UE25CS151A

Department of Computer Science and Engineering

PES University, Bangalore, India

Lecture Notes

Python for Computational Problem Solving - UE25CS151A

Lecture 71

Introduction to PyImage (PIL)

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1. Introduction to PIL (Python Imaging Library)

The **Python Imaging Library** (PIL), now maintained as **Pillow**, is used for opening, manipulating, and saving **image files** in many formats. Pillow makes image processing simple and efficient — ideal for basic tasks like resizing, cropping, rotating, and applying filters.

- To install Pillow:

```
pip install pillow
```

2. Importing and Loading an Image

You can open an image using the Image class from the PIL module.

```
from PIL import Image
# Load an image
img = Image.open("PES LOGO.jpg")
# Display image
img.show()
```

Output:

Common formats supported: JPEG, PNG, BMP, GIF, TIFF, etc.

3. Checking Basic Image Information:

print(img.format) # e.g., JPEG
print(img.size) # (width, height)
print(img.mode) # e.g., or L (grayscale)

```
Size: (92, 150)
Format: PNG
Mode: RGBA
```

4. Resizing Images

Resize using the resize() method.

```
resized_img = img.resize((200, 200))
resized_img.show()
```

resize() returns a **new** image object. It does *not* change the original image. You must save this new object to a new variable.

Warning: Using .resize() this way can **squash or stretch** your image if the new dimensions don't match the original aspect ratio.

To maintain aspect ratio, use thumbnail():

```
img.thumbnail((200, 200))
img.show()
```

It modifies the image "in-place" (doesn't return a new one) and won't go *over* the size you set.

5. Converting Image Modes

```
gray_img = img.convert("L")
gray_img.show()
```

Common Image Modes in Python (PIL / Pillow)

- **"1" Mode:**
  - 1-bit per pixel
  - Used for **true black and white images** (no gray shades)
- **"L" Mode:**
  - 8-bit grayscale
  - Each pixel represents a shade of gray (0 = black, 255 = white)
- **"RGB" Mode:**
  - 8-bit × 3 channels — **Red, Green, Blue**
  - Standard mode for **color images**
- **"RGBA" Mode:**
  - 8-bit × 4 channels — **Red, Green, Blue, Alpha**
  - Similar to RGB but includes an **Alpha (transparency)** channel
- **"CMYK" Mode:**
  - 8-bit × 4 channels — **Cyan, Magenta, Yellow, Black**
  - Commonly used for **printing and publishing**

6. Saving Images

```
gray_img.save("output_image.png")
print("Image saved successfully!")
```

7. Rotating and Cropping

Rotate:

```
rotated_img = img.rotate(45)
rotated_img.show()
```

Crop: Image.crop(left, upper, right, lower) pixel coordinates

```
cropped_img = img.crop((50, 50, 200, 200))
cropped_img.show()
```

8. Summary

Pillow (PIL) helps perform simple image processing easily.

Key functions: Image.open(), Image.show(), Image.save(), resize(), convert(), rotate(), crop(). Use cases: resizing photos, grayscale conversion