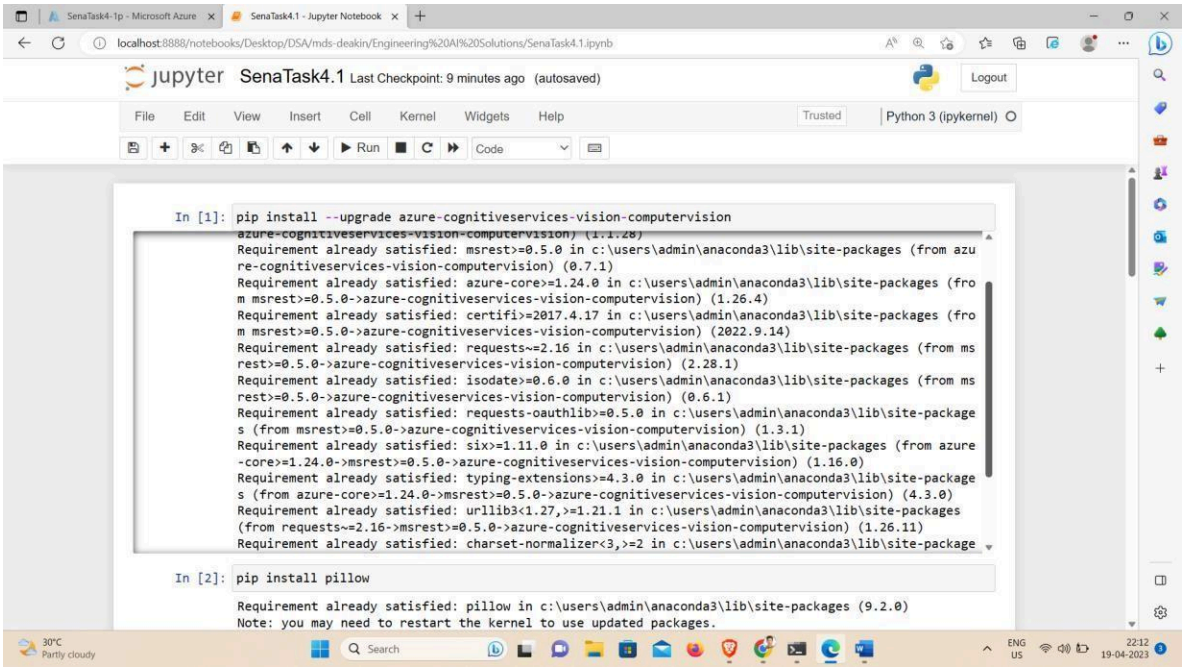
For this task you need to develop a program to detect different objects in images with their rectangles coordinates. To do this task, use the computer vision SDK to detect different objects on Azure. It is recommended to follow the instruction on slides seminar and lecture recording for week 4.

Submit the following files on Olympus:

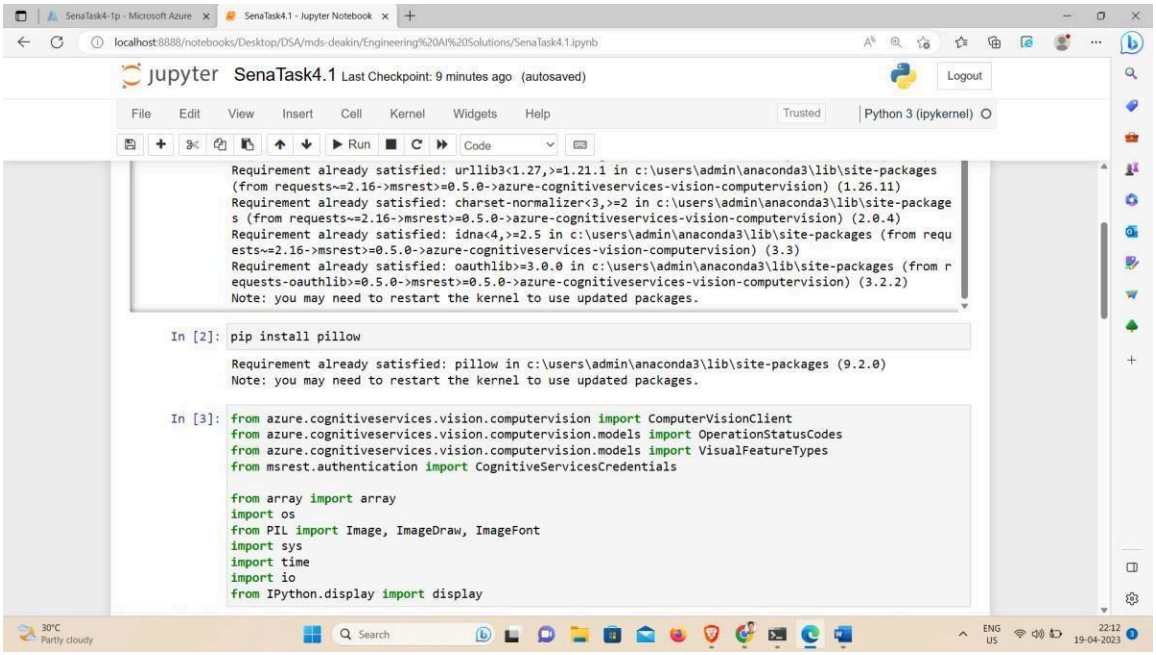
- Submit your answers as a PDF file. You need to answer the following parts in your document.
- Please explain cell by cell of your code from reading a local image to object detection, drawing a bounding box around different objects. To complete this task, you need to provide the screenshot of your code and explain cell by cell of the code and explain what sort of API is being used.

