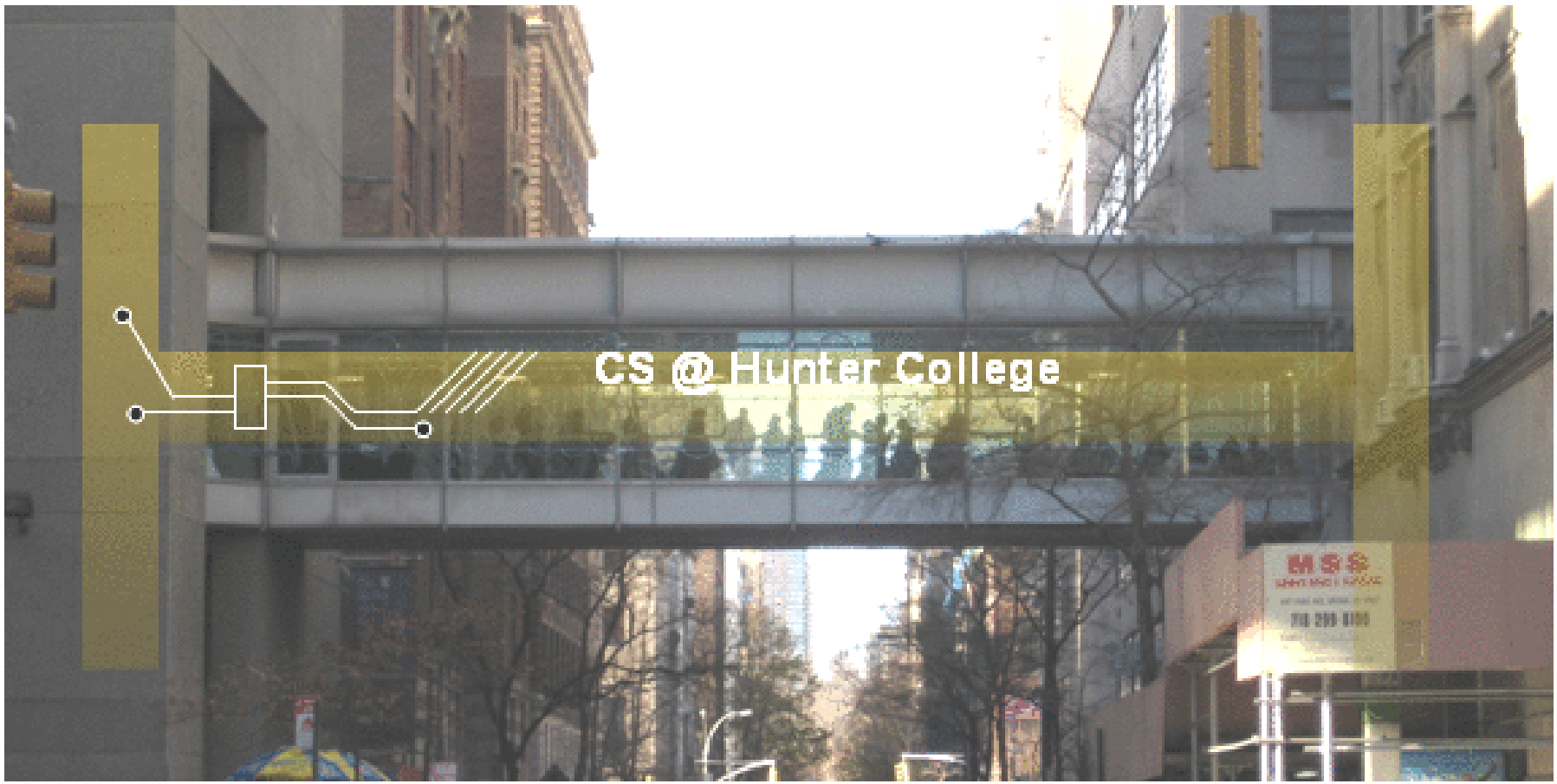
CSci 127: Introduction to Computer Science



hunter.cuny.edu/csci

Announcements

- Welcome back! Lectures are back on a normal schedule until Spring Break.

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- We endL lecture with a survey of computing research and tech in NYC.

  Today: Citi Bike's Bike Angels:
  Collin Waldroch & Carter Wang.

Frequently Asked Questions

From lecture slips & recitation sections.

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- Could you spend more time on problem solving & algorithms?
  Yes! More in upcoming lectures & labs.

Today's Topics

- Recap: Colors
- Indexing and Slicing
- Design Question: Cropping Images
- Decisions

Recap: Colors

Color Name	HEX	Color
Black	#000000	
Navy	#000080	
DarkBlue	#00008B	
MediumBlue	#0000CD	
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- Can specify by name.

