

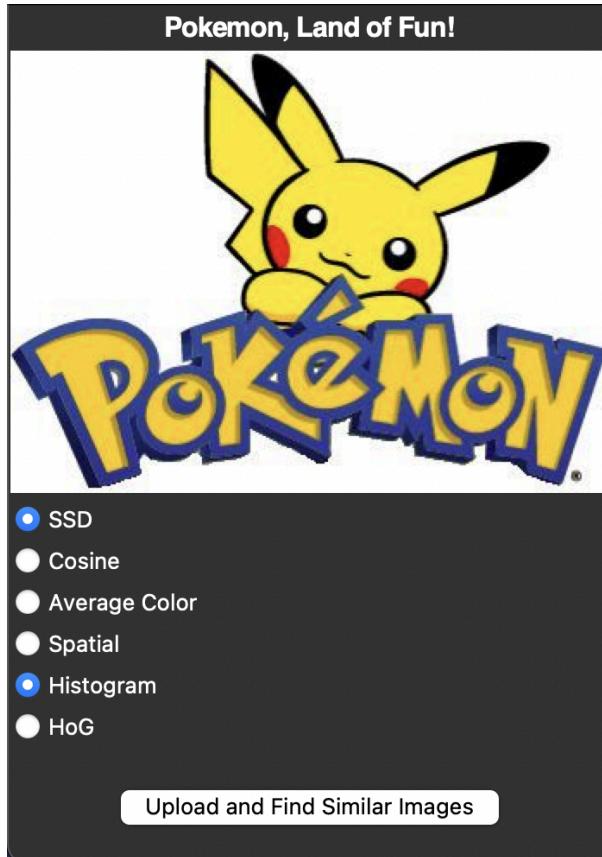
Pokemon, Land of Fun
Ritvik Warrier
CSE408

Image Feature Extraction

In this project, I chose to implement 4 features. Average pixel color, spatial grid of average pixel colors, color histograms, and Histograms of Oriented Gradient.

User Interface

I developed my user interface using the Tkinter library, a library for elementary python development. It contains radio buttons that enable users to choose whether they'd like to compute SSD or cosine similarity, and a button that allows them to upload a local image and find the top 10 most similar images according to the input choices.



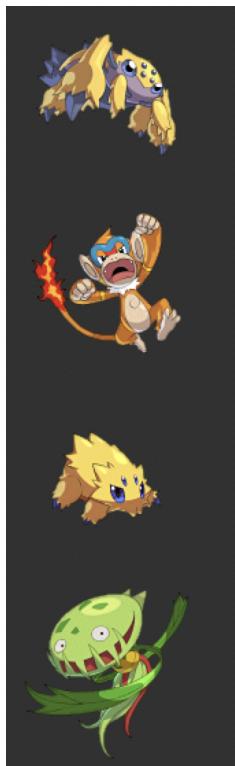
Testing the System

04.png:

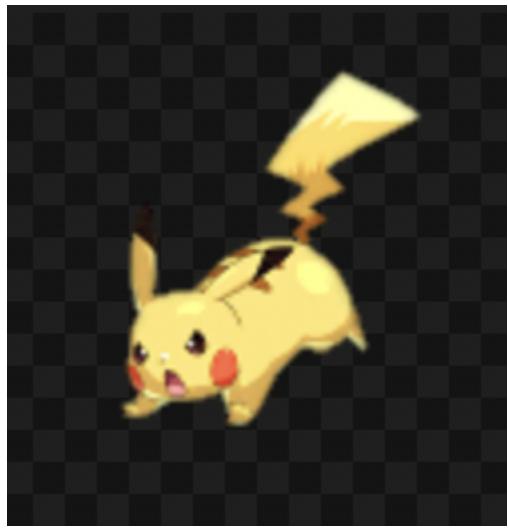


SSD + Average Color





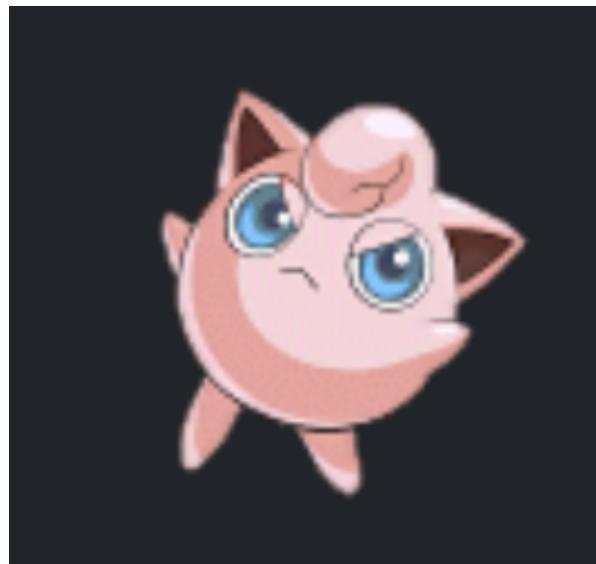
25.png



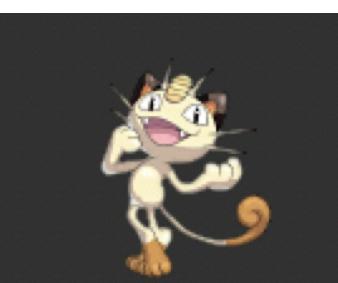
SSD + Spatial



39.png

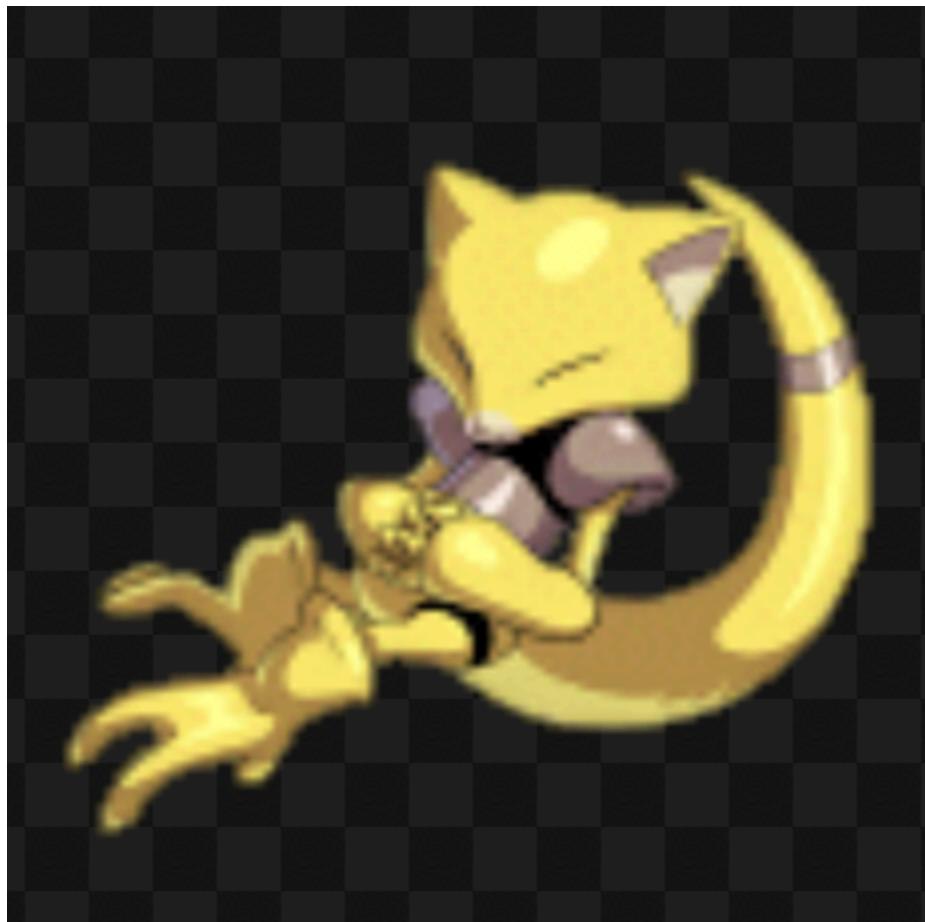


SSD + Histogram



63.png

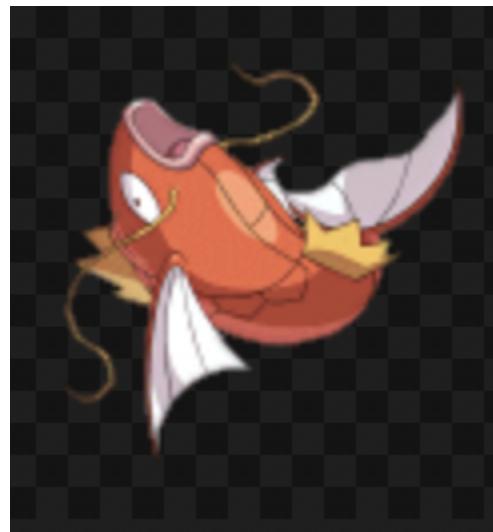
SSD + HoG





129.png

Cosine + Average Color





