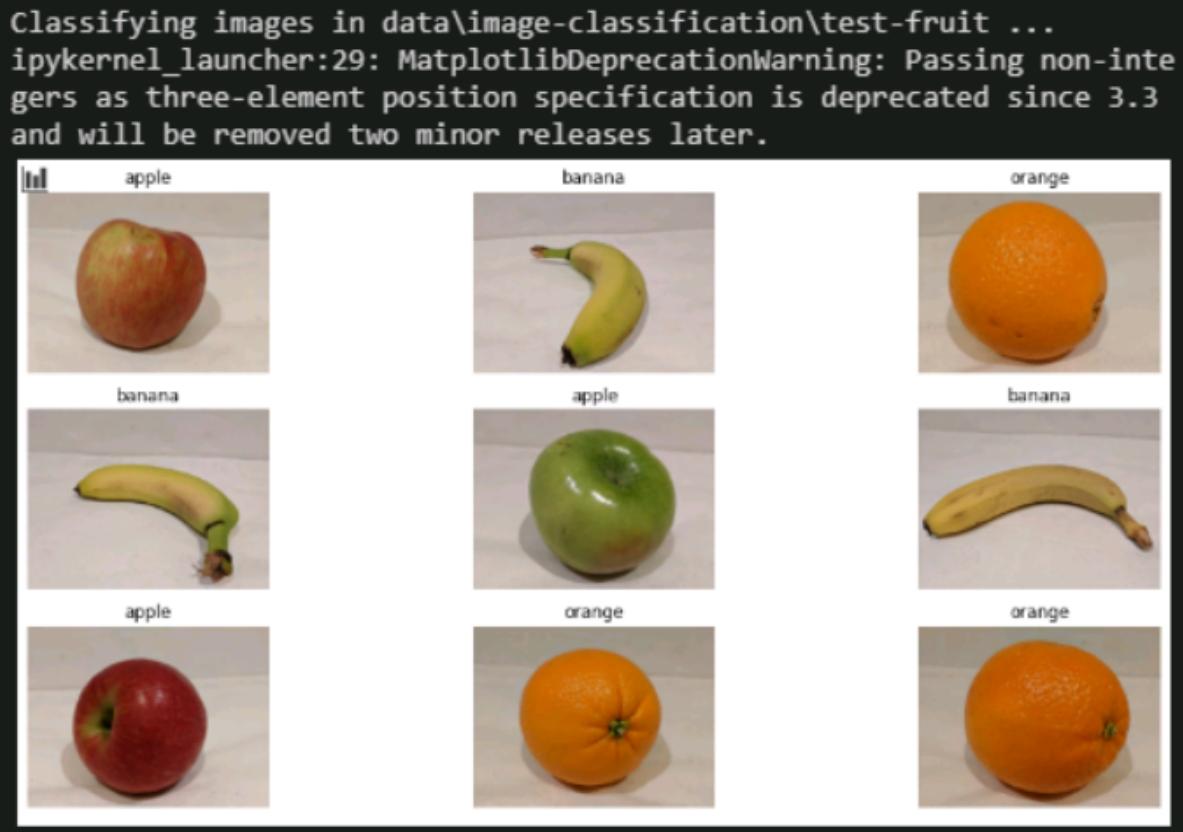
Iteration 2

Predictions

Tag	Probability
strawberry	99.9%
apple	0%
orange	0%
banana	0%

13. Setelah berhasil menambah data-set dan juga melatih model, kami juga menjalankan quick-test dengan tujuan mengetahui apakah model sudah mampu mengenali foto strawberry yang diuji, **gambar diambil dari local files** dan hasilnya adalah ada pada gambar. Strawberry berhasil terdeteksi dengan probability 99.9%.

`pic.show()`

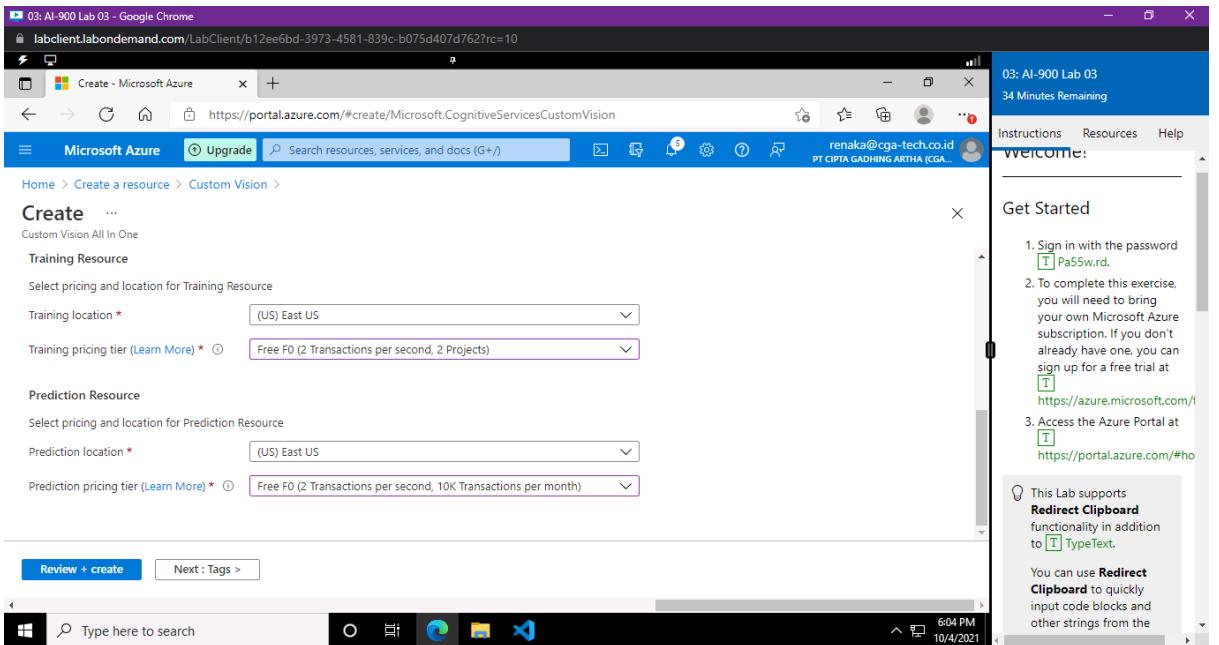


14. Gambar di atas adalah hasil dari proses paling terakhir yaitu setelah publish. Dalam proses melabeli buah secara satu per satu, hasil modifikasinya tidak dapat melabeli gambar strawberry dengan label “strawberry”. Penyebabnya adalah kemungkinan besar ada pada kesalahan dimana data-test belum disesuaikan dengan data training yang baru. Jadi, di data training strawberrynya sudah ada, tetapi di data untuk testnya belum ada (masih menggunakan data test bawaan yang hanya ada banana, orange, dan apple).