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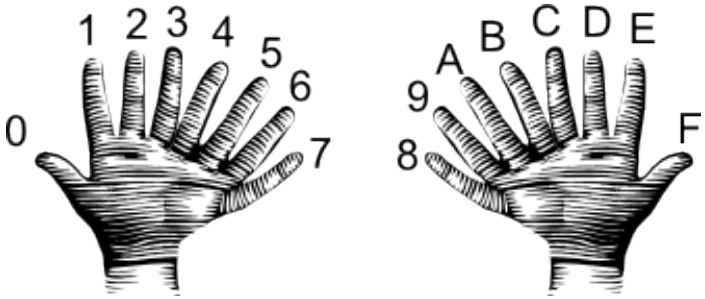
  - Hexcodes (base-16 numbers)...

Recap: Hexadecimal




```
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
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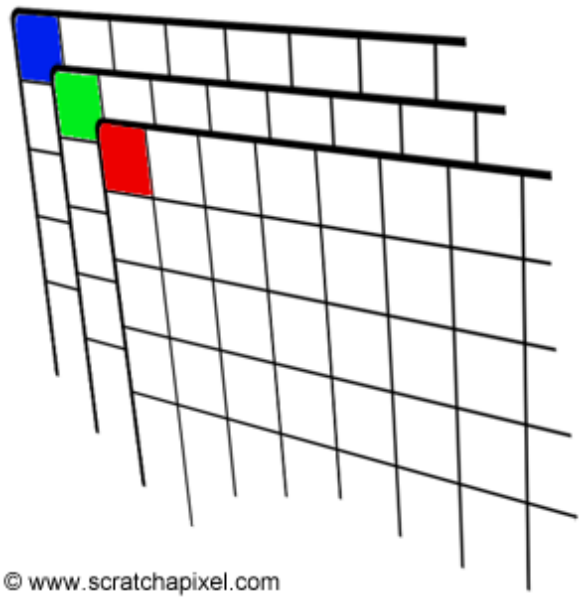

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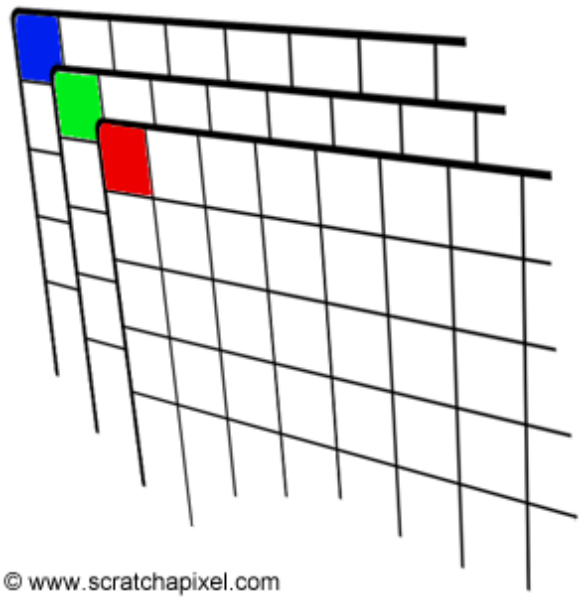
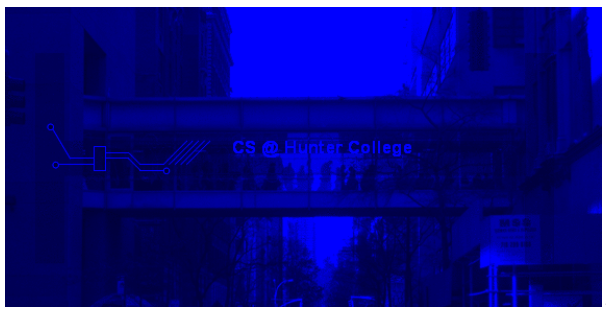


`img[i,j,0]`

`img[i,j,1]`



`img[i,j,2]`

This image has 287 rows, 573 columns, and 4 color channels (for red, green, blue, and a 4th for how transparent).

In Pairs or Triples...

Let's start with loops & slices:

```
word = "Hunter"
for i in range(2,10,3):
    for c in word:
        print(i,c, end = "")
    print()

pali = "a man a plan a canal Panama"
print(pali[0], pali[-1])
print(pali[2:5], pali[-4:-1])

qPop = [152999,284041,469042,1079129,1297634,
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print("Queens population in 1900:", qPop[0])
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Python Tutor

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(Demo with pythonTutor)

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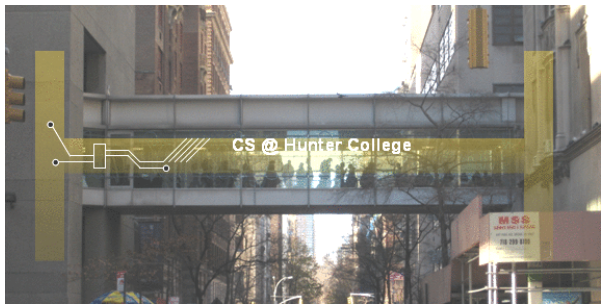