Solution:

Step 1: Install cognitive services-vision-computer vision and pillow

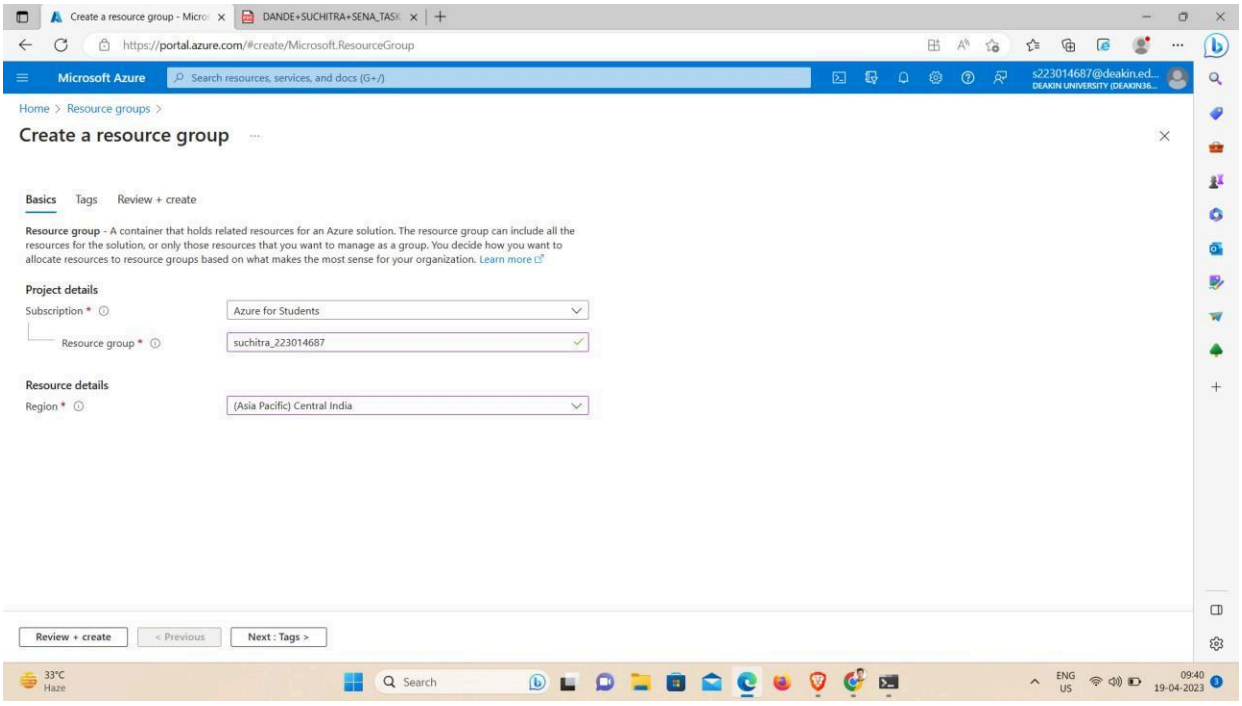


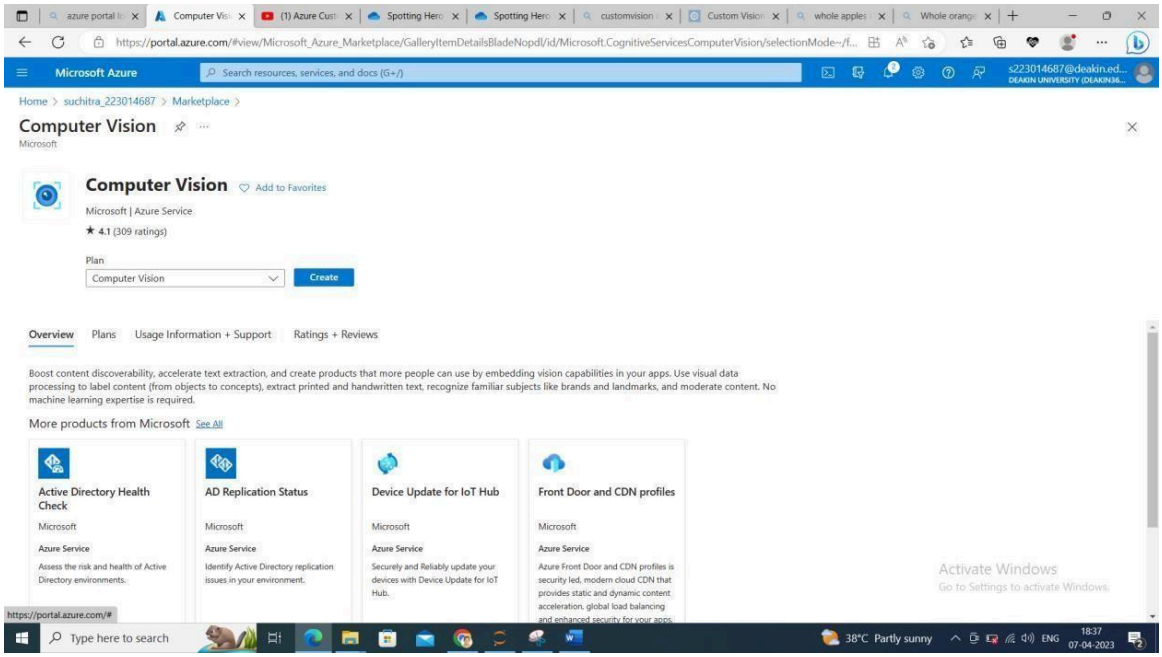
Step 2: Import Libraries

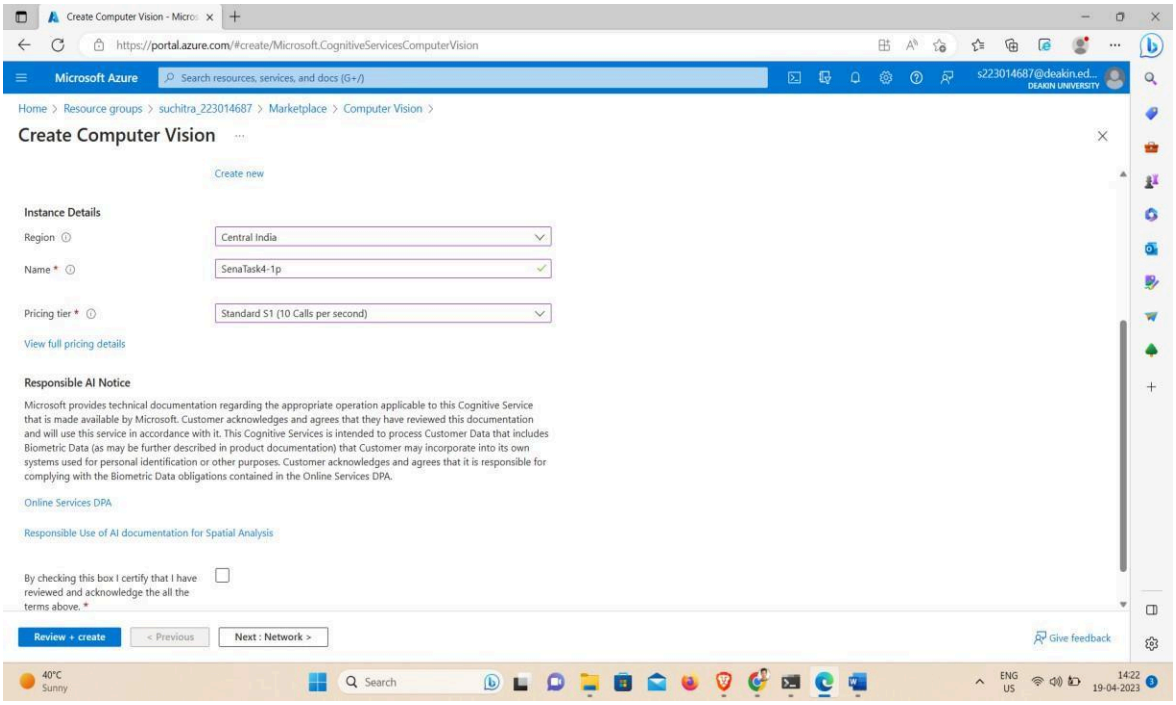


Step3: In the azure portal create a resource group "Suchitra_223014687" and create computer vision as shown in below screenshots [1].

Add subscription and endpoint keys of Computer Vision




Microsoft Azure
Search resources, services, and docs (G+/)
Home > suchitra_223014687 > Marketplace >
Computer Vision
Microsoft
Computer Vision
Add to Favorites
Microsoft | Azure Service
4.1 (309 ratings)
Plan
Computer Vision
Create
Overview
Plans
Usage Information + Support
Ratings + Reviews
Boost content discoverability, accelerate text extraction, and create products that more people can use by embedding vision capabilities in your apps. Use visual data processing to label content (from objects to concepts), extract printed and handwritten text, recognize familiar subjects like brands and landmarks, and moderate content. No machine learning expertise is required.
More products from Microsoft
See All
Active Directory Health Check
AD Replication Status
Device Update for IoT Hub
Front Door and CDN profiles
Microsoft
Azure Service
Assess the risk and health of Active Directory environments.
Identify Active Directory replication issues in your environment.
Securely and Reliably update your devices with Device Update for IoT Hub.
Azure Front Door and CDN profiles is security led, modern cloud CDN that provides static and dynamic content acceleration, global load balancing and enhanced security for your apps.
Activate Windows
Go to Settings to activate Windows.
https://portal.azure.com/#
Type here to search
38°C Partly sunny
ENG
18:37
07-04-2023


