RET Site: Cyber Security Initiative for Nevada Teachers (CSINT)

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Introduction

Students in CS1 will experience four sequenced lessons in image processing. Image processing is fundamental to multiple cybersecurity strategies in biometrics.

First Quarter: Students are introduced to cybersecurity, biometrics, and coordinate concepts through game programming with Microsoft's TouchDevelop .

Second Quarter: Students master coordinate regions through 3D Modeling with PLaSM .

Third Quarter: Students apply coordinate concepts in image processing with Python programming.

Fourth Quarter: Students synthesize knowledge in a Steganography semester project in Python.

Region Boxes & Facial Recognition

- Research and essential questions on facial recognition:
  - > Why are coordinate points important?
  - > How are they being used today?
  - > What are the benefits and concerns?

- Review Cartesian plane and compare the graphic coordinate system used in TouchDevelop through Mark the Spot game.
- Understand regions of pixels (X1,X2,Y1,Y2)
- Students will practice identifying regions with a hands-on activity

Mark the Spot on TouchDevelop | 3D Modeling with PLaSM (NClab)
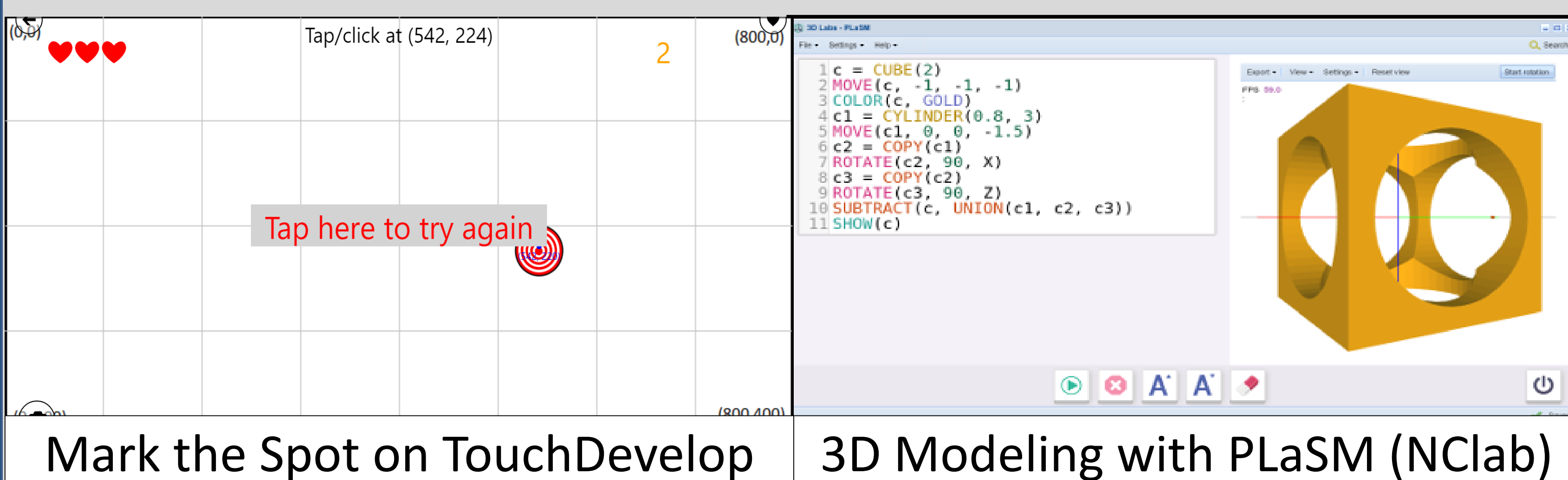
Unplugged Binary Activity

- Research and essential questions on binary numbers:
  - > How do computers represent numbers beyond 0 and 1?
  - > What are the smallest pieces of data on a computer ?
  - > How are characters represented on a computer?
- Student learn how to create binary numbers up to 255
- Students learn the basics of computer memory
- Pair programming binary number practice
- Pair programming binary to ASCII practice