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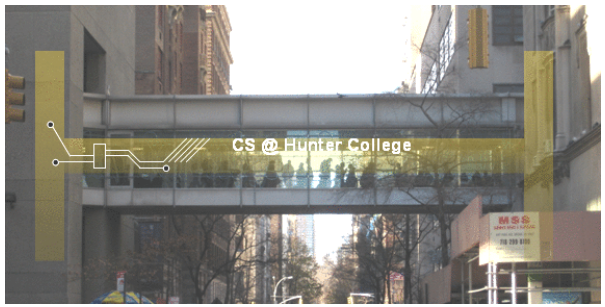

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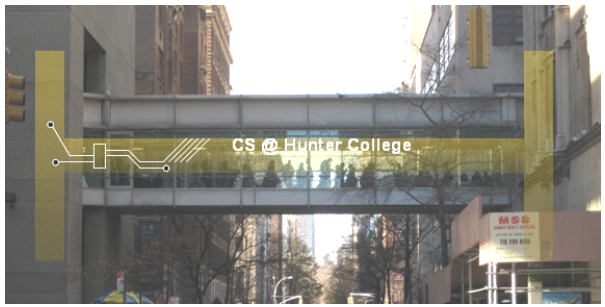

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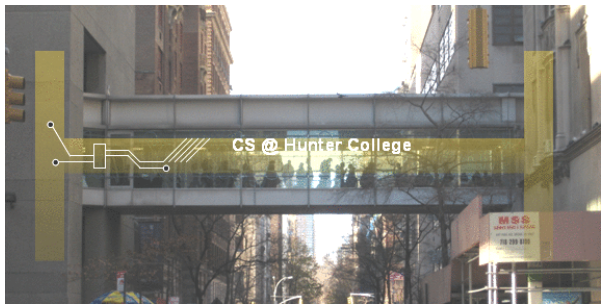

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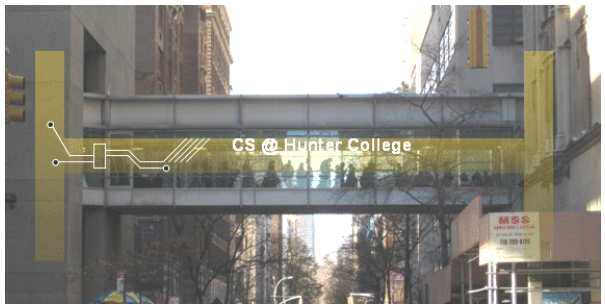

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  4. Copy the cropped portion to a new array.
  5. Save the new array to the output file.
- **If time: translate to Python.**

Design: Cropping Images

```
#Name:  CSci 127 Teaching Staff
#Date:  Fall 2017
#This program loads an image, displays it, and then creates, displays,
#    and saves a new image that has only the red channel displayed.

#Import the packages for images and arrays:
import matplotlib.pyplot as plt
import numpy as np

inImg = input('Enter input image: ')
img = plt.imread(inImg)  #Read in image from csBridge.png
plt.imshow(img)          #Load image into pyplot
plt.show()               #Show the image (waits until closed to continue)

outImg = input('Enter out image: ')
t = int(input('Enter top:'))
b = int(input('Enter bottom:'))
l = int(input('Enter left: '))
r = int(input('Enter right: '))

img2 = img[t:b,l:r]      #Slice the original array by dimensions entered

plt.imshow(img2)         #Load our new image into pyplot
plt.show()               #Show the image (waits until closed to continue)

plt.imsave(outImg, img2) #Save the image we created to the out file.
```

In Pairs or Triples...

Predict what these will do (novel concepts):

```
yearBorn = int(input('Enter year born: '))
if yearBorn < 1946:
    print("Greatest Generation")
elif yearBorn <= 1964:
    print("Baby Boomer")
elif yearBorn <= 1984:
    print("Generation X")
elif yearBorn <= 2004:
    print("Millennial")
else:
    print("TBD")

x = int(input('Enter number: '))
if x % 2 == 0:
    print('Even number')
else:
    print('Odd number')
```

```
import turtle

tess = turtle.Turtle()
myWin = turtle.Screen()     #The graphics window
commands = input("Please enter a command string: ")

for ch in commands:
    #perform action indicated by the character
    if ch == 'F':           #move forward
        tess.forward(50)
    elif ch == 'L':         #turn left
        tess.left(90)
    elif ch == 'R':         #turn right
        tess.right(90)
    elif ch == '^':         #lift pen
        tess.penup()
    elif ch == 'v':         #lower pen
        tess.pendown()
    elif ch == 'B':         #go backwards
        tess.backward(50)
    elif ch == 'r':         #turn red
        tess.color("red")
    elif ch == 'g':         #turn green
        tess.color("green")
    elif ch == 'b':         #turn blue
        tess.color("blue")
    else:                   #for any other character
        print("Error: do not know the command:", c)
```