Create Computer Vision - Micro
https://portal.azure.com/#create/Microsoft.CognitiveServicesComputerVision
Microsoft Azure
Search resources, services, and docs (G+/)
Home > Resource groups > suchitra_223014687 > Marketplace > Computer Vision >
Create Computer Vision
Create new
Instance Details
Region
Central India
Name *
SenaTask4-1p
Pricing tier *
Standard S1 (10 Calls per second)
View full pricing details
Responsible AI Notice
Microsoft provides technical documentation regarding the appropriate operation applicable to this Cognitive Service that is made available by Microsoft. Customer acknowledges and agrees that they have reviewed this documentation and will use this service in accordance with it. This Cognitive Services is intended to process Customer Data that includes Biometric Data (as may be further described in product documentation) that Customer may incorporate into its own systems used for personal identification or other purposes. Customer acknowledges and agrees that it is responsible for complying with the Biometric Data obligations contained in the Online Services DPA.
Online Services DPA
Responsible Use of AI documentation for Spatial Analysis
By checking this box I certify that I have reviewed and acknowledge the all the terms above. *
Review + create
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Give feedback
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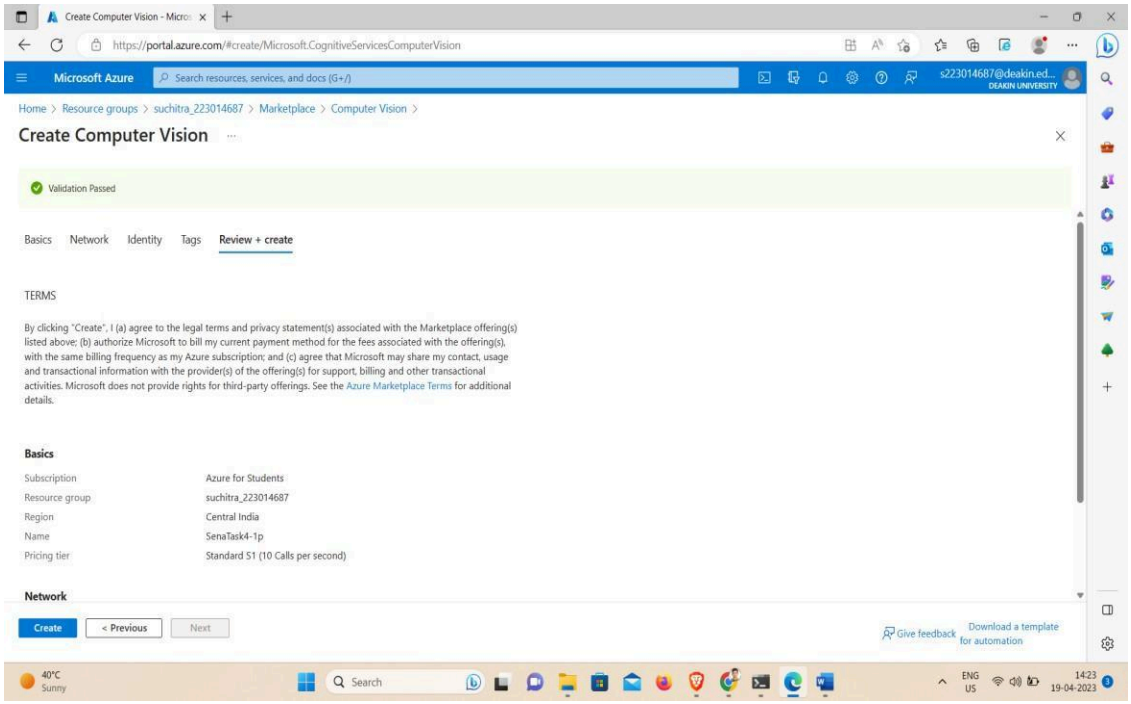
19-04-2023