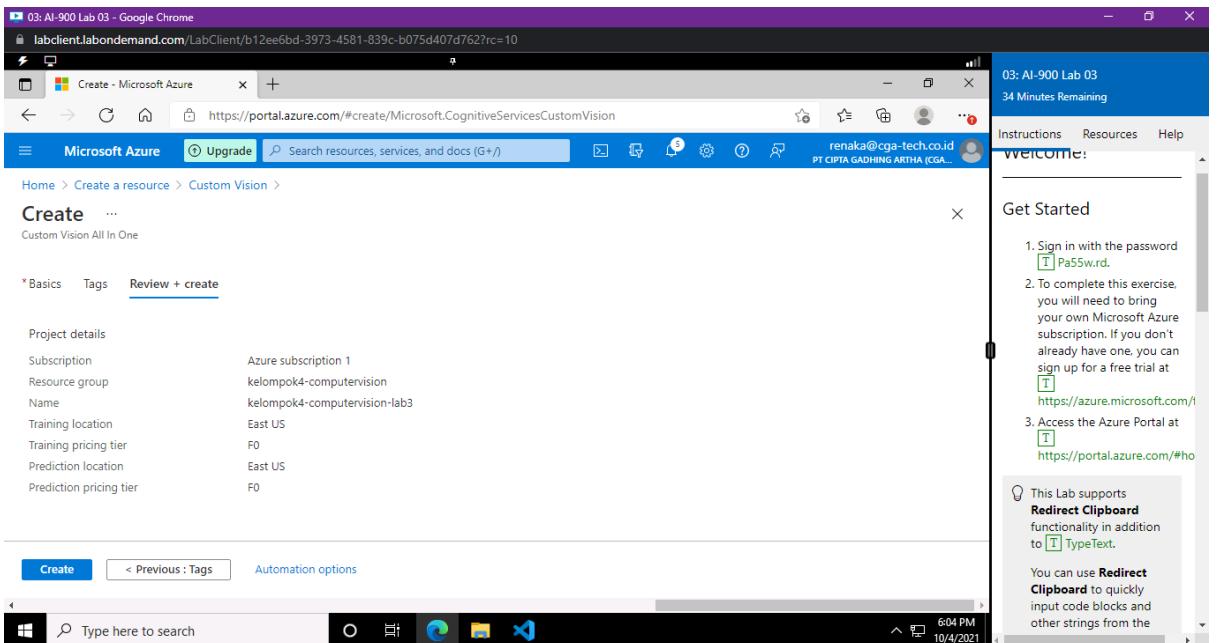
PERCOBAAN 3

Detect objects in images with the Custom Vision service

Seperti percobaan lab sebelumnya, pada microsoft learn klik launch lab, dan menunggu virtual machine terbuat. ketika sudah terbuat, lakukan login dan klik GET_FILES. kalau sudah, klik Visual studio Code, dan klik 03 - Object Detection.ipynb dan lakukan langkah-langkah pada notebook tersebut. Di lab ini kita akan menggunakan layanan custom vision pada Azure untuk mendeteksi objek dalam gambar.



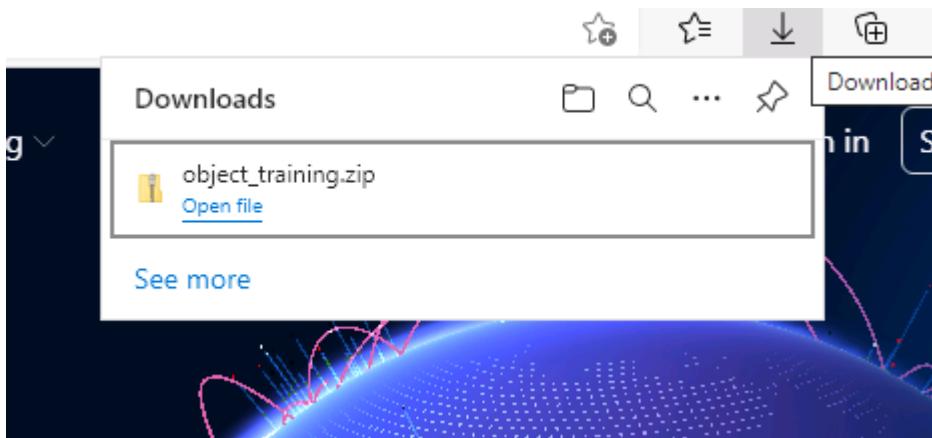
1. Membuat Custom Vision project dengan nama “kelompok4-customvision-lab3” dan melakukan konfigurasi terkait dengan training pricing dan prediction pricing



2. Melakukan review untuk validasi dan mengcreate service Custom Vision

The screenshot shows the Microsoft Azure portal interface. A deployment named "Microsoft.CognitiveServicesCustomVision" is shown as complete. Deployment details include a start time of 10/4/2021, 6:05:12 PM, and a correlation ID of beb0ed61-3975-4d1d-b66b-5c947be4... The portal includes a sidebar with various links and a "Get Started" section with instructions for completing the exercise.