Python Tutor

```
yearBorn = int(input('Enter year born: '))
if yearBorn < 1946:
    print("Greatest Generation")
elif yearBorn <= 1964:
    print("Baby Boomer")
elif yearBorn <= 1984:
    print("Generation X")
elif yearBorn <= 2004:
    print("Millennial")
else:
    print("TBD")

x = int(input('Enter number: '))
if x % 2 == 0:
    print('Even number')
else:
    print('Odd number')
```

(Demo with pythonTutor)

IDLE

```
import turtle

tess = turtle.Turtle()
myWin = turtle.Screen()     #The graphics window
commands = input("Please enter a command string: ")

for ch in commands:
    #perform action indicated by the character
    if ch == 'F':           #move forward
        tess.forward(50)
    elif ch == 'L':         #turn left
        tess.left(90)
    elif ch == 'R':         #turn right
        tess.right(90)
    elif ch == '^':         #lift pen
        tess.penup()
    elif ch == 'v':         #lower pen
        tess.pendown()
    elif ch == 'B':         #go backwards
        tess.backward(50)
    elif ch == 'r':         #turn red
        tess.color("red")
    elif ch == 'g':         #turn green
        tess.color("green")
    elif ch == 'b':         #turn blue
        tess.color("blue")
    else:                   #for any other character
        print("Error: do not know the command:", c)
```

(Demo with IDLE)