Create Computer Vision - Micros
https://portal.azure.com/#create/Microsoft.CognitiveServicesComputerVision
Microsoft Azure
Search resources, services, and docs (G+/)
s223014687@deakin.ed...
DEAKIN UNIVERSITY
Home > Resource groups > suchitra_223014687 > Marketplace > Computer Vision >
Create Computer Vision
Validation Passed
Basics Network Identity Tags Review + create
TERMS
By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the Azure Marketplace Terms for additional details.
Basics
Subscription Azure for Students
Resource group suchitra_223014687
Region Central India
Name SenaTask4-1p
Pricing tier Standard S1 (10 Calls per second)
Network
Create
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Give feedback
Download a template for automation
40°C
Sunny
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ENG
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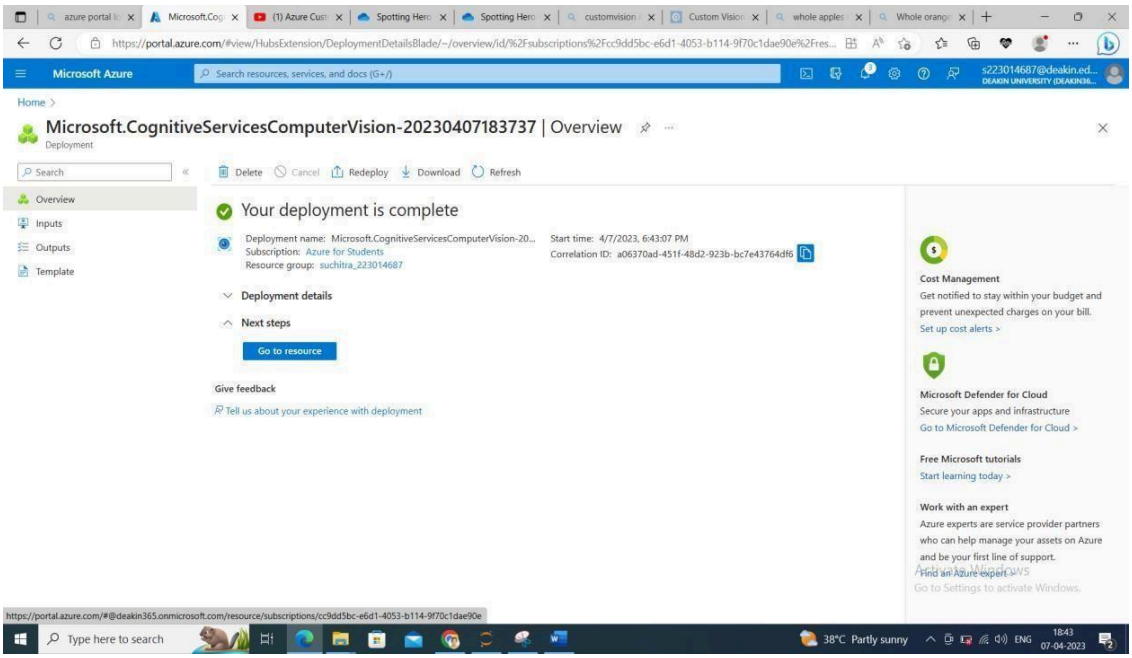
https://portal.azure.com/#view/HubsExtension/DeploymentDetailsBlade/~/overview/id/%2Fsubscriptions%2Fcc9dd5bc-e6d1-4053-b114-9f70c1dae90e%2Fres...
Microsoft Azure
Search resources, services, and docs (G+/)
s223014687@deakin.ed...
DEAKIN UNIVERSITY (DEAKIN36...
Home >