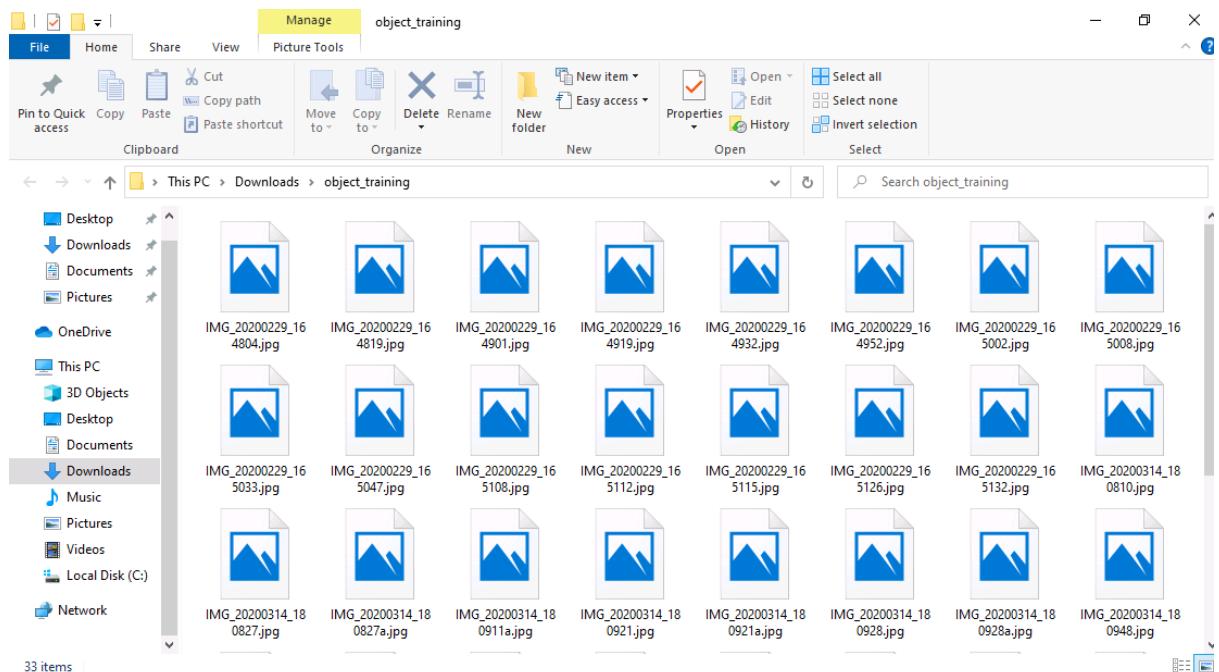
3. Menunggu hingga proses deployment selesai



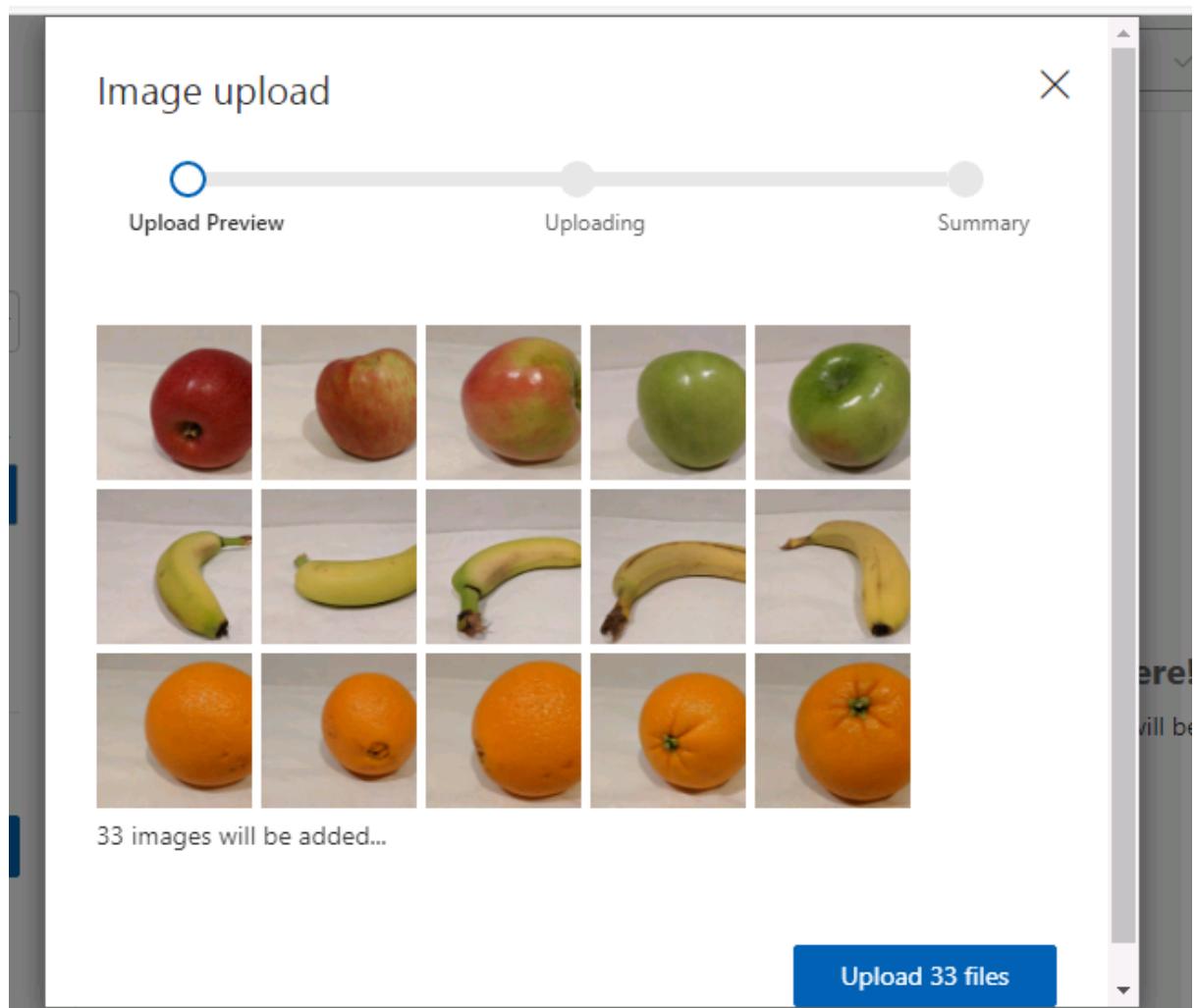
4. Mengunduh dataset gambar untuk dilakukan training

The screenshot shows the "Create new project" dialog box on the Custom Vision website. The project name is set to "Grocery Detection". Under "Project Types", "Object Detection" is selected. Under "Domains", "General [A1]" is selected. The "Resource" dropdown is set to "kelompok4-computervision [50]". The sidebar on the right provides instructions for completing the exercise.