Decisions

```
if x < y:
    print("x is less than y")
elif x > y:
    print("x is greater than y")
else:
    print("x and y must be equal")
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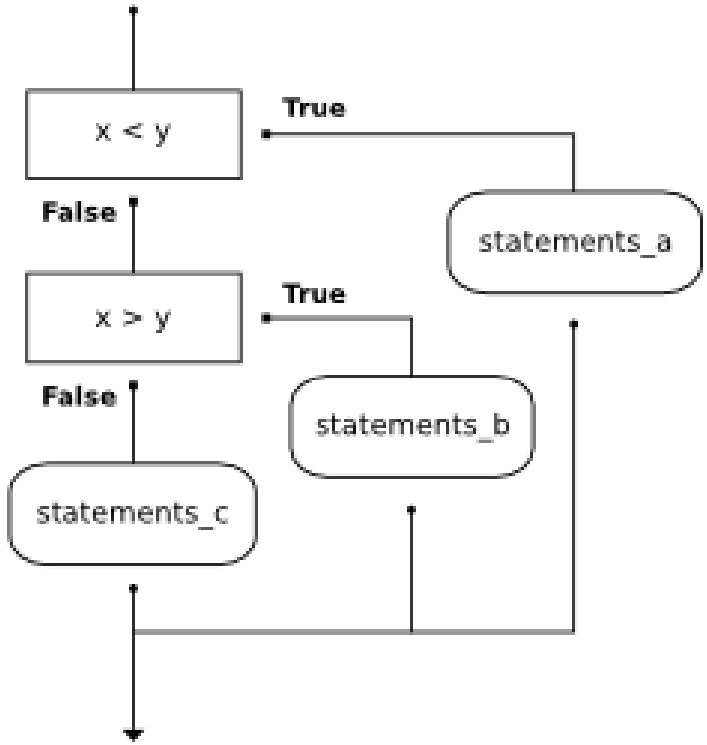

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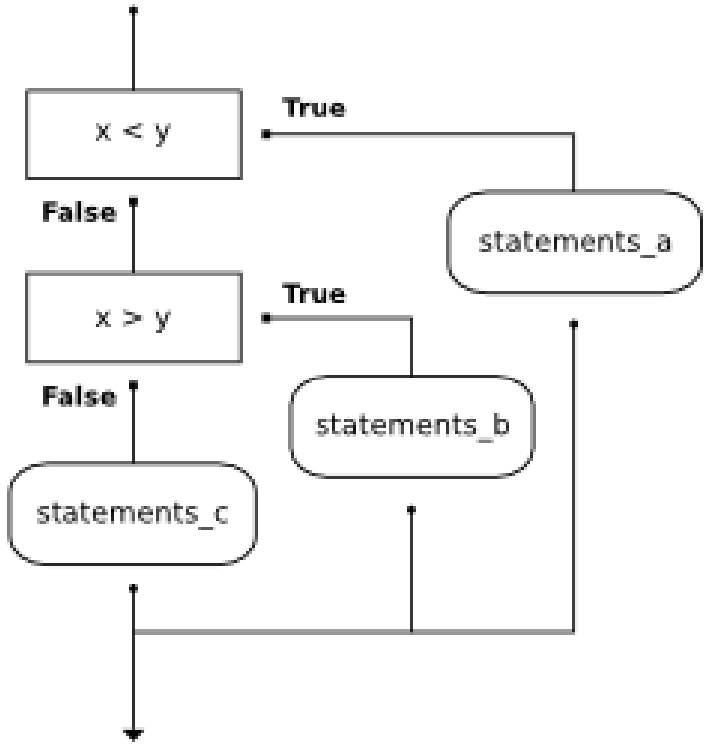

(This was just a first glance, will do much more on decisions over the next several weeks.)

CS Surveys Talk: CitiBike BikeAngels

Collin Waldoch
