1. Open, Save, Create Images

Open Image

```
img = Image.open("image.jpg")
```

Save Image

```
img.save("out.png")
```

```
img.save("out.jpg", quality=95, optimize=True)
```

Create New Image

```
img = Image.new("RGB", (640, 480), (255, 255, 255))
```

---

2. Image Attributes

```
img.size      # (width, height)
```

```
img.mode      # "RGB", "RGBA", "L", "P"
```

```
img.format    # "JPEG", "PNG"
```

```
img.info      # metadata dict
```

---

3. Resize, Crop, Rotate, Flip

Resize

```
img = img.resize((300, 300))
```

```
img = img.resize((300, 300), Image.LANCZOS)
```

Thumbnail (keeps aspect ratio)

```
img.thumbnail((300, 300))
```

Crop

```
img = img.crop((left, top, right, bottom))
```

Rotate

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

```
img = img.rotate(45, expand=True)
```

Flip / Mirror

```
img = img.transpose(Image.FLIP_LEFT_RIGHT)
```

```
img = img.transpose(Image.FLIP_TOP_BOTTOM)
```

---

4. Color Modes & Conversion

Common Modes

Mode	Meaning
"RGB"	Color image
"RGBA"	RGB + Alpha
"L"	Grayscale
"P"	Palette

Convert Mode

img_gray = img.convert("L")

img_rgba = img.convert("RGBA")

---

5. Drawing (Shapes, Text)

draw = ImageDraw.Draw(img)

Draw Shapes

draw.line((0, 0, 100, 100), fill="red", width=3)

draw.rectangle((10, 10, 100, 100), outline="blue", width=2)

draw.ellipse((50, 50, 150, 150), fill="green")

Draw Text

font = ImageFont.truetype("arial.ttf", 24)

draw.text((10, 10), "Hello", fill="white", font=font)

---

6. Fonts

Default Font

font = ImageFont.load_default()

TrueType Font

font = ImageFont.truetype("arial.ttf", size=32)

---

7. Filters & Effects

Built-in Filters

```
img_blur = img.filter(ImageFilter.BLUR)
```

```
img_sharp = img.filter(ImageFilter.SHARPEN)
```

```
img_edge = img.filter(ImageFilter.FIND_EDGES)
```

Gaussian Blur

```
img = img.filter(ImageFilter.GaussianBlur(radius=2))
```

---

8. Image Enhancements

```
enhancer = ImageEnhance.Brightness(img)
```

```
img = enhancer.enhance(1.5)
```

Enhancement Class	
Brightness	ImageEnhance.Brightness
Contrast	ImageEnhance.Contrast
Color	ImageEnhance.Color
Sharpness	ImageEnhance.Sharpness

---

9. ImageOps (Very Common!)

```
from PIL import ImageOps
```

Invert / Grayscale / Autocontrast

```
img = ImageOps.invert(img)
```

```
img = ImageOps.grayscale(img)
```

```
img = ImageOps.autocontrast(img)
```

Mirror / Flip

```
img = ImageOps.mirror(img)
```

```
img = ImageOps.flip(img)
```

Expand (Add Border)

```
img = ImageOps.expand(img, border=10, fill="black")
```

---

10. Transparency & Alpha

Add Alpha Channel

img = img.convert("RGBA")

Change Alpha

r, g, b, a = img.split()

a = a.point(lambda x: x * 0.5)

img = Image.merge("RGBA", (r, g, b, a))

---

11. Paste & Composite

Paste Image

img.paste(overlay, (50, 50))

Paste with Mask (Transparency)

img.paste(overlay, (50, 50), overlay)

Alpha Composite

img = Image.alpha_composite(bg, fg)

---

12. Image + NumPy (VERY Common)

PIL → NumPy

np_img = np.array(img)

NumPy → PIL

img = Image.fromarray(np_img)

---

13. Pixel Access (Avoid for Large Images)

pixel = img.getpixel((x, y))

img.putpixel((x, y), (255, 0, 0))

---

14. EXIF & Metadata

Read EXIF

exif = img.getexif()

Auto Rotate by EXIF

img = ImageOps.exif_transpose(img)

---

15. Show Image (Debug)

img.show()

---

16. Common Patterns

Load → Resize → Save

Image.open("in.jpg").resize((256,256)).save("out.jpg")

Add Text Watermark

draw = ImageDraw.Draw(img)

draw.text((img.width-150, img.height-40), "© Me", fill=(255,255,255,128))

Convert to Grayscale

img = Image.open("in.jpg").convert("L")

---

17. Performance Tips ⚡

- ✅ Use .thumbnail() for previews
- ✅ Avoid getpixel() loops
- ✅ Convert once, not repeatedly
- ✅ Use NumPy for heavy operations

TL;DR – Most Used Functions

Image.open()

Image.save()

Image.resize()

Image.crop()

Image.rotate()

Image.convert()

ImageDraw.Draw()

ImageFont.truetype()

ImageFilter.GaussianBlur()

ImageOps.autocontrast()

Image.fromarray()

np.array(img)

If you want next:

- 📌 **Advanced Pillow (masks, compositing, blending)**
- 📌 **Image pipelines (Pillow → NumPy → OpenCV → Torch)**
- 📌 **Pillow vs OpenCV function mapping**
- 📌 **Real-world examples (watermarking, thumbnails, dataset prep)**

Just say the word 🚀