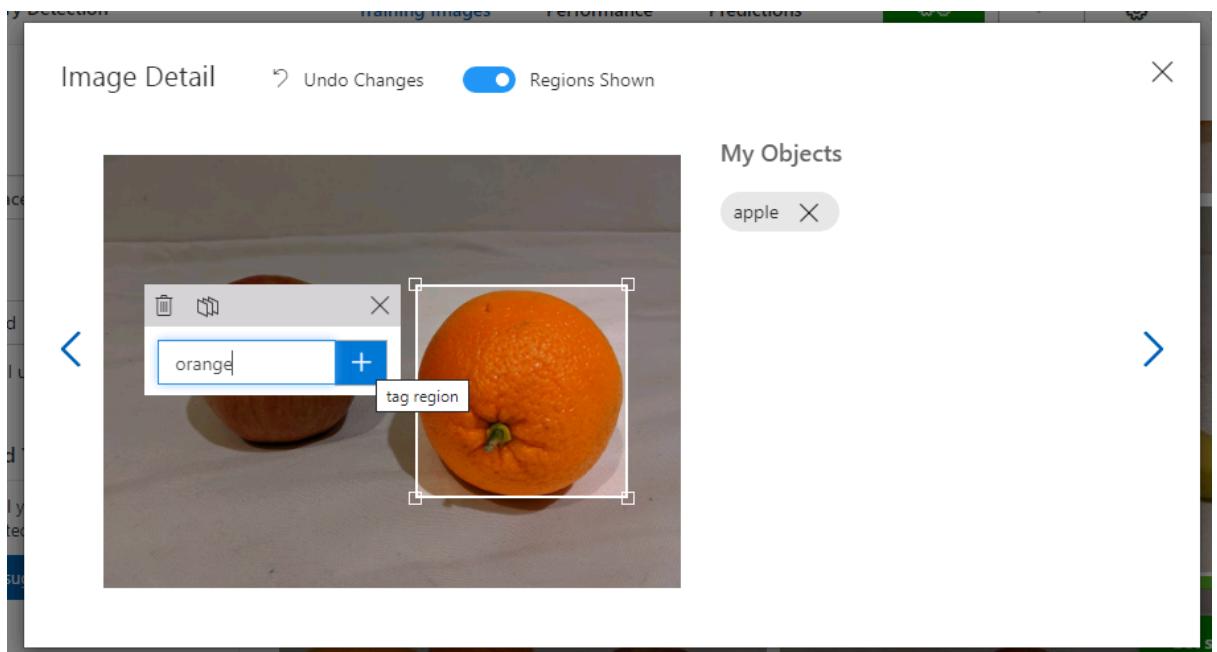
5. Membuat project baru situs www.customvision.ai dengan nama Grocery Detection



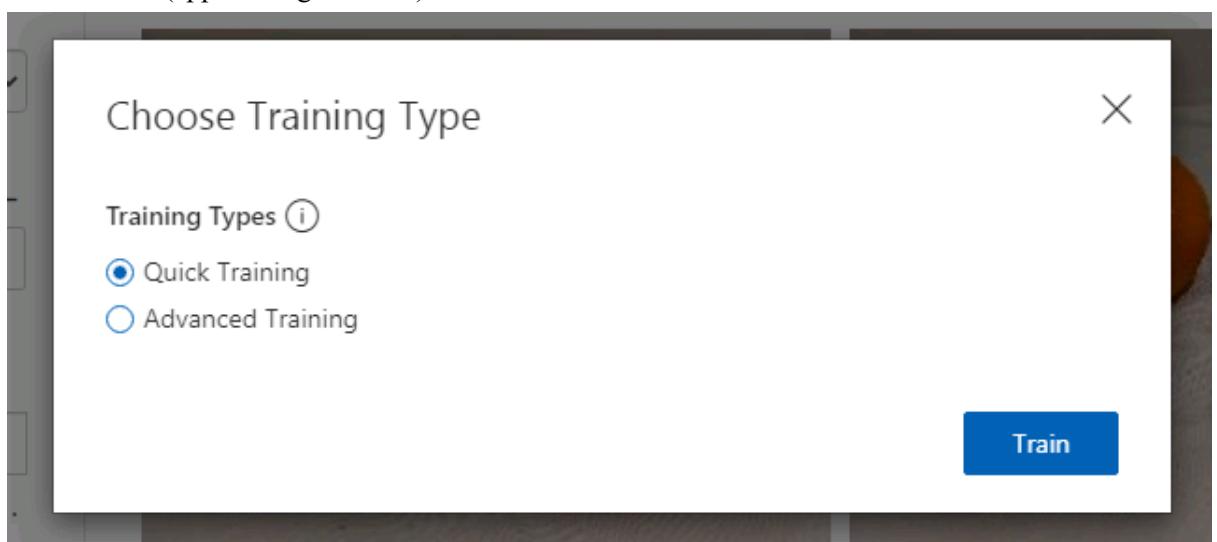
6. Mengekstrak seluruh gambar ke dalam satu folder