(Image from *New Yorker*)

Carter Wang

Collin Waldoch & Carter Wang

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- Brief overview of Citibike & Bike Angels

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- What Collin & Carter do and love about BikeAngels.

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- What Collin & Carter do and love about BikeAngels.
- Design challenge: work in pairs or triples with BikeAngels & UTAs.

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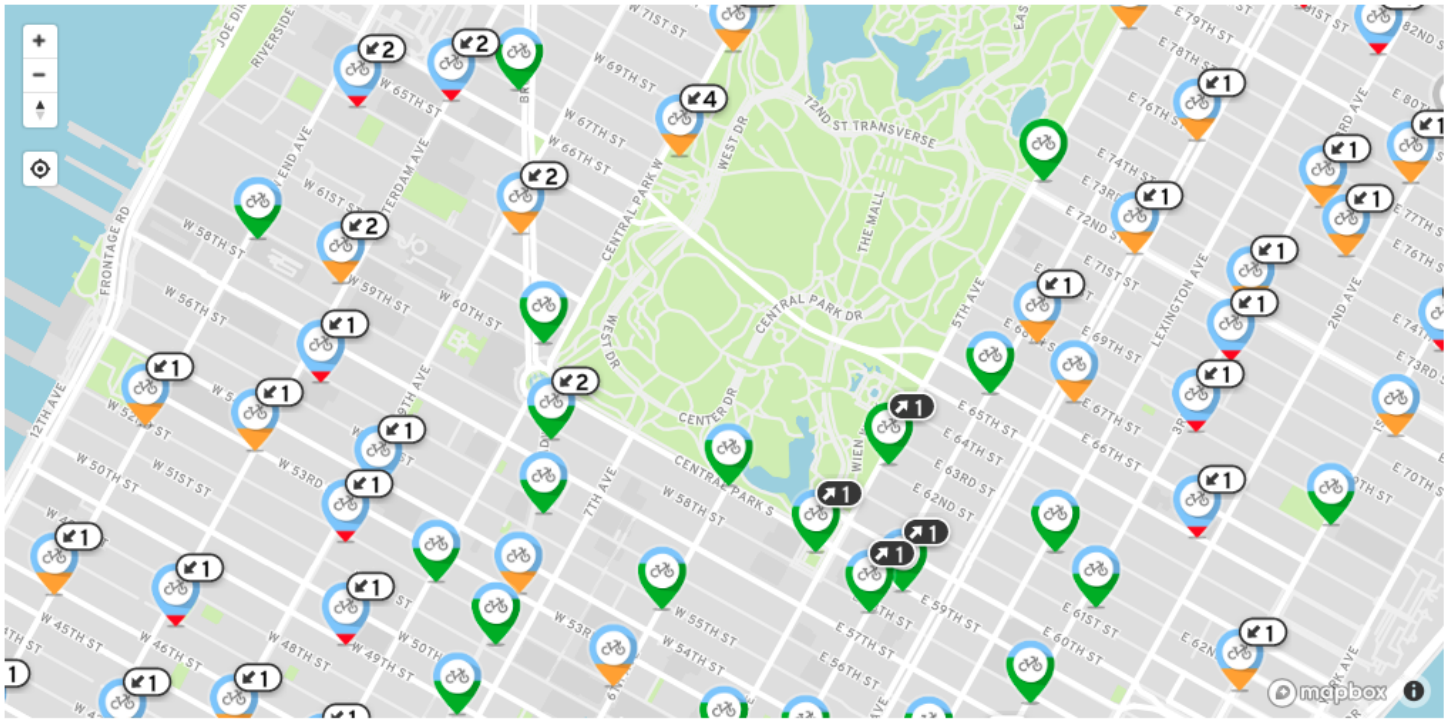
