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 (✓) or not appropriate (×) 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.
- × if the augmentation is not appropriate for the task.

Task \ Augmentation	**A. Horizontal Flip**	**B. Random Rotation**	**C. Color Jitter**	**D. Gaussian Noise**	**E. Random Crop & Resize**
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					