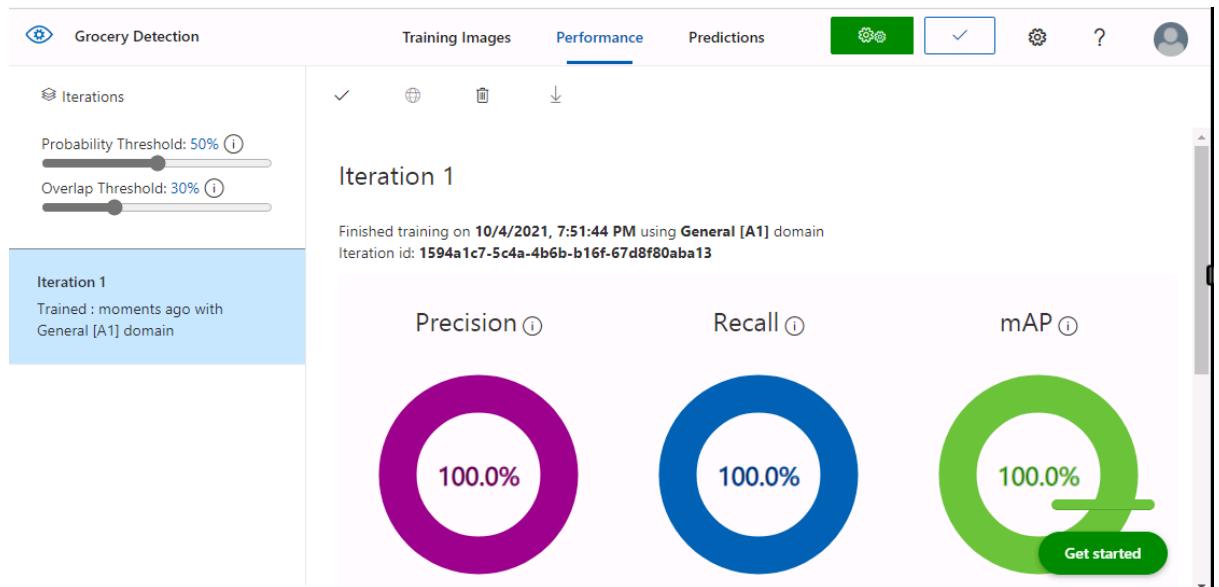
7. Mengunggah seluruh gambar dengan menekan tombol add images



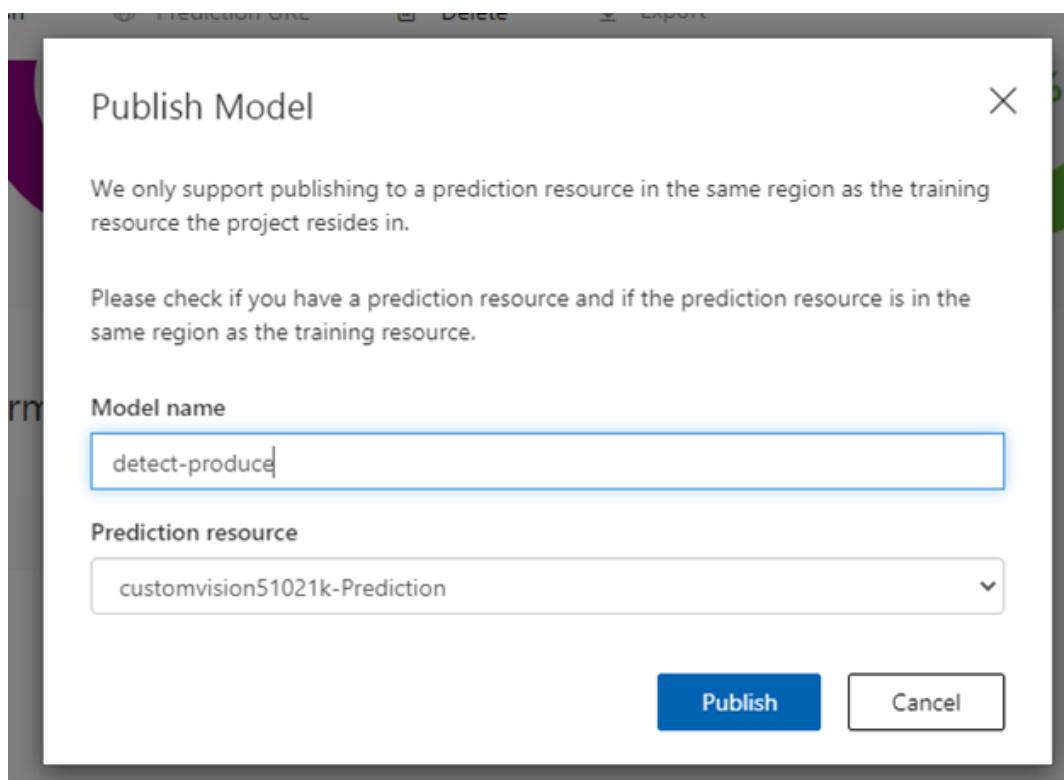
8. Melakukan proses labeling pada gambar dengan mengisi label sesuai dengan nama buah (apple/orange/banana)



9. Melakukan proses training dengan opsi Quick Training



10. Setelah proses training selesai maka akan menampilkan hasil seperti diatas



11. Publish model yang sudah dibuat

Project Settings

General

Project Name*

Grocery Detection

Project Id

52251d91-c3f4-4f89-8c4a-04544c2571ab

12. Di setting dapat terlihat Project Id nya

Settings

Resources:

create new

▼ customvision51021k-Prediction
Subscription: Azure for Students
Resource Group: 10okt2021fikr
Resource Kind: Custom Vision Prediction

Key:

8b16ff44fe104f4faaab77ae627a590e

Endpoint:

<https://customvision51021k-prediction.cognitiveservices.azure.com/>

Resource Id:

/subscriptions/48e5f9f3-a4ad-4346-975a-5e2c5cb3f778/resourceGroups/10okt2021fikr/providers/Microsoft.CognitiveSer