Source: csunplugged.org
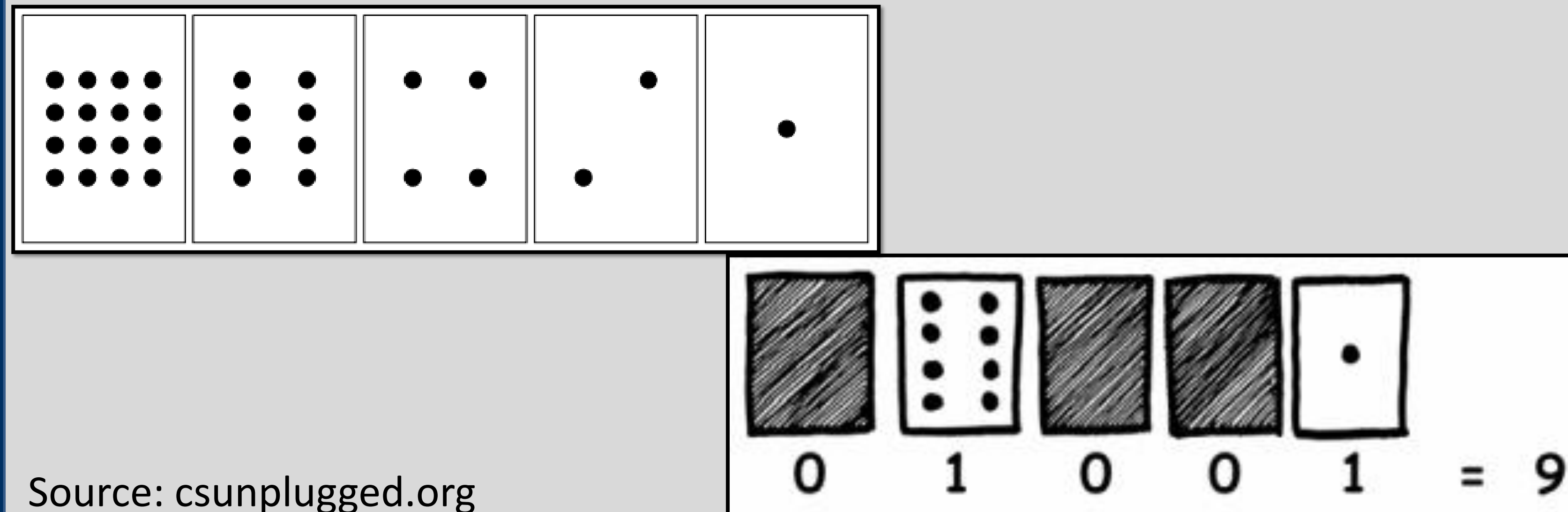
Coordinate Regions Tic-Tac-Toe

