
My NASA Data - Mini Lesson

Creating and Interpreting Images

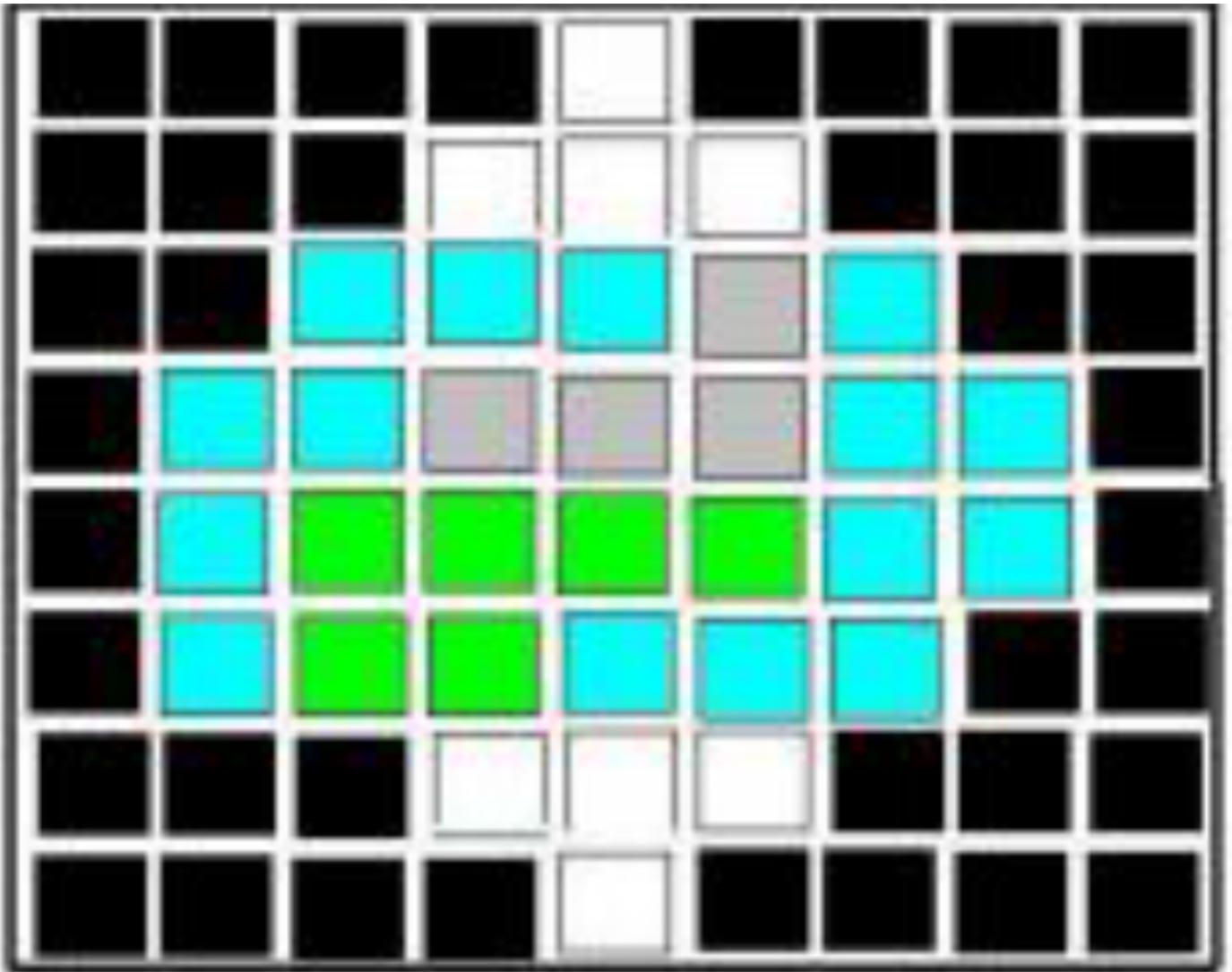


Image Credit: Creating and Interpreting Images

https://landsat.gsfc.nasa.gov/wp-content/uploads/2013/06/RS_56.pdf

Mini Lesson



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Images taken from a satellite are often used to display, both the appearance of an object and the contents of the object. For example, the Landsat image above shows Tokyo, Japan. The pixels that make up the image have been colorized to bring out specific details. Purple is used to represent areas that have been developed. Green is for forested areas. By obtaining images of the same scene using different filters, scientists can identify the specific 'colors' of hundreds of different surface features. Let's see how this works!

Suppose that an astronomer has obtained the first crude image of a planet orbiting another star. The satellite observatory was able to image the surface of this planet within a 8x9-pixel (rows X columns) portion of a larger image of the star and its surroundings. Images were obtained in three different

color filters: Red, Green and Blue, so that surface markings could be classified as water, land, snow or plants/trees.

The pixel data sequences for the three images are shown below:

Red = {0,0,0,0,5,0,0,0,0,0,0,0,5,5,5,0,0,0,0,0,0,0,5,0,0,0,0,0,0,5,5,5,0,0,0,0,
0,5,5,5,0,0,0,0,0,0,0,5,0,0,0,0}

Blue= {0,0,0,0,5,0,0,0,0,0,0,0,5,5,5,0,0,0,0,0,5,5,5,0,5,0,0,0,5,5,0,0,0,5,5,0,0,5,0,0,0,0,
5,5,0,0,5,0,0,5,5,5,0,0,0,0,0,5,5,5,0,0,0,0,0,0,0,0,0,5,0,0,0,0 }

Green= {0,0,0,0,5,0,0,0,0,0,0,0,5,5,5,0,0,0,0,0,0,0,0,5,0,0,0,0,0,0,5,5,5,0,0,0,0,5,5,5,0,0,0,
0,0,0,5,5,0,0,0,0,0,0,0,5,5,5,0,0,0,0,,0,0,5,0,0,0,0 }

1. Create an array table for each of the three images showing the pixel values in their appropriate locations assuming that the images were read-out from the top left pixel to the lower right pixel in the sequence.
2. By comparing the colors for each pixel, determine whether the pixel indicates dark sky S (R,B,G) = S (0,0,0); water W (0,5,0); ice I (5,5,5); land L (5,0,5) or plants P (0,0,5). Create a blank grid and fill in the corresponding pixels with the symbols S, W, I, L and P. If there are no matches, place a question mark in that pixel.
3. Using colors of your choosing, create a blank grid and color each pixel with a color suitable for the various symbols (e.g. ice = white, water = blue etc).
4. Assuming that the planet is perfectly round, draw and color an image of the planet as it might actually appear using the above surface composition information as a clue.

Sources:

1. Space Math <http://spacemath.gsfc.nasa.gov>
2. Landsat Math <https://landsat.gsfc.nasa.gov/landsat-math-2/>

Information from satellites is often used to display information about objects. This information can include how things appear, as well as their contents. Explore how pixel data sequences can be used to create an image and interpret it.

Grade Band

- [9-12](#)

Crosscutting Concepts

- [Scale, Proportion, and Quantity](#)

Instructional Strategies

- [Integration of content areas](#)

Related Links

- [Landsat Math](#)
- [Data Literacy Cubes Page](#)