Microsoft.CognitiveServicesComputerVision-20230407183737 | Overview
Deployment
Search
Overview
Inputs
Outputs
Template
Delete Cancel Redeploy Download Refresh
Your deployment is complete
Deployment name: Microsoft.CognitiveServicesComputerVision-20...
Subscription: Azure for Students
Resource group: suchitra_223014687
Start time: 4/7/2023, 6:43:07 PM
Correlation ID: a06370ad-451f-48d2-923b-bc7e43764df6
Deployment details
Next steps
Go to resource
Give feedback
Tell us about your experience with deployment
Cost Management
Get notified to stay within your budget and prevent unexpected charges on your bill.
Set up cost alerts >
Microsoft Defender for Cloud
Secure your apps and infrastructure
Go to Microsoft Defender for Cloud >
Free Microsoft tutorials
Start learning today >
Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
Find an Azure expert >
Activate Windows
Go to Settings to activate Windows.
https://portal.azure.com/#@deakin365.onmicrosoft.com/resource/subscriptions/cc9dd5bc-e6d1-4053-b114-9f70c1dae90e
Type here to search
38°C Partly sunny
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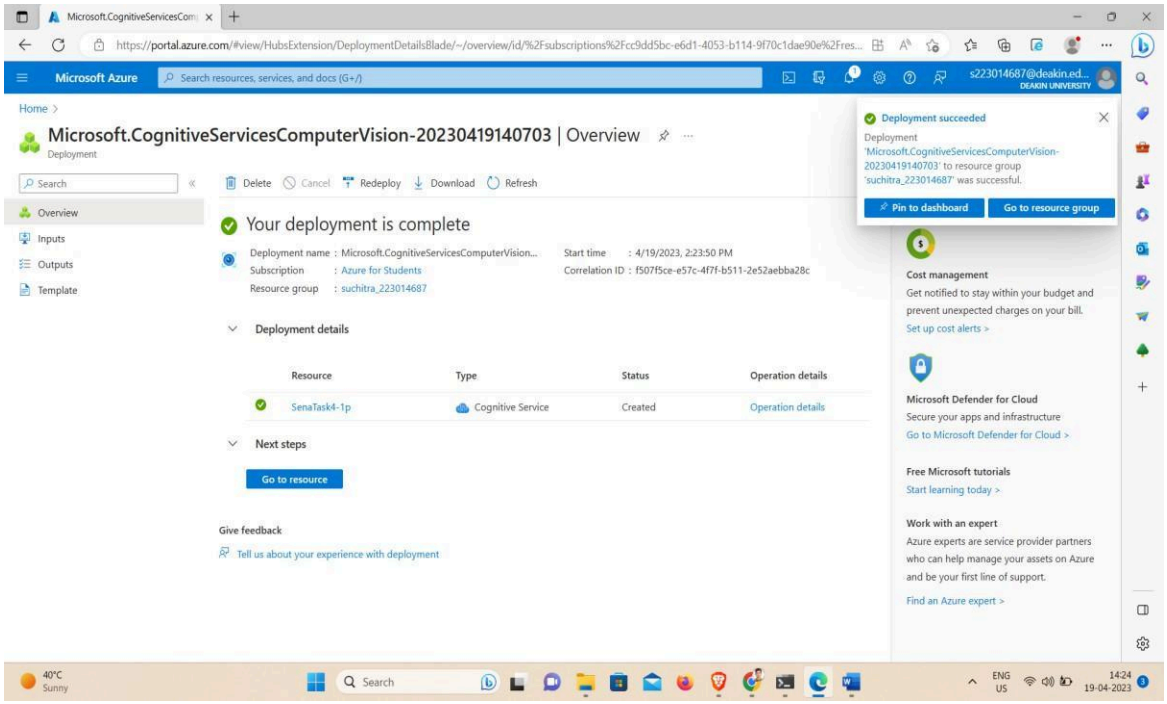
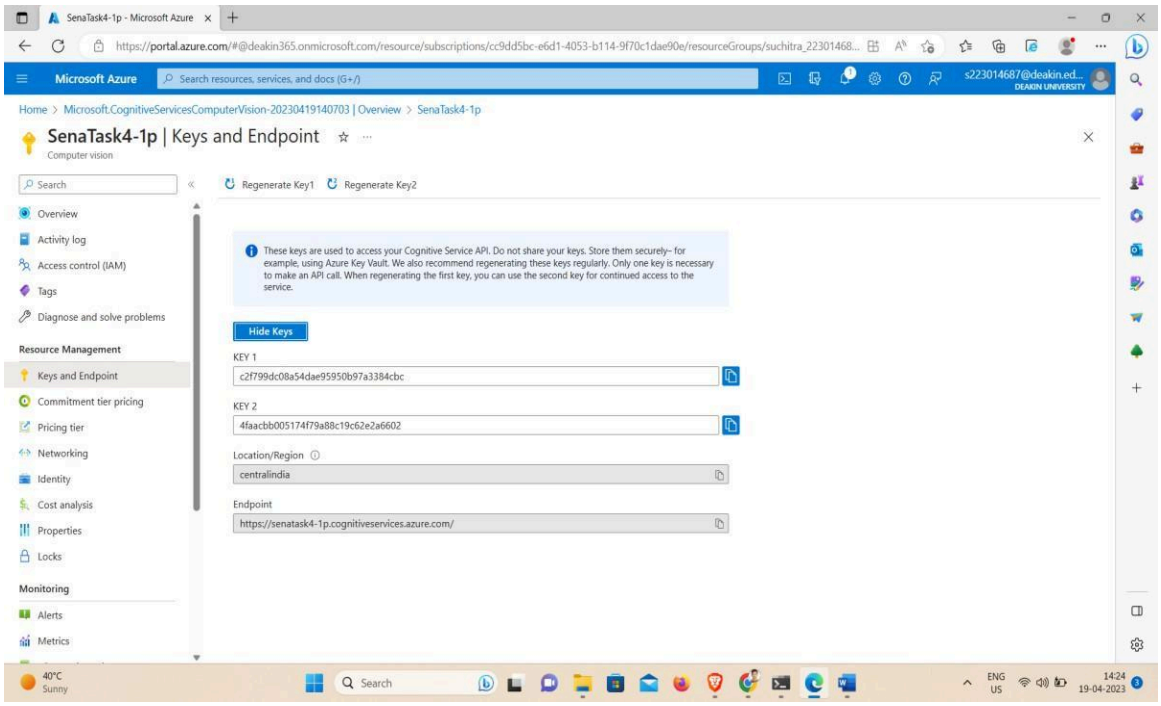


