CMT107 Visual Computing

Image Processing in Java

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- Images in Java

- Read (Load) an image

- Draw an image

- Process an image

- Write (Save) an image

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Images in Java

- An image is typically a rectangular two-dimensional array of pixels
  - Each pixel represents the colour at that position
  - Dimensions represents the horizontal extent (width) and vertical extent (height) as it is displayed.
- Most important image class in Java 2D API
  - java.awt.image.BufferedImage
- Image programming tasks:
  - Load an external image file
  - Draw an image onto a drawing surface
  - Manipulate the pixels of an image
  - Save the contents of an image to an external image file

- Use javax.imageio package

```
BufferedImage img = null;
try {
    img = ImageIO.read(new File("Daffodil.jpg"));
} catch (IOException e) {
}
```

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- Use Graphics function

    boolean Graphics.drawImage(Image img, int x, int y,
                            ImageObserver observer);

- Example

    public void paint(Graphics g) {

        g.drawImage(img, 0, 0, null);
    }

- The width and height of an image can be obtained by

  width = img.getWidth();

  height = img.getHeight();

- The pixel colour at (x,y) can be retrieved and set by

  Color pixel = new Color(img.getRGB(x, y));

  img.setRGB(x, y, pixel.getRGB());

- Example: convert a colour image to a grayscale image

```
for (int y = 0; y < height; y++){

    for (int x = 0; x < width; x++) {

        Color pixel = new Color(img.getRGB(x, y));

        int r = pixel.getRed();

        int g = pixel.getGreen();

        int b = pixel.getBlue();

        r = g = b = (int) (0.299*r + 0.587*g + 0.114*b); //grayscale

        img_out.setRGB(x, y, (new Color(r, g, b)).getRGB());

    }

}
```

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• Use javax.imageio package

```
try {

        ImageIO.write(img_out, "jpg", new File("DaffodilG.jpg"));

} catch (IOException ex) {

}
```

- What is an image?

- What is a pixel?

- How to load and save an image?

- How to draw an image?

- How to access and set the pixels of an image?