

**School of Computer Sciences**

**Semester 2, Academic Year 2022/2023**

**CDS521:** **Multimodal Information Retrieval**

**Assignment 1**

**G6: Roundabout, intersection, crosswalk, flyover (overpass)**

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# Python Code for Image Resizing

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| import os  from PIL import Image  for root, dirs, files in os.walk(top=r".", topdown=True):      if "resized" not in root:          for file in files:              if file.endswith(".png") or file.endswith(".jpg"):                  img = Image.open(os.path.join(root,file))                  width, height = img.size                  if width == height:                      left  = 0                      upper = 0                      right = width                      lower = height                  elif width > height:                      left  = round((width-height)/2)                      upper = 0                      right = round(((width-height)/2)+height)                      lower = height                  elif width < height:                      left  = 0                      upper = round((height-width)/2)                      right = width                      lower = round(((height-width)/2)+width)                  img\_cropped = img.crop(box=(left, upper, right, lower))                  img\_resized = img\_cropped.resize((224,224))                  if os.path.exists(rf"{root}\resized"):                      pass                  else:                      os.mkdir(rf"{root}\resized")                  print(rf"{root}\resized\{file}")                  img\_resized.save(rf"{root}\resized\{file}") |

The image resizing process is realized using python. Two python libraries are used, namely os and pillow (PIL).

os.walk function is used to obtain the paths of all the files in the working directory. For each of the files, the code will check whether the name “resized” exists in the root directory of the image. If the name “resized” is not in the path, the file will be used for subsequent processes.

The code will then reiterate for all the files in the root directory. If the file name ends with either .jpg or .png, which indicates image file format, the open function from pillow Image class will be used to open the image file and the size (width and height) of image will be obtained.

The images might not be perfectly square before resizing. In order to prevent distortion of images, the images will be cropped into a perfect square. This is realized through checking the aspect ratio of the images. If the image width and height are equal, no cropping action will be performed. If the width is greater than the height, the left and right sides of the image will be cropped, and a perfect square image is returned. If the width is less than the height, the top and bottom part of the image will be cropped and return a square image.

The cropped images will then be resized to a resolution of 224×224. The algorithm will then check whether the folder “resized” exists in the root directory using the function os.path.exists. If the path is not found, the directory will be created using the function os.mkdir.

The cropped image is then stored in the new “cropped” directory, and the process will repeat itself until all the images have been cropped.

# Folder Structure

The submission folder consists of eight folders, namely roundabout, roundabout\_resize, intersection, intersection\_resize, crosswalk, crosswalk\_resize, flyover, and flyover\_resize. Each folder will have two subfolders, namely “downloaded” for downloaded photos and “new” for new photos. Crosswalk and crosswalk\_resize does not have downloaded photos as it is not available explicitly from the source.

File name of images obtained from Mendeley data website located in “downloaded” folders starts with its class label, followed by underscore, its five-digit index number, and file format. For instance, intersection\_01234.png.

As for the images obtained from Malaysia located in “new” folders, the file name starts with malaysia, followed by underscore, its class label, underscore, its 3-digit index number and file format. For instance, malaysia\_intersection\_012.png.

Table 1 summarizes the number if images collected for each class, while Figure 1 illustrates the folder structure of the submission file.

Table : Number of images collected for each class.

|  |  |  |
| --- | --- | --- |
| **Images** | **Downloaded** | **New** |
| Roundabout | 2040 | 100 |
| Intersection | 2498 | 101 |
| Crosswalk | Not available | 242 |
| Overpass | 2500 | 135 |

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| --- |
| CDS521\_Assignment1\_G6.zip  |-CDS521\_Assignment1\_G6.pdf  |-crosswalk  | |-new  | |-malaysia\_crosswalk\_001.png  | |-malaysia\_crosswalk\_002.png  | |-...  |-crosswalk\_resize  | |-new  | |-malaysia\_crosswalk\_001.png  | |-malaysia\_crosswalk\_002.png  | |-...  |-intersection  | |-downloaded  | | |-intersection\_0001.jpg  | | |-intersection\_0002.jpg  | | |-...  | |-new  | |-malaysia\_intersection\_001.png  | |-malaysia\_intersection\_002.png  | |-...  |-intersection\_resize  | |-downloaded  | | |-intersection\_0001.jpg  | | |-intersection\_0002.jpg  | | |-...  | |-new  | |-malaysia\_intersection\_001.png  | |-malaysia\_intersection\_002.png  | |-...  |-overpass  | |-downloaded  | | |-overpass\_0001.jpg  | | |-overpass\_0002.jpg  | | |-...  | |-new  | |-malaysia\_overpass\_001.png  | |-malaysia\_overpass\_002.png  | |-...  |-overpass\_resize  | |-downloaded  | | |-overpass\_0001.jpg  | | |-overpass\_0002.jpg  | | |-...  | |-new  | |-malaysia\_overpass\_001.png  | |-malaysia\_overpass\_002.png  | |-...  |-roundabout  | |-downloaded  | | |-roundabout\_0001.jpg  | | |-roundabout\_0002.jpg  | | |-...  | |-new  | |-malaysia\_roundabout\_001.png  | |-malaysia\_roundabout\_002.png  | |-...  |-roundabout\_resize  |-downloaded  | |-roundabout\_0001.jpg  | |-roundabout\_0002.jpg  | |-...  |-new  |-malaysia\_roundabout\_001.png  |-malaysia\_roundabout\_002.png  |-... |

Figure : Folder structure of submission file

# Contributions

Table : Members contribution list

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| --- | --- |
| **Images** | **Contributors** |
| Roundabout | Gan Zhong Li, Wendy Tan Hway Shin |
| Intersection | Looi Kah Fung, Ubaid Mohamed Dahir |
| Crosswalk | Al-Shammari Sura Abdulateef Hadi, Chasith Somsak, Deenesha Murugun, Gan Zhong Li, Looi Kah Fung, Wendy Tan Hway Shin, Ubaid Mohamed Dahir, Usman Salisu Nguru |
| Flyover (overpass) | Al-Shammari Sura Abdulateef Hadi, Chasith Somsak, Deenesha Murugun |

# Application of Collected Images

The images obtained can be used to train machine learning models, specifically deep learning models for the identification of various features on the arial images taken from cities, specifically roundabout, intersection, crosswalk and flyover.