Created SenaTask4-1 resource and see for the keys and Endpoint [1].



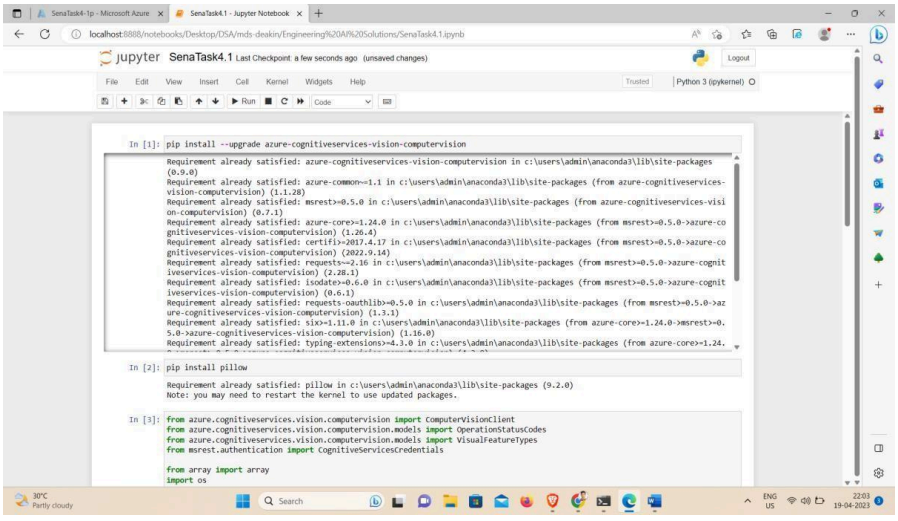
Step 4: Capture the Local Image

The input image is available at https://www.colourbox.com/image/handsome-man-standing-near-his-new-car-image-2639638, which is the InputURL for detecting objects [2].

Step 5: Object Detection for the Above Image

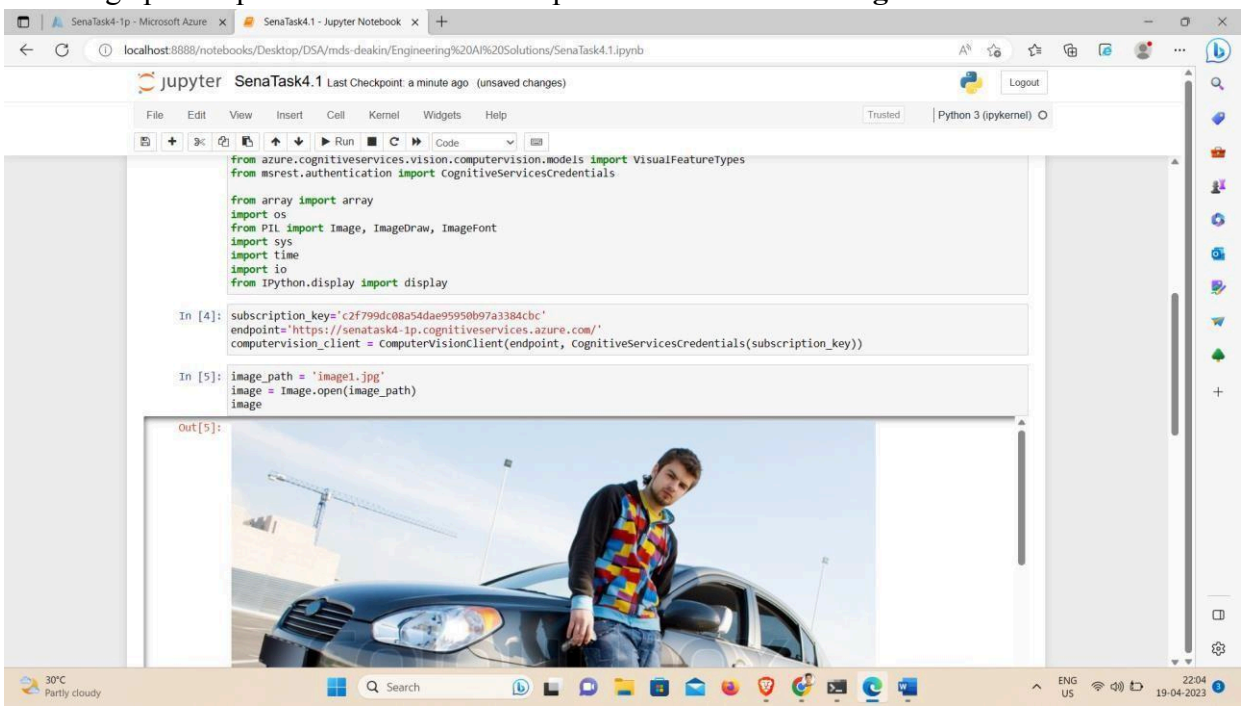
The Python Code in Jupyter Notebook is attached.

