Overview/Questions

- Review: python, functions, the definite loop
- Review: images and pixels
- Computing with images: overlay example
- Making decisions in python
- Computing with images: red-eye reduction
Review: The Definite Loop

The definite loop has the general form:
for <var> in <sequence>:
    <body>

The variable after the keyword for is called the loop index. It will assume each successive value in <sequence>, and will perform the <body> statements for each value.

Example: Image Overlay

An image overlay function...

```python
# function to overlay pic1 on top of pic2
def overlay(pic1, pic2):
    for pixel in pic1.getPixels():
        # get this pixel's location:
        x = getX(pixel)
        y = getY(pixel)

        # get this pixel's color:
        color = getColor(pixel)

        # find the pixel at the same location in pic2
target = getPixelAt(pic2, x, y)
        # set that pixels's color
        setColor(target, color)
    repaint(pic2)
```
Problem: Red-Eye

What causes red-eye in a picture?
How could we correct for red-eye?

Flow of Control

Sequential Execution
Each instruction is executed in order they are written (after the previous one, before the next one).

Functions
Enable procedural decomposition.
Repeat statements by calling functions multiple times.
Flow of Control

Repetition
The definite loop allows statements to be repeated some fixed number of times.

Selection
Some statements are executed while others are not.

if statement
A structure which evaluates a logical expression, and controls a block of statements.

```plaintext
# general form:
if <expr>:
    <body>  # execute when <expr> evaluates to True
```

Python Equality Operators

Equality

==
True if and only if both operands have the same value. Example: 5 == 3

Inequality

!=
True if and only if the operands do not have the same value. Example: 5 != 3

Python Relational Operators

Less than

<
True if and only if LHS operand has a numeric value less than RHS operand. Example: 5 < 3

Greater than

>
True if and only if LHS operand has a numeric value more than RHS operand. Example: 5 > 3
Controlled Block

A set of statements which are “controlled” by a control statement. A controlled block must be indented:

```python
# collect a numeric input
grade = input("Enter a numeric grade (<= 100): ")
# str() is treating the int grade as a string
print "Your grade is a " + str(grade) + "."
if grade > 93:
    print "Outstanding, you earned an A!"
```

else statement

A control statement which is subordinate to a an if statement.

```python
# collect a numeric input
grade = input("Enter a numeric grade (<= 100): ")
# str() is treating the int grade as a string
print "Your grade is a " + str(grade) + "."
if grade > 93:
    print "Outstanding, you earned an A!"
else:
    print "Better luck next time."
Example: Reduce Red-Eye

Examine pixel colors, and reduce overly red pixels.

```python
def reduceRedEye(pic):
    # for each pixel in the image:
    for pixel in pic.getPixels():
        # get the red value
        red = getRed(pixel)
        green = getGreen(pixel)
        blue = getBlue(pixel)

        # if the red value > (green + blue) then set the red value to g+b.
        if red > (green + blue):
            setRed(pixel, green+blue)

    # show the resulting picture (repaint)
    repaint(pic)

    # write the new picture to a file
    path = "~/Users/azs/Desktop/output.jpg"
    writePictureTo(pic, path)
```

How to Save an Image

The function `writePictureTo(picture, path)` will store your work back out to an image (.jpg) file.

```python
# write the new picture to a file
path = "~/Users/azs/Desktop/output.jpg"
writePictureTo(pic, path)
```

* important*
make sure you pass in a valid picture variable and a valid pathname on your computer
- "~/Users/<username>/Desktop/..." on mac
- "C:/code/..." on windows
JES With Help Display

Use Window Layout to get the view you want

This Week’s Lab and HW

In this week’s lab, you will practice using the definite loops with images!

Read the in-program help to find out about the other functions.

Help menu → Picture Functions
What You Learned Today

– Review: python, functions, the definite loop
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Announcements and To Do

– HW06 (Photoshop) due WED 10/20
– Readings:
  • Wong ch 4, pp 102-117 (for Thursday)