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Purpose: Computational Thinking Skill: Abstraction Week 2

Project Topic: Picture This? JPEG It!

Abstraction is a way to make problems or systems easier to think about and involves hiding details -- removing unnecessary complexity. From the article, the word "Vision" is indeed the abstraction just defined as it helps us avoid overthinking the complexity of the "process of seeing" or vision. From the article, we get a clearer picture of what the abstraction vision means, and this is what it had to teach us about the vision process; vision involves several processes and components namely light rays and their intensity (luminance), the color of the light (based on the electromagnetic spectrum, the brain, the eye nerves, the retina, and the detectors. It also tells us the nerves intercept light rays and pass them to the back of the eyes, where the retina has detectors that measure the amount of light and color. This is a mouth full of terms and processes in anyone's bid to understand "vision." So, to leave out the complex description of the whole process, it is abstracted away with the word vision.

Now, from this very complex process of vision, psychologists discovered that the human eye was susceptible to changes in the amount of light in an image (luminance) but less so to the changes in color, and this, they said, was because our eyes have two sets of detectors as previously mentioned. It is noted that detectors for color are far less than those for light, making it easy to remove them from images without any noticeable effect (from our eyes) when represented as a stream of ones and zeros. Psychologists once more told us that our brains tend to ignore "small prints" in images, making it possible to take an image and, via some mathematical wizardry, turn it into a "top ten" of details. This "top ten" is called the spatial frequency spectrum of the image and tells us what patterns at different levels of detail add together to make the original image. With this, computer scientists can decide that any image only needs, say, the top five and remove the other lower chart (spectrum) entries. JPEG creation is based on the "removing things we won't notice" idea. It encapsulates taking the whole image and breaking it into bits, cutting down the data in each bit using the knowledge of how the brain does it, and finally ending up with instructions on rebuilding the image. These instructions will be passed to a small program called the “codex” which knows how to translate these instructions into a picture. So, when we use the word JPEG; we are referring to the abstracting away of the process just described on how an image is converted into a set of instructions that can be exchanged between systems and processes.