Unit 2 - Lesson 3

Encoding B&W Images

Objectives: we will be able to…

- Explain how images are encoded with pixel data
- Describe a pixel as an element of a digital image
- Encode a B&W image in binary representing both the pixel data (intensity) and metadata (width, height)
- Create the necessary metadata to represent the width and height of a digital image, using a computational tool
- Explain why image width and height are metadata for a digital image

Recall…

- Back in the Internet Unit you encoded a line-drawing image as a list of numbers that made up the coordinates of the points in the image.
- That works for line drawings, but how might you encode a different kind of image?
- Today we're going to consider how you might use bits to encode a photographic image (how could I encode vision…?)
- We will start with black and white images

Invent An Encoding Scheme for B&W Images

- We are going to use the "Invent a B&W image encoding scheme – Activity Guide"
  - Just the first two pages, for now
- We will work in pairs

Discussion:

- How have you encoded white and black portions of your image, what do 0 and 1 stand for in your encoding?
- Are your encodings flexible enough to accommodate images of any size?
  - How do you accomplish this?
- Is your encoding intuitive and easy to use?
- Is your encoding efficient?

Pixels

- Each little dot that makes up a picture like this is called a **pixel**. Where did this word pixel come from?
  - It turns out that originally the dots were referred to as "picture elements", that got shortened to "pict-el" and eventually "pixel"
- 1 or 0 for every pixel
- Data must contain metadata (data that describes the pixel data)
  - Like length and width

Use the Pixelation Widget

- Video: B&W Pixelation Tutorial
- We are going to use the "B&W Pixelation Widget – Activity Guide"

Wrap-up

- The image file protocol we used contains "metadata": the width and height.
- **Metadata is "data about data"** that might be required to encode or decode the bits.
- For example, you couldn't render the B&W image properly without somehow including the dimensions

Wrap-Up

- What other examples of metadata have we seen in the course so far?
  - Hint: packets
- What other types of data might we want to send that would require metadata?
- Did you think about compression at all while doing this exercise?
- Can you think of a way you might represent an image of pixel data with fewer bits?

Vocabulary:

- Image – a type of data used for graphics or pictures
- Metadata – is data that describes other data.
- Pixel – short for "picture element" it is the fundamental unit of a digital image, typically a tiny square or dot which contains a single point of color of a larger image.