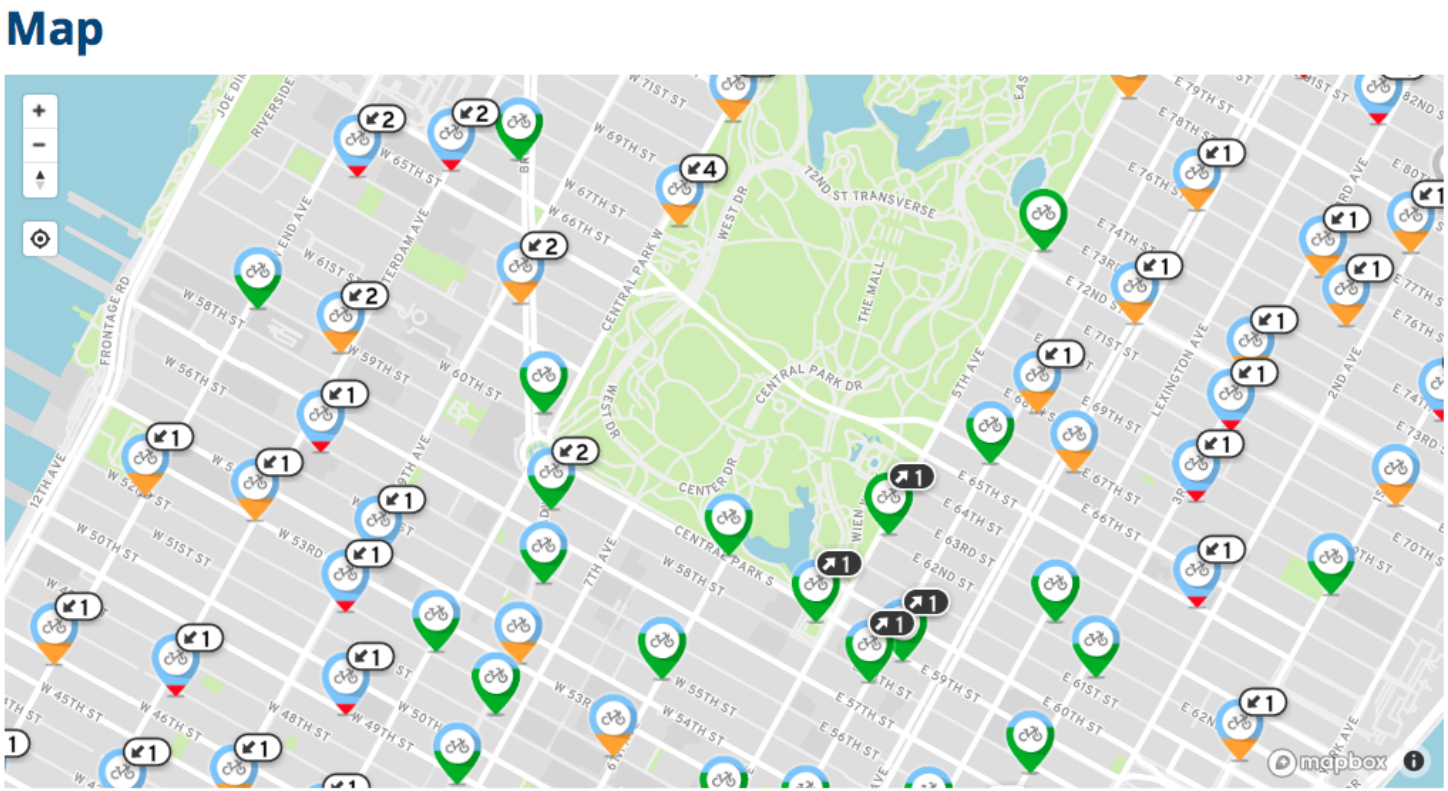
- Brief overview of Citibike & Bike Angels
- What Collin & Carter do and love about BikeAngels.
- Design challenge: work in pairs or triples with BikeAngels & UTAs.
- 12:30-1pm: Informal Q&A with BikeAngels in 1001A Hunter North.

Lecture Slip

Map

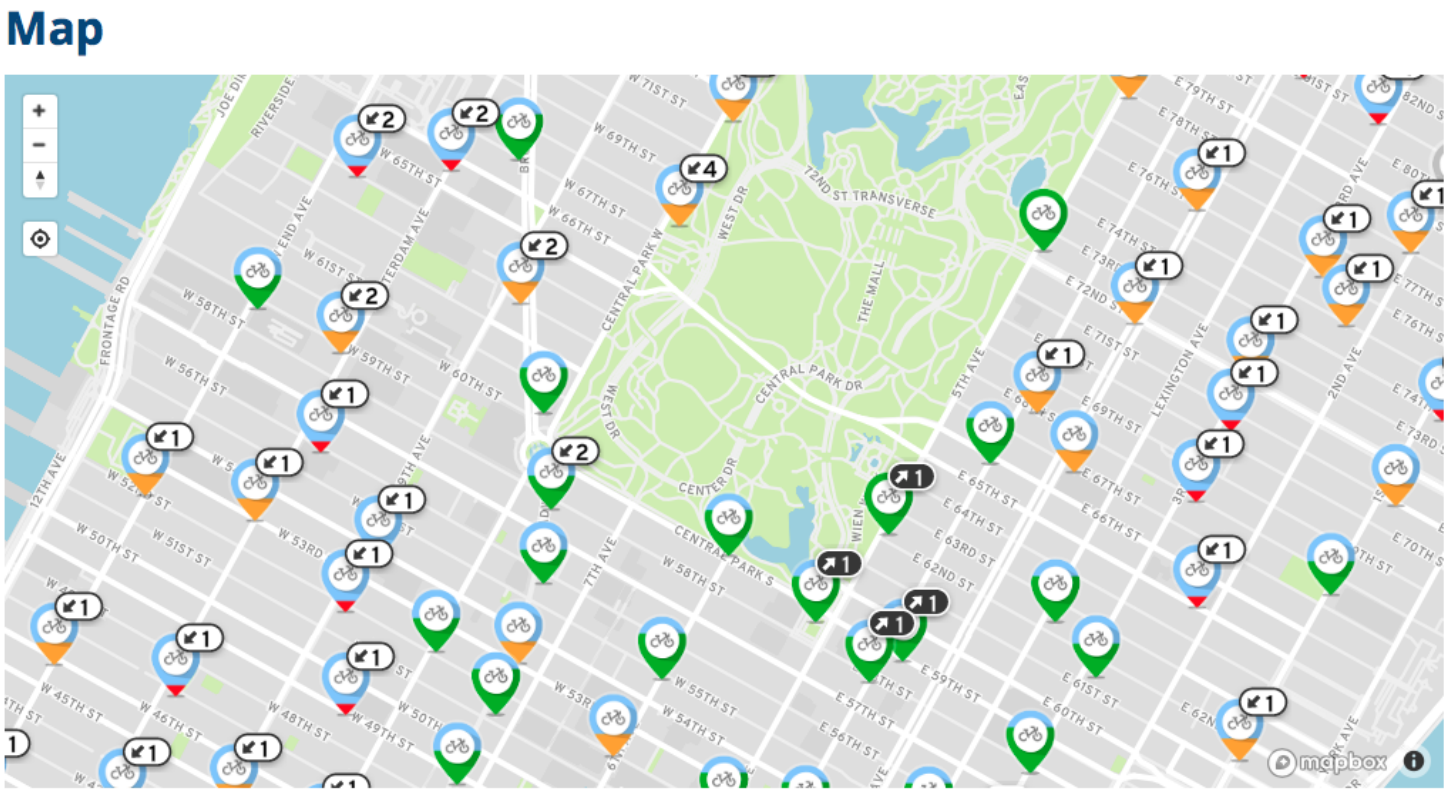


Lecture Slip



- Design an algorithm to find mostly full stations.

Lecture Slip