Pricing Tier: F0

Change Pricing Tier

0 predictions made: 10000 remain until reset

13. dari resource setting didapatkan key dan endpoint

```
project_id = '52251d91-c3f4-4f89-8c4a-04544c2571ab' # Replace with your project ID
cv_key = '8b16ff44fe104f4faaab77ae627a590e' # Replace with your prediction resource primary key
cv_endpoint = 'https://customvision51021k-prediction.cognitiveservices.azure.com/' # Replace with your prediction resource endpoint

model_name = 'detect-produce' # this must match the model name you set when publishing your model iteration exactly (including case)!
print('Ready to predict using model {} in project {}'.format(model_name, project_id))
```

14. Masukkan project id, endpoint, dan key di notebook yang sudah disediakan di lab

```

Ready to predict using model detect-produce in project 52251d91-c3f4-4f89-8c4a-0
4544c2571ab

()

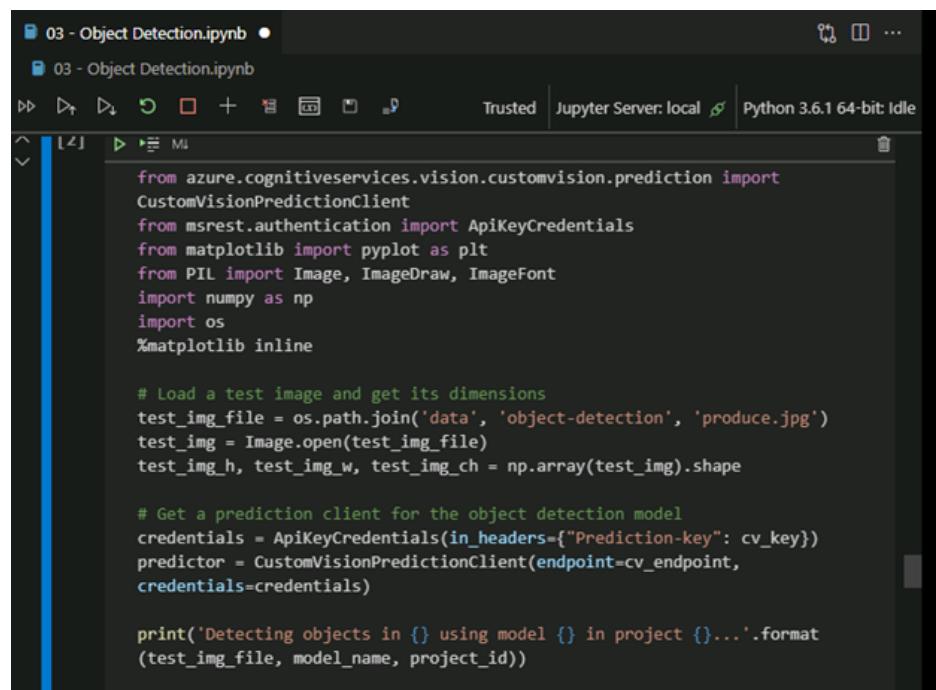
Now you can use your key and endpoint with a Custom Vision client to connect to
your custom vision object detection model.

Run the following code cell, which uses your model to detect individual produce
items in an image.

Note: Don't worry too much about the details of the code. It uses the
Python SDK for the Custom Vision service to submit an image to your
model and retrieve predictions for detected objects. Each prediction
consists of a class name (apple, banana, or orange) and bounding box
coordinates that indicate where in the image the predicted object has
been detected. The code then uses this information to draw a labelled
box around each object on the image.

```

15. Jika semua telah terkonfigurasi dengan benar maka akan tampil statement seperti diatas



```

03 - Object Detection.ipynb •
03 - Object Detection.ipynb
Trusted | Jupyter Server: local | Python 3.6.1 64-bit: Idle
from azure.cognitiveservices.vision.customvision.prediction import
CustomVisionPredictionClient
from msrest.authentication import ApiKeyCredentials
from matplotlib import pyplot as plt
from PIL import Image, ImageDraw, ImageFont
import numpy as np
import os
%matplotlib inline

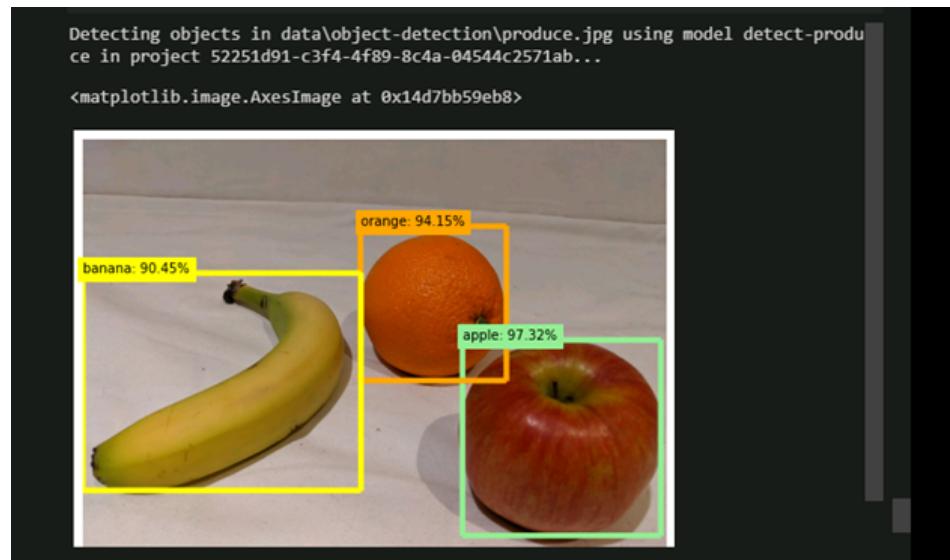
# Load a test image and get its dimensions
test_img_file = os.path.join('data', 'object-detection', 'produce.jpg')
test_img = Image.open(test_img_file)
test_img_h, test_img_w, test_img_ch = np.array(test_img).shape

# Get a prediction client for the object detection model
credentials = ApiKeyCredentials(in_headers={"Prediction-key": cv_key})
predictor = CustomVisionPredictionClient(endpoint=cv_endpoint,
credentials=credentials)

print('Detecting objects in {} using model {} in project {}...'.format(
test_img_file, model_name, project_id))

```

16. Jalankan kode diatas untuk melihat prediksi yang dihasilkan, yang menunjukkan objek yang terdeteksi dan probabilitas untuk setiap prediksi



17. Gambar diatas menunjukkan hasil akhirnya

PERCOBAAN 4

Detect and analyze faces with the Face service

Seperti percobaan lab sebelumnya, pada microsoft learn klik launch lab, dan menunggu virtual machine terbuat. ketika sudah terbuat, lakukan login dan klik GET_FILES. kalau sudah, klik Visual studio Code, dan klik 04 - face analysis.ipynb dan lakukan langkah-langkah pada notebook tersebut. Di lab ini kita akan menggunakan layanan face pada Azure untuk mendeteksi dan menganalisis wajah.

