ECE/CS/ME 539 - Fall 2024 — Activity 25

Objective:

To critically assess the appropriateness of various image augmentation techniques for different computer vision tasks, especially focusing on scenarios where certain augmentations may not be valid.

Instructions: Complete the provided table by marking each augmentation technique as appropriate (\checkmark) or not appropriate (\times) for each image task.

Image Tasks:

1. Determining Image Orientation:

• Identify whether images are correctly oriented or upside down.

2. Arrow Direction Detection:

• Recognize the pointing direction (e.g., left, right, up, down) of arrows in images.

3. Image Cleanliness Classification:

• Classify images as clean (clear) or containing noise/distortions.

4. Object Size Detection:

• Determine if objects in images are large or small relative to the image frame.

5. Handwritten Digit Recognition:

• Classify handwritten digits from 0 to 9.

6. Facial Recognition:

• Identify individuals based on facial features.

7. Medical Tumor Detection:

• Detect the presence of tumors in MRI scans.

8. OCR for Printed Text:

• Convert images of printed text into machine-encoded text.

9. Animal Species Classification:

• Identify animal species in wildlife photographs.

10. Barcode Scanning:

• Read and interpret barcode information from images.

Augmentation Techniques:

• A. Horizontal Flip:

- Flips the image along the vertical axis.

• B. Random Rotation:

- Rotates the image by a random angle within a specified range (e.g., $\pm 30^{\circ}$).

• C. Color Jitter:

- Randomly changes the brightness, contrast, and saturation of the image.

• D. Gaussian Noise Addition:

- Adds random noise to the image based on a Gaussian distribution.

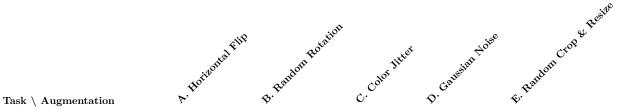
• E. Random Crop and Resize:

- Randomly crops a portion of the image and resizes it back to the original dimensions.

Exercise Table

Fill in the table below by marking each cell with:

- if the augmentation is appropriate for the task.
- \bullet × if the augmentation is not appropriate for the task.



- 1. Determining Image Orientation
- 2. Arrow Direction Detection
- 3. Image Cleanliness Classification
- 4. Object Size Detection
- 5. Handwritten Digit Recognition
- 6. Facial Recognition
- 7. Medical Tumor Detection
- 8. OCR for Printed Text
- 9. Animal Species Classification
- 10. Barcode Scanning