using HSV vs RGB for color-based clustering > HSV provided better clustering results

1 channel HSV provided better results than 1 channel RBG

HSV is more intuitive to humans, and therefore provides better clustering results

Unsupervised learning >> calculating Euclidian distance between the groupings

A group of cartoon bugs

Description automatically generated with medium confidence

A close-up of a blue bug

Description automatically generated A close up of a bug

Description automatically generated A green and white bug

Description automatically generated

A close up of a bug

Description automatically generated A close-up of a blue bug

Description automatically generated A close-up of a blue bug

Description automatically generated

A close up of a bug

Description automatically generated A close-up of a blue bug

Description automatically generated

A green bug with a black background

Description automatically generated A close-up of a bug

Description automatically generated

Found shape outline using openCV and RGBA photo

A close-up of a beetle

Description automatically generatedA close-up of a bug

Description automatically generated

A close up of a bug

Description automatically generated

Cute vs Scary

People who thought bugs were more cute and less scary resulted in more nuanced groupings (shape + color + pattern) vs people who grouped only by color thought most bugs were very scary

Bug 15 (*Ctesias serra)* was universally scary and was considered an outlier.

Typical bug lover groupings: (avg scary score, avg cute score)

Typical bug adverse groupings:

Binary classifications:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| spots? | Vertical lines? | furry | iridescent? | horns? |

Spots: 0 – no spots, 0.5 – lightly spotted, 1 – visible spots

Vertical lines: 0 – no lines, 0.5 – lightly lined, 1 – visible lines

fuzzy: 0 – not fuzzy, 1 – visible fuzz

Iridescent: 0 – not iridescent, 0.5 lightly iridescent, 1 very iridescent

Horns: 0 – no horns, 0.5 - jaws, 1 prominent horns/antlers or something similar

**Training based on weights:** assign weights 0-1 to each category

Binary classifications

* spotted, fuzzy, vertical lines, iridescent, horns
* 5 dimensions

Shape

* Shape outline found using OpenCV
* Converted into a low-rez

Color

* dominate color found using OpenCV and
* 3 dimensions

Key Observations:

In my efforts to make a machine categorize bugs in a way that more closely resembles human grouping, I discovered that simplifying features played a significant role. This simplification involved reducing complexity in two main areas: color and shape. By condensing the color scheme from three colors to a single dominant color, and by scaling down the image resolution from a full-size image to a low-resolution version, the machine-generated clusters appeared more similar to those created by humans.

Human Perception and Simplification: Humans tend to simplify and abstract information when they process visual data. We often don't analyze every pixel or color variation but rather focus on dominant features. By reducing the color palette to a single dominant color and decreasing the resolution (thereby simplifying the shape), the machine's processing becomes more akin to this human tendency to abstract and generalize.

Cognitive Load: Our brains are wired to efficiently process large amounts of information by focusing on the most salient features. Detailed, high-resolution images can contain a lot of noise and extraneous information that humans typically filter out. Lower resolution images and reduced color complexity mimic this filtering process, aligning the machine's clustering with how humans might naturally categorize these images.

Feature Salience: In high-resolution images or those with a wide range of colors, less relevant details can become overly prominent, leading to clusters based on these less important features. Simplifying the images means that the machine focuses on more prominent, general features that are likely more relevant to how humans categorize the images.

Pattern Recognition: Humans are excellent at recognizing patterns and general shapes but are not as good at processing high-fidelity, detailed information in a quick, categorical manner. By reducing the resolution and color detail, the machine's task aligns more closely with human pattern recognition capabilities, focusing on broader patterns rather than minute details.