[Home](#) > [Create a resource](#) > [Cognitive Services](#) >

Create Cognitive Services ...

[more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ

Fairfax Azure for Students

Resource group * ⓘ

(New) cognitive-service-4

[Create new](#)

Instance details

Region * ⓘ

Southeast Asia

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Create Cognitive Services ...

Name * ⓘ

cognitive-services4 ✓

Pricing tier * ⓘ

Standard S0

[View full pricing details](#)

By checking this box I acknowledge that I
have read and understood all the terms
below

Responsible AI Notice

Microsoft provides technical documentation regarding the appropriate operation applicable to this Cognitive Service.

1. Klik tombol create a resource pada custom vision, cari layanan kognitif dan buat resource dengan pengaturan sebagai berikut:
 - **Subscription:** Fairfax Azure for Students
 - **Resource group:** (New) cognitive-service-4
 - **Region:** Southeast Asia
 - **Name:** Cognitive-service4

- **Pricing tier:** S0
- **I confirm I have read and understood the notices:**
Selected.

Basics

Subscription	Fairfax Azure for Students
Resource group	cognitive-service-4
Region	Southeast Asia
Name	cognitive-services4
Pricing tier	Standard S0

Identity

Identity type	None
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2. Selanjutnya klik review + create dan tunggu hingga penerapan selesai

Microsoft Azure

Home > Microsoft.CognitiveServicesAllInOne-20211004190804 | Overview

Deployment

Overview

Inputs

Outputs

Template

We'd love your feedback!

Your deployment is complete

Deployment name: Microsoft.CognitiveServicesAllInO... Start time: 10/4/2021, 7:20:27 PM
Subscription: Fairfax Azure for Students Correlation ID: 48f4fc87-709e-4c17-a66...
Resource group: cognitive-service-4

Deployment details (Download)

Next steps

Go to resource

3. Ini merupakan halaman ketika kita berhasil membuat sebuah resource

1. In the Azure portal, on the Keys and Endpoint page for your cognitive service resource, copy the Key1 for your resource and paste it in the code below, replacing YOUR_COG_KEY.

2. Copy the endpoint for your resource and and paste it in the code below, replacing YOUR_COG_ENDPOINT.

3. Run the code in the cell below by clicking the Run Cell ▶ button (at the top left of the cell).

```
cog_key = '04d3813b103f44d2839be34636d1b573'  
cog_endpoint = 'https://cognitive-services4.cognitiveservices.azure.com/'  
  
print('Ready to use cognitive services at {} using key {}'.format(  
    cog_endpoint, cog_key))
```

Now that you have a Cognitive Services resource you can use the Face service to detect human faces in the store.

Run the code cell below to see an example.

4. Untuk menggunakan cognitive service resource aplikasi ini membutuhkan endpoint dan authentication key, salin kunci1 pada cog_key dan salin endpoint pada cog_endpoint

Now that you have a Cognitive Services resource you can use the Face service to detect human faces in the store.

Run the code cell below to see an example.

```
[3] ▶ M  
from azure.cognitiveservices.vision.face import FaceClient  
from msrest.authentication import CognitiveServicesCredentials  
from python_code import faces  
import os  
%matplotlib inline  
  
# Create a face detection client.  
face_client = FaceClient(cog_endpoint, CognitiveServicesCredentials  
(cog_key))  
  
# Open an image  
image_path = os.path.join('data', 'face', 'store_cam2.jpg')  
image_stream = open(image_path, "rb")
```

5. Selanjutnya, untuk melihat hasilnya jalankan kode berikut

```
# Display the faces (code in python_code/faces.py)
faces.show_faces(image_path, detected_faces)
```

(2 faces detected)



- Setelah di run, maka akan muncul 2 wajah yang terdeteksi

```
▷ ⏪ M▲ □
```

```
# Open an image
image_path = os.path.join('data', 'face', 'store_cam3.jpg')
image_stream = open(image_path, "rb")

# Detect faces
detected_faces = face_client.face.detect_with_stream(image=image_stream)

# Display the faces (code in python_code/faces.py)
faces.show_faces(image_path, detected_faces, show_id=True)
```

(2 faces detected)



- Code selanjutnya di run dan terlihat hasil seperti gambar diatas



(1 faces detected)

Person aged approximately 34

- anger: 0.0
- contempt: 0.0
- disgust: 0.0
- fear: 0.0
- happiness: 1.0
- neutral: 0.0
- sadness: 0.0
- surprise: 0.0

```
# Get the ID of the first face in image 1
image_1_path = os.path.join('data', 'face', 'store_cam3.jpg')
image_1_stream = open(image_1_path, "rb")
image_1_faces = face_client.face.detect_with_stream(image=image_1_stream)
face_1 = image_1_faces[0]

# Get the face IDs in a second image
image_2_path = os.path.join('data', 'face', 'store_cam2.jpg')
image_2_stream = open(image_2_path, "rb")
image_2_faces = face_client.face.detect_with_stream(image=image_2_stream)
image_2_face_ids = list(map(lambda face: face.face_id, image_2_faces))

# Find faces in image 2 that are similar to the one in image 1
similar_faces = face_client.face.find_similar(face_id=face_1.face_id,
face_ids=image_2_face_ids)

# Show the face in image 1, and similar faces in image 2(code in
python_code/face.py)
faces.show_similar_faces(image_1_path, face_1, image_2_path,
image_2_faces, similar_faces)
```

8. Code diatas merupakan code untuk menganalisis apakah ada face similarity pada dua image. Klik RUN untuk menjalankannya.

```
# Show the face in image 1, and similar faces in image 2(code in
# python_code/face.py)
faces.show_similar_faces(image_1_path, face_1, image_2_path,
image_2_faces, similar_faces)
```



{}

≡

9. Gambar diatas adalah hasil ketika code diatas di RUN. Terlihat bahwa sistem dapat mendeteksi bahwa ada kesamaan wajah (face similarity) pada kedua gambar, yaitu pada ibu-ibu.