1. Firstly, installed necessary packages – azure-cognitiveservices-vision-computervision, pillow and imported necessary libraries [3].



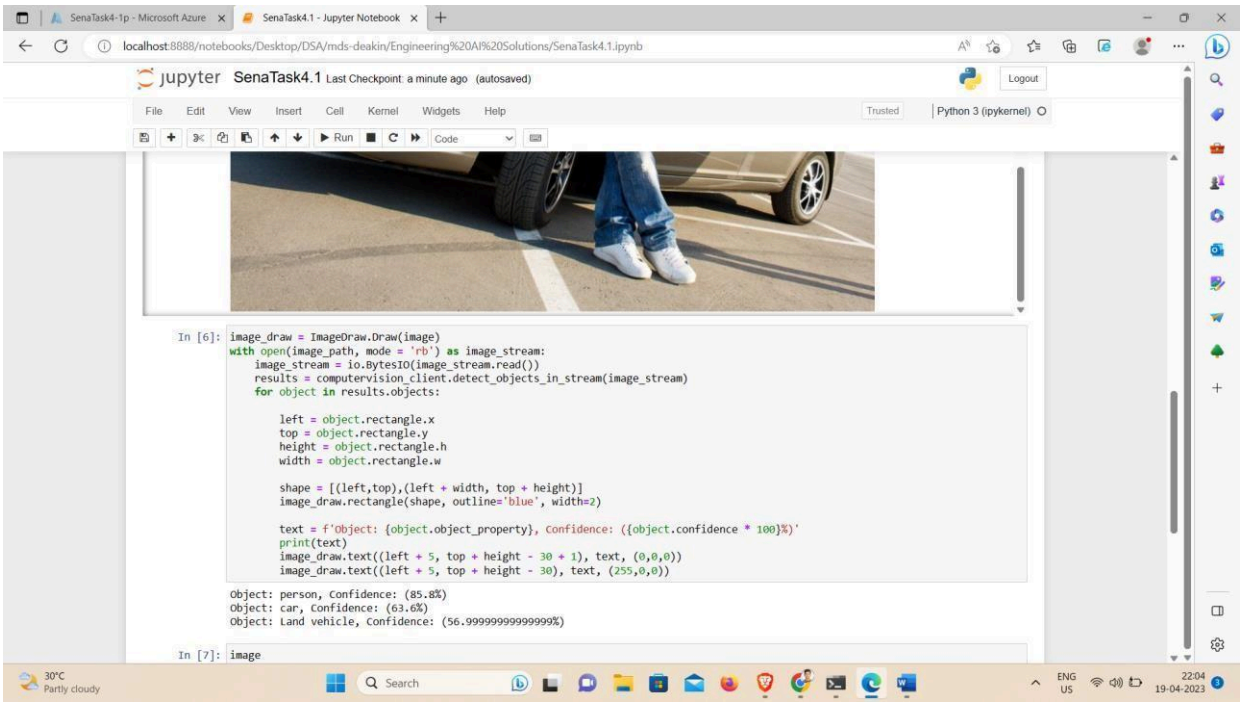
Opening the image which is saved as ‘image1.jpg’ and displaying it as output.

The image path is provided which is then opened and stored in '**image**' variable.



2. Code to get the detected Images along with Bounding Boxes and Confidence Probability

- The ImageDraw Library is used to draw the image. The file is read from the image path and the image is converted to stream using BytesIO, which is stored in image_stream variable [4].
- **detect_objects_in_stream** method is used for detecting objects in this stream, which is stored in **results** variable.
- For loop is used to iterate on the objects detected in results variable, to get the object property, object confidence and object bounding box which are printed as text.
- The bounding box parameters -left, top, height and width are adjusted on the draw image using **image_draw.text()** [4].

