Lab-6 Task-1

- Color – HSV (**apply before morph ops**)
- Texture - Gabor, LBP (**apply after morph ops or in place of ED**)
- Hough – Lines
- Hough – Circles
- Note:- take images with shapes like line, circle etc. for hough.
- Tune the hough parameters for best representation.

Lab-6 Task-2

- Epochs-50
- Accuracy
- Precision
- Recall
- F1-Score.
- ROC
- Loss curve
- Note:- take small sample for train and test with no class imbalance.
- Explain the flow of your code.

Region based image segmentation based on color

- Convert your image to a color space that best represents color differences (like HSV),
- define thresholds for the desired colors in that space,
- then use a region growing algorithm to group pixels with similar color values into segmented regions.
- selecting "seed" pixels within the desired color range and iteratively expanding the region by adding neighboring pixels that fall within the color threshold.

Region based image segmentation based on texture

- Typically use a technique called "region growing" where you iteratively expand regions of pixels with similar texture features, gradually merging them into larger segments until the entire image is segmented based on texture variations.
- This can involve calculating texture descriptors like co-occurrence matrices, Gabor filters, or Local Binary Patterns (LBP) for each pixel, then comparing these features to identify neighboring pixels with similar textures to add to the growing region.

Region based image segmentation based on texture

- **Preprocessing:**
  - Convert the image to grayscale if needed.
  - Apply image smoothing (e.g., Gaussian filter) to reduce noise.
- **Feature Extraction:**
- Calculate texture features for each pixel using a chosen method:
  - **Co-occurrence matrices:** Analyze the frequency of pixel intensity combinations in a local neighborhood.
  - **Gabor filters:**
  - **Local Binary Patterns (LBP):**
- **Region Growing Algorithm:**
  - **Seed Selection:**
  - **Region Expansion:**

Region based image segmentation based on texture

- Important considerations:
- **Choosing the right texture feature:** Different texture features are suitable for different types of images.
- **Similarity threshold:** Setting a proper threshold for comparing texture features is crucial to accurately identify similar pixels.
- **Handling complex textures:** For images with intricate textures, advanced techniques like adaptive thresholding or hierarchical segmentation might be required.

Edge detection using "discontinuity" in gray scale and color values

- Grey
  - **Image conversion:**
  - **Applying a derivative operator:** Sobel, Prewitt, or Canny filters
  - **Thresholding:** The calculated gradient values are then compared to a predefined threshold. Pixels with gradient values exceeding the threshold are considered to be edge pixels.
- Color
  - **Channel-wise calculation:**edge detection can be performed on each color channel separately, then combining the results to identify edges based on color changes.
  - **Color space conversion:**converting the image to a different color space like HSV.