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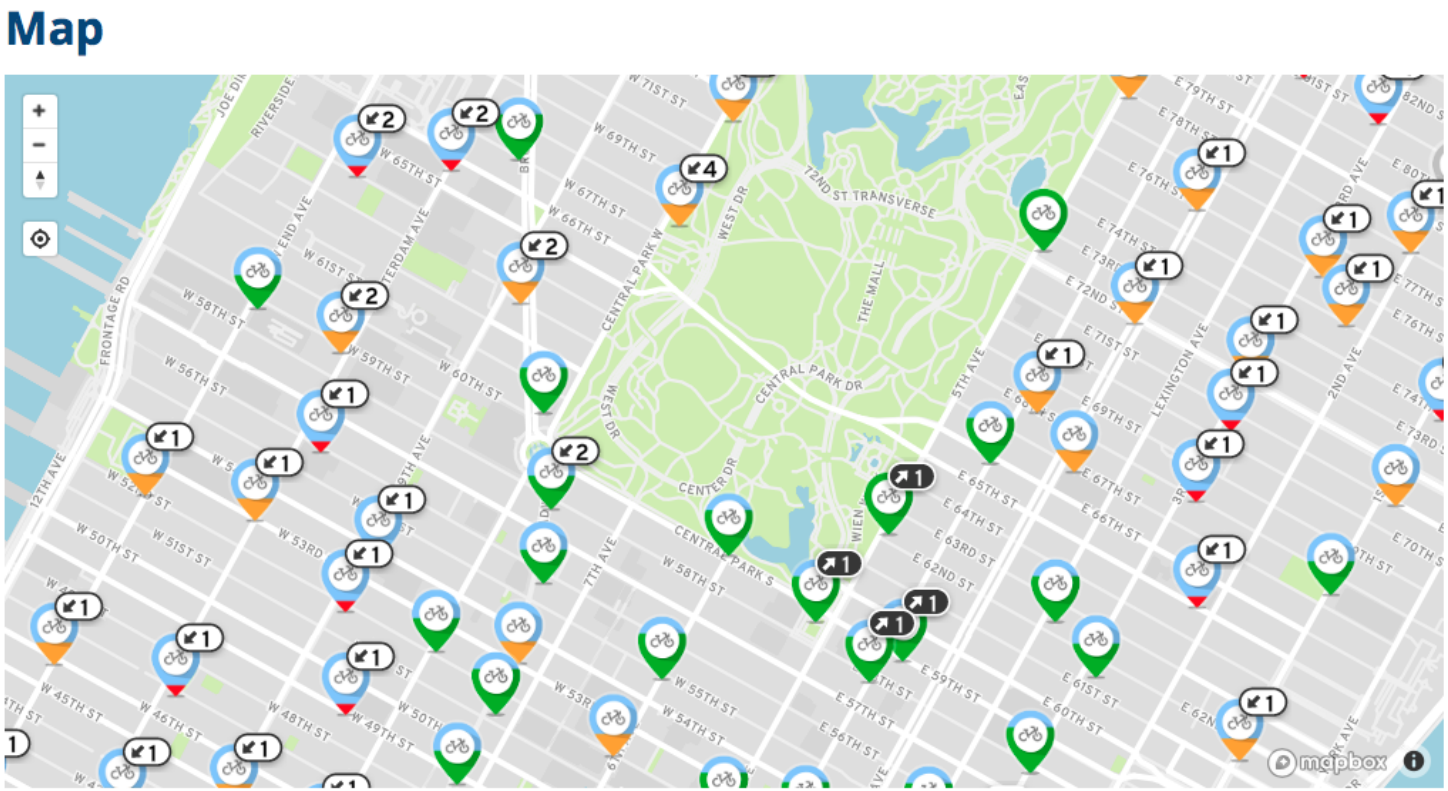

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- Note: map and photo form on back of lecture slip.

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- On lecture slip, write down a topic you wish we had spent more time (and why).

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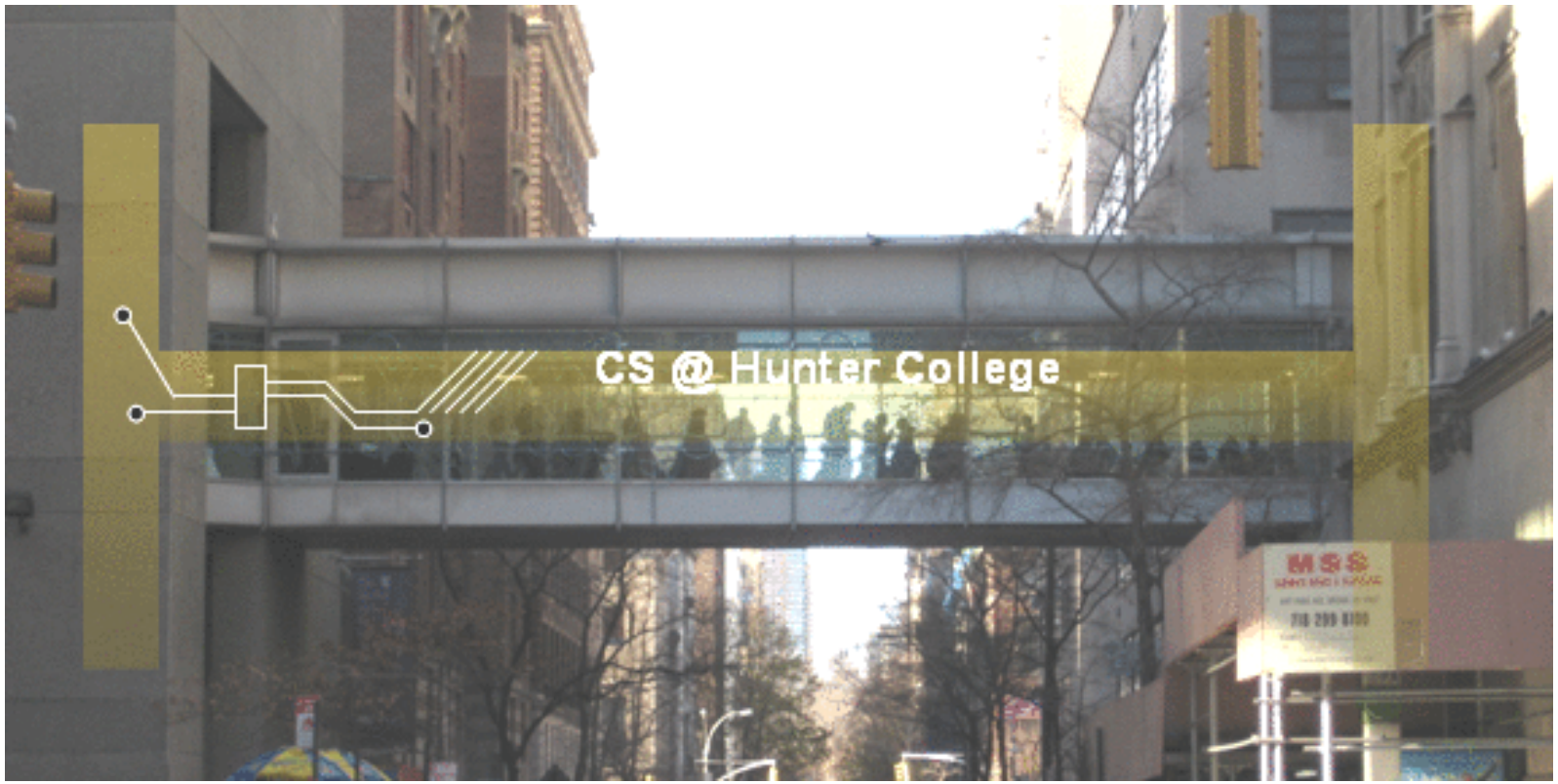
Lecture Slips & Writing Boards



- Turn in lecture slips & writing boards as you leave...