Recognize faces

So far you've seen that Face can detect faces and facial features, and can identify two faces that are similar to one another. You can take things a step further by implementing a *facial recognition* solution in which you train Face to recognize a specific person's face. This can be useful in a variety of scenarios, such as automatically tagging photographs of friends in a social media application, or using facial recognition as part of a biometric identity verification system.

To see how this works, let's suppose the Northwind Traders company wants to use facial recognition to ensure that only authorized employees in the IT department can access secure systems.

We'll start by creating a *person group* to represent the authorized employees.

10. Layanan pada face services di Azure yang selanjutnya adalah Recognize faces atau mengenali suatu wajah.

```
[11] ▶ M4  
group_id = 'employee_group_id'  
try:  
    # Delete group if it already exists  
    face_client.person_group.delete(group_id)  
except Exception as ex:  
    print(ex.message)  
finally:  
    face_client.person_group.create(group_id, 'employees')  
    print ('Group created!')  
  
Group created!
```

11. Code diatas adalah code untuk membuat group yang nantinya akan diisi oleh input dataset. Klik RUN untuk menjalankannya.

```
We'll add a single employee called Wendell, and register three photographs of the  
employee.  
  
[12] ▶ M4  
import matplotlib.pyplot as plt  
from PIL import Image  
import os  
%matplotlib inline  
  
# Add a person (Wendell) to the group  
wendell = face_client.person_group_person.create(group_id, 'Wendell')  
  
# Get photo's of Wendell  
folder = os.path.join('data', 'face', 'wendell')  
wendell_pics = os.listdir(folder)  
  
# Register the photos  
i = 0  
fig = plt.figure(figsize=(8, 8))  
for pic in wendell_pics:
```

12. Code diatas adalah code untuk menaruh beberapa input dataset dari satu orang bernama Wendell ke dalam group yang tadi telah dibuat. Kemudian untuk menjalankannya klik RUN.

```
    imgplot = plt.imshow(img)
    plt.show()


    {}


```

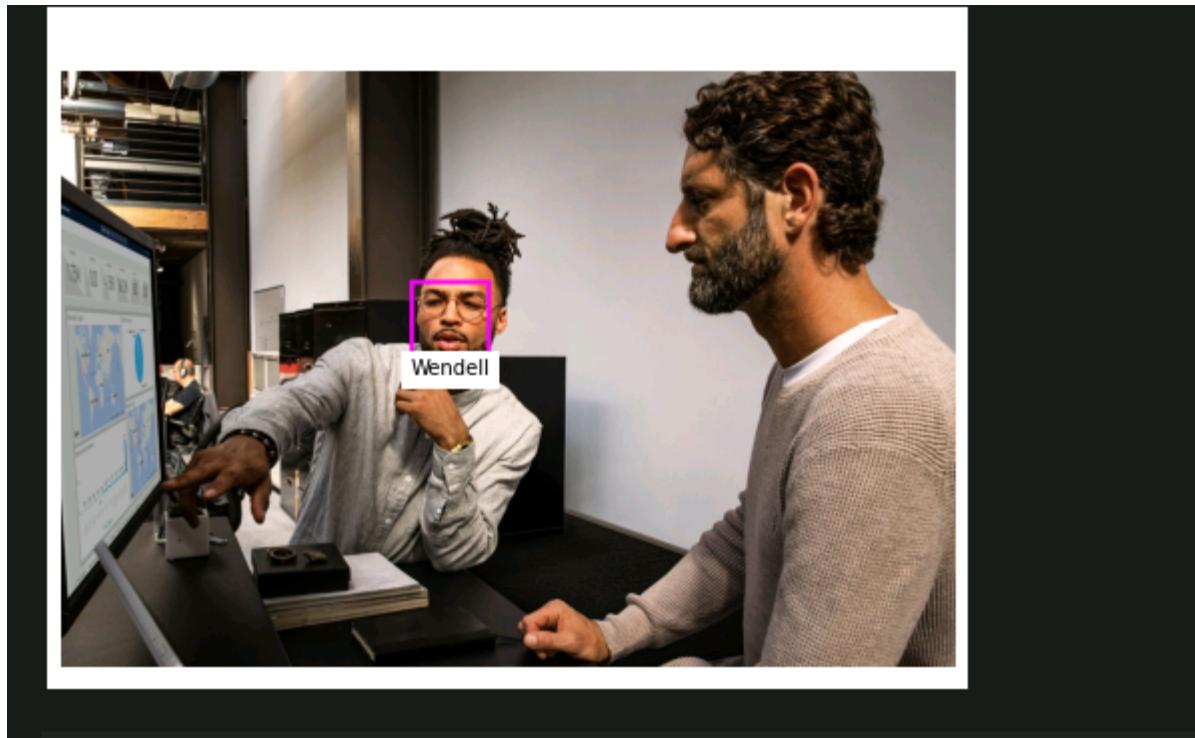
13. Ketika code sebelumnya sudah di RUN, muncul beberapa input dataset dari orang bernama Wendell.

```
RECOGNIZE EACH PERSON.

[13] ▶ M↓
    face_client.person_group.train(group_id)
    print('Trained!')
Trained!
{}


```

14. Jalankan kode diatas dan klik RUN. code ini berguna untuk melakukan training pada input dataset.



15. Gambar diatas merupakan hasil dari RUN code sebelumnya.