Week 12 Lecture:
Python, Sockets, and the Web

Adam Hartz
hz@mit.edu

30 November 2020
What Is a Web Application?

Example: CAT-SOOP: collect and assess online exercises
Written in Python, 2011-now

Based on a program called “the tutor” by Tomás Lozano-Pérez (written in the Scheme dialect of LISP!)

Structurally, CAT-SOOP is a fairly standard web application. What does it do?

- **Receive request from user**
  (show me a page, submit this answer, etc)

- **Find relevant information**
  (page content, user info, history of submissions, etc)

- **Log new information if necessary**, and

- **Send response**
  (typically, HTML to be displayed in the browser)
3) IMAGE FILTERING VIA PER PIXEL TRANSFORMATIONS

As our first task is manipulating images, we will look at an inversion filter, which reflects pixels about the middle gray value (128 becomes 255 white and vice versa). For example, here is a photograph of Adam's cat. On the left side is the original image, and on the right is its inverted version.

Most of the implementation of the inversion filter has been completed for you. It is invoked by calling the method called `inversion()`. No new pieces have been implemented correctly. Your task in this part of the lab is to fix the implementation of the inversion filter.

Before you do that however, let's add a simple test case so that we can test whether our code is working.

Let's start with a 1x1 image that is defined with the following parameters:

- height: 1
- width: 1
- pixels: [128]

Inversion (Python code)

If we were to run this image through a working inversion filter, what would the expected output be? In the box below, enter a Python list representing the expected pixels key in the resulting image (tr,set).

```
[255]
```

If we were to run this image through a working inversion filter, what would the expected output be? In the box below, enter a Python list representing the expected pixels key in the resulting image (tr,set).

```
[255]
```

Let's add a simple test case to the lab's regular tests so that it is run when we execute testing. If you open `test.py` in a text editor, you will see that it is a Python file that makes use of Python's built-in module `unittest`. Unit test the inversion filter by adding a new test case.

```python
class TestInversion(unittest.TestCase):
    def test_inversion(self):
        # Your test code here
```

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have submitted this assignment 0 times.
What Is a Server?
What Is a Server?
Sockets

Sockets allow communication across processes (on the same machine or different machines).

Typically, a server will wait for a client to make a connection on a designated port (a virtual endpoint for a connection).

Once the client connects, the socket allows for communication between the server and the client.

Client and server can each send/receive data via the socket.

Example: yelling echo server.
The Rest of Today

Designing a:

- Web Server
- Web Application Framework
- Web Application