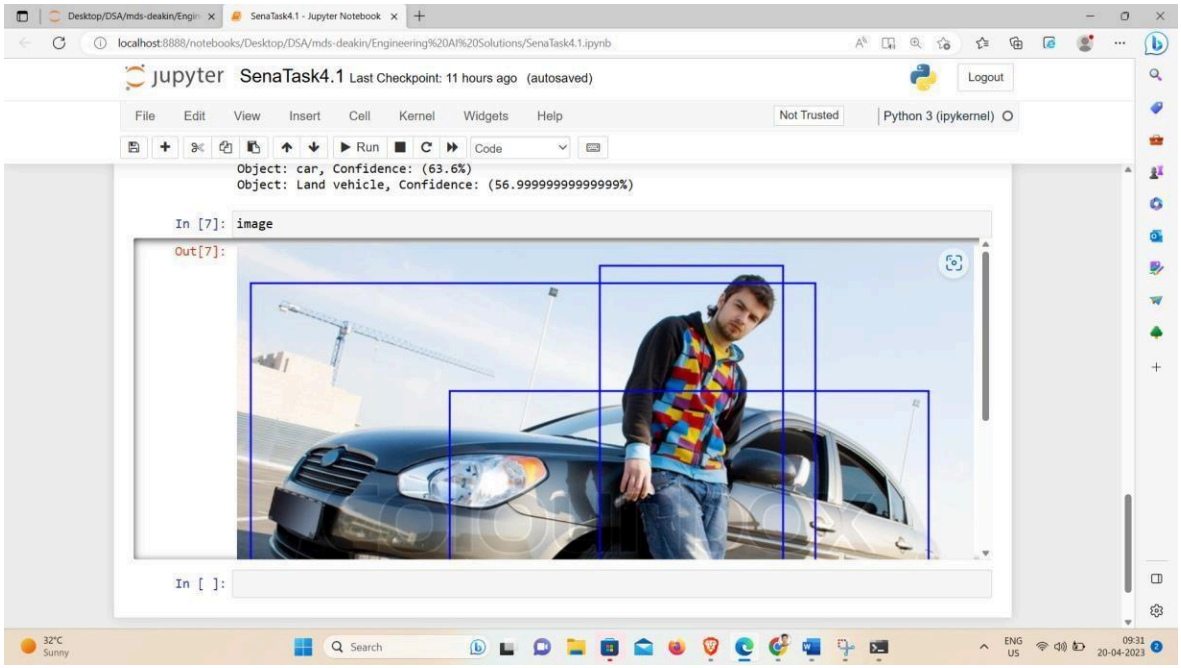


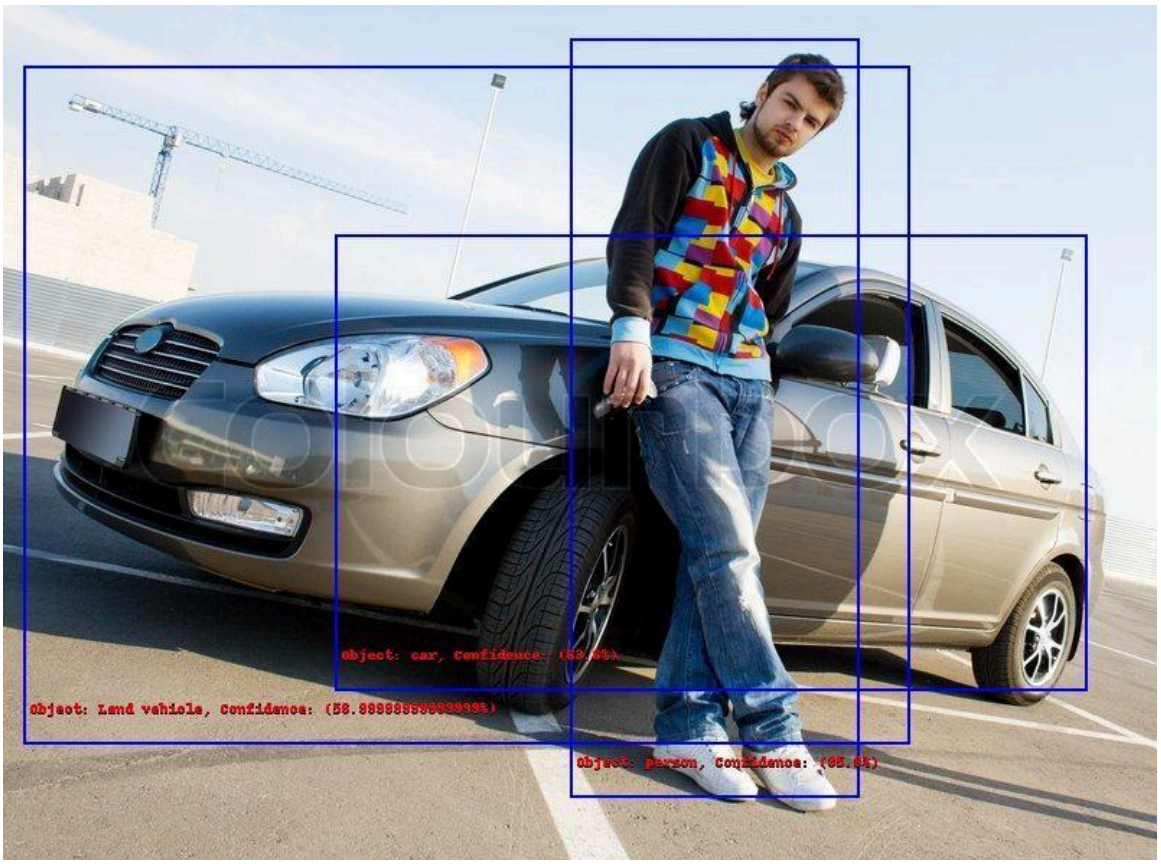
3. Output:

The detected objects are:

```
Object: person, Confidence: (85.8%) Object:
car, Confidence: (63.6%)
Object: Land vehicle, Confidence: (56.999999999999999%)
```

The output image along with detected objects, confidence and Bounding box probabilities are shown below.





References:

[1] George Dolgikh. '*Handsome man standing near his new car. Colourbox'* https://www.colourbox.com/image/handsome-man-standing-near-his-new-car-image-2639677

[2] Azure SDK for Python (2.0.0) *Azure Cognitive Services Computer Vision SDK for Python* Computer Vision SDK Documentation https://azuresdkdocs.blob.core.windows.net/$web/python/azure-cognitiveservices-vision-computervision/0.7.0/index.html#more-sample-code

[3] CloudCasts - Alan Smith (2022) 'Azure Computer Vision using Python', [video], YouTube, accessed 19-April-2023.