# **DPS920/CVI620 – Lab 7**

# **MS Azure Computer Vision Services**

| Total Mark: | 10 marks (3% of the total course grade)   * 6 out of 10: Learn@Seneca submission (Due: Wednesday November 1st end of day) * 4 out of 10: Lab demo (Due: During Lab of week 8) |
| --- | --- |
| Submission file(s): | * Lab07.docx |

Please work in **groups** to complete this lab. This lab is worth 3% of the total course grade and will be evaluated through your written submission, as well as the lab demo. During the lab demo, group members are *randomly* selected to explain the submitted solution. Group members who are not present during the lab demo will lose the demo mark.

Please submit the submission file(s) through Learn@Seneca. ALL team members must submit the final work.

***Please paste the resulting images and answers in this document.***

## **Part I: Azure Computer Vision Services**

1. If you do not already have an MS Azure account, sign up with your **Seneca Email** here:

[Azure for Students – Free Account Credit | Microsoft Azure](https://azure.microsoft.com/en-us/free/students/)

1. Choose two of the following services (preferably those relevant to your project) to work on.

* Option A: **Analyze images with Azure Computer Vision Service**

<https://docs.microsoft.com/en-us/learn/modules/analyze-images-computer-vision/>

A screenshot of a computer

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A screenshot of a computer

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A screenshot of a computer

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A screenshot of a computer screen

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A person holding a shopping basket

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A screenshot of a computer

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1. What did you learn from this assignment?

From this assignment, I learned how to utilize Azure Computer Vision Service to analyze images. Azure Computer Vision is a cloud-based service that provides advanced algorithms to process and analyze images and return information. Through the module, I got a hands-on experience in understanding the various features provided by the service, such as extracting information about visual features, detecting objects, reading printed and handwritten text, and more. Additionally, I learned about the capabilities and limitations of this AI service, and how to effectively integrate it into applications to enhance their functionalities.

2. Give examples of applications where this service can be used.

- Retail: Businesses can use it to recognize and classify products on shelves for inventory management.

- Healthcare: Analyze medical imagery to assist doctors in diagnosing diseases.

- Automotive: Recognize and classify vehicle types for smart parking solutions.

- Smart Cities: Monitor public areas for safety, cleanliness, or maintenance requirements.

- Finance: Process and analyze handwritten forms and checks.

- Education: Assist visually impaired students by reading out loud the text from images or handwritten notes.

3. In these applications, what type of hardware is needed? What about data?

- Hardware:

- For capturing images or videos: Cameras with decent resolution and clarity. This can range from standard webcams to more advanced DSLR or surveillance cameras depending on the application.

- Connectivity: Devices with internet connectivity capabilities to communicate with the Azure cloud service. This might include computers, smartphones, or IoT devices.

- Storage: Especially for applications that require saving or archiving images for future reference.

- Data:

- A collection of images or videos to be analyzed.

- In some cases, labeled data might be required for training custom models or for improving accuracy in certain domain-specific applications.

- Adequate bandwidth to upload images to the Azure service, especially for real-time applications.

4. How can the service be improved?

- Accuracy: While the service is already advanced, there's always room for improvements in accuracy, especially in complex scenarios or with low-quality images.

- Customization: Providing more tools or options for users to train the model on domain-specific data to improve accuracy for niche applications.

- Localization: Enhancing language support, especially for reading text from images in languages that might not be widely spoken.

* Option C: **Detect objects in images with the Custom Vision service**

<https://docs.microsoft.com/en-us/learn/modules/detect-objects-images-custom-vision/>

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A screenshot of a computer

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A person helping a child ride a bike

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A person teaching a child to ride a bike

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A blue screen with white text

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A group of people crossing a street

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A screenshot of a computer program

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* + What did you learn from this assignment?

From this assignment I learned how to use Microsoft Azure Custom Vision service for object detection. First of all, I needed to create an Azure AI services multi-service account, then to create a project within Custom Vision. Then upload images and label objects which we are trying to detect. Once everything is labeled, I trained a model and tested it on one image. Then I published it and got a published model URL, which I used in simple command line application running in Azure Cloud. The application returned the object it detected, probability and coordinates.

I learned that Microsoft Azure provides a very convenient way to create an object detection application from start to finish.

* + Give examples of applications where this service can be used.

Detecting pedestrians and cyclists in images can be used in a variety of applications. For example, it enables self-driving cars to navigate urban environments while avoiding collisions. In smart city infrastructure, such systems can enhance traffic management and reduce accidents at intersections by providing real-time data to control traffic signals and alert drivers to the presence of vulnerable road users. Additionally, in the field of surveillance and security, image-based detection of pedestrians and cyclists can be used to monitor public spaces, enhancing public safety by identifying potential threats or tracking the movements of individuals.

* + In these applications, what type of hardware is needed? What about data?

For these kinds of applications cameras for capturing images and videos are essential. Also, computing resources for training resources are required. They can be cloud based for smart city solutions and should be onboard for autonomous vehicles.

To train a model we need a substantial amount of labeled data, preferably from different angles and in different backgrounds and lightning conditions.

* + How can the service be improved?

The service can be improved by refining and updating the underlying machine learning and computer vision algorithms, collecting more diverse, high-quality training and validation data to ensure the model is capable of handling a wide range of scenarios, including different weather, lighting conditions, and locations. Adaptive learning can be implemented to allow the system to continually learn and adapt to changing conditions and environments.

## **Part II: Group work**

1. Complete this declaration by adding your names:

We, group 5, Liliya Panfilova and Davender Singh, declare that the attached assignment is our own work in accordance with the Seneca Academic Policy. We have not copied any part of this assignment, manually or electronically, from any other source including web sites, unless specified as references. We have not distributed our work to other students.

1. Specify what each member has done towards the completion of this work:

|  | Name | Task(s) |
| --- | --- | --- |
| 1 | Liliya Panfilova | Option C: Detect objects in images with the Custom Vision service |
| 2 | Davender Singh | Option A: Analyze images with Azure Computer Vision Service |
| 3 |  |  |