- Research and essential questions on coordinate regions:
  - > Where is the origin?
  - > How do you define images in pixels?
  - > How do you identify region?
- Students will review ranges
- Students learn how to use OpenCV in Python to copy and move a region of an image
- Practice: Copy and move the eyes of the baboon
- Students will then play a game of Tic-Tac-Toe where they will have to copy an "X" or an "O" and move it to the correct location by using Python
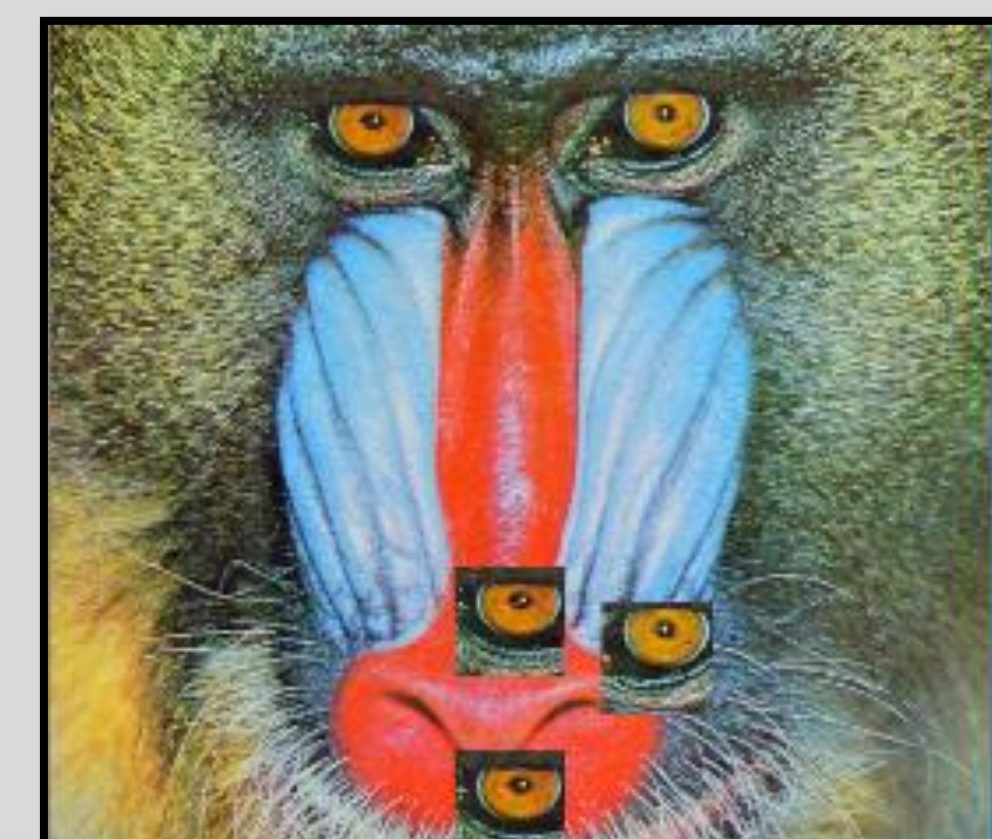
Region of Images with OpenCV
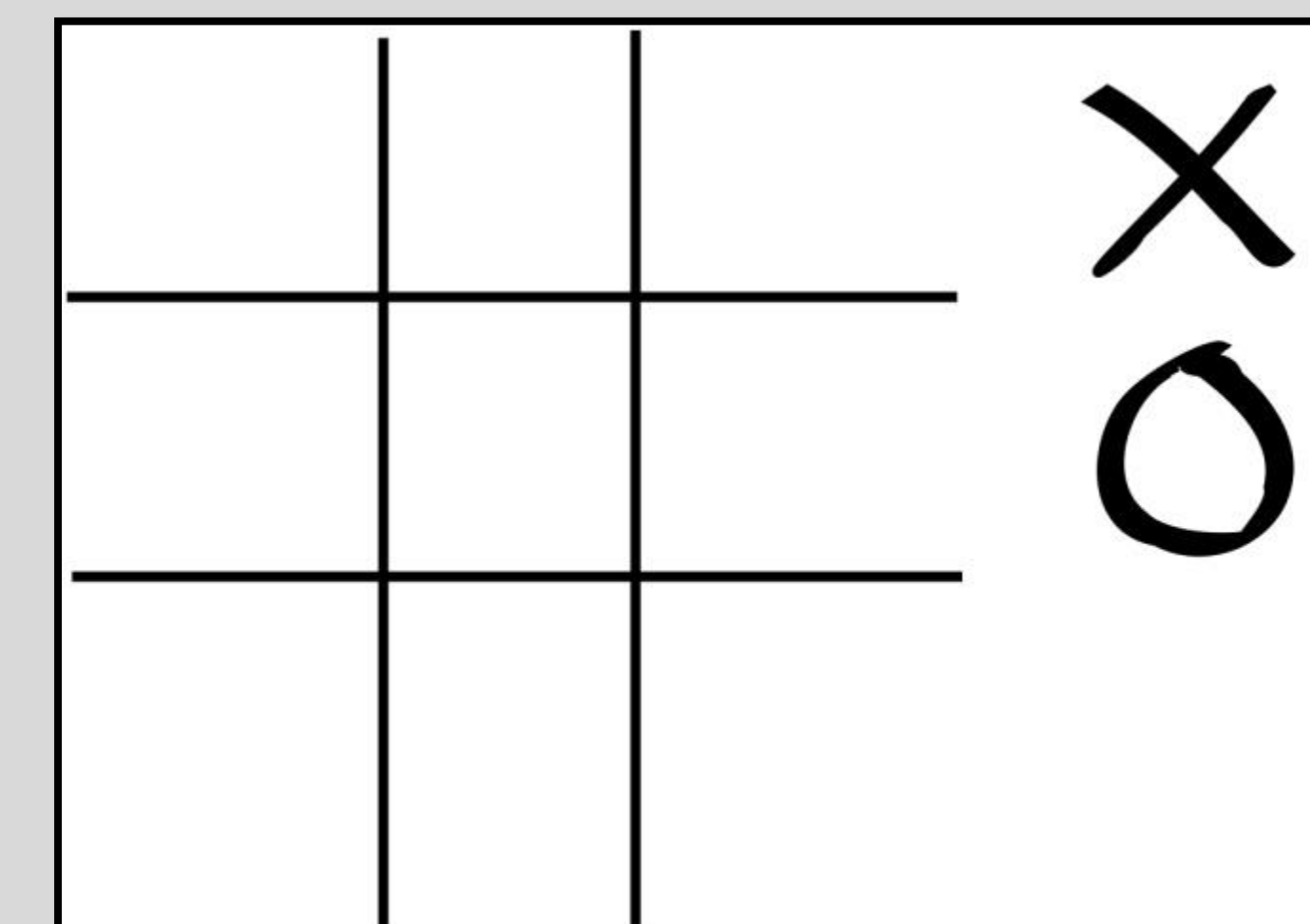
Steganography

- Research and essential questions on steganography:
  - > How are images created by a computer?
  - > How are secret messages stored within computer images?
- Students will process a color image into a grayscale image using OpenCV.
- Students will conduct several different image processing strategies using OpenCV.
- As semester projects, students will write a program in Python that will decode a message hidden in a gray scale image and then a second program to encode their own messages in gray scale images.

Color to Grayscale to Edge Detection with OpenCV

Evaluation

- Pre-Assessment: Will be given at the beginning of the semester. This will be in multiple choice format using Schoology.
- Post-Assessment: Will be given at the end of the semester as a stand-alone assessment or may be embedded into the final exam. The post-assessment questions will be the same as the pre-assessment.