147.png

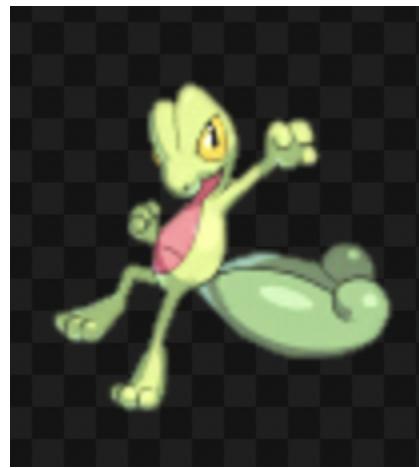
Cosine + Spatial

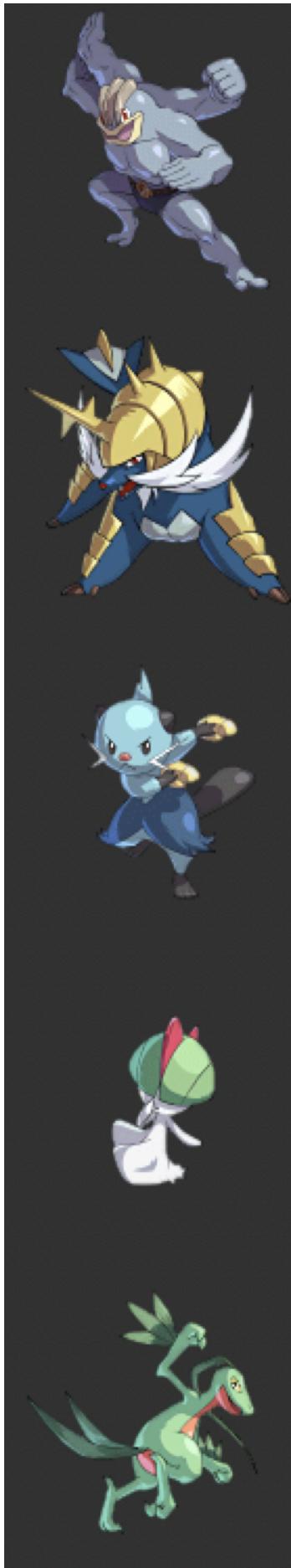
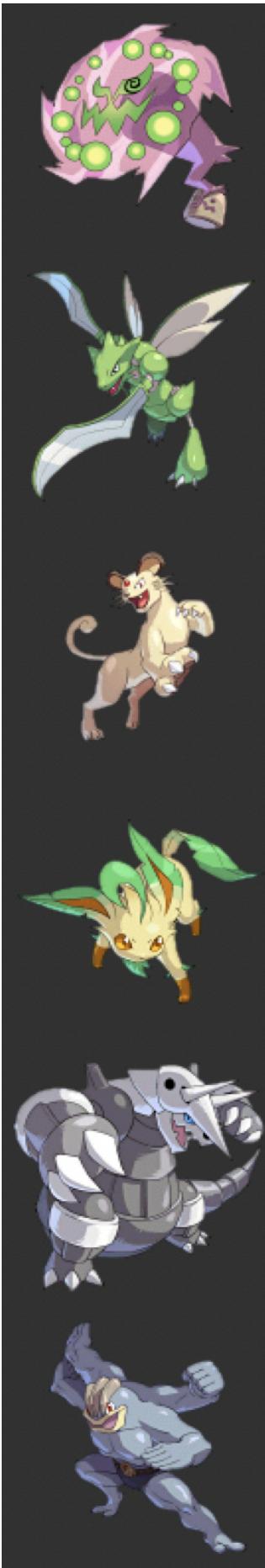




252.png

Cosine + Histogram

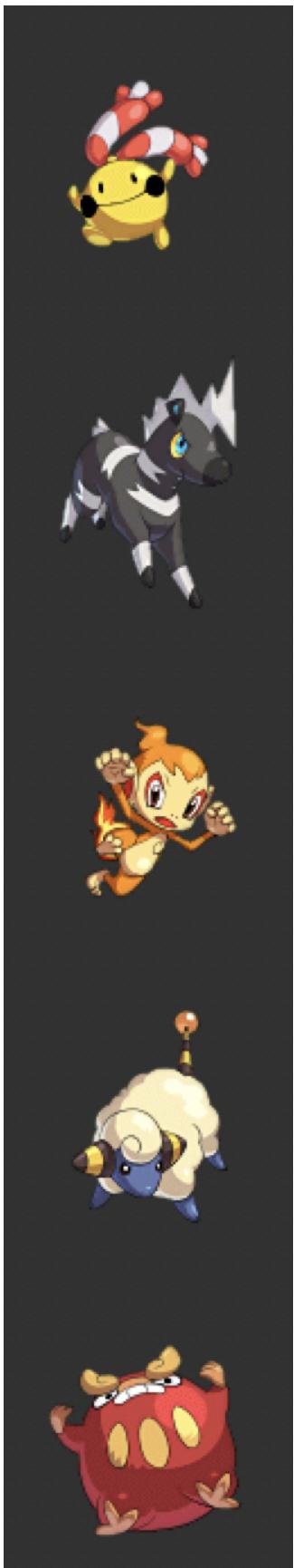




374.png

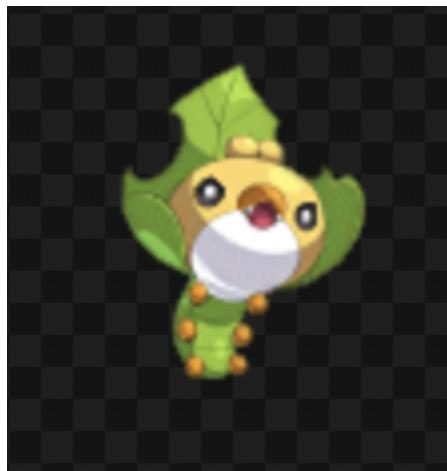
Cosine + HoG





540.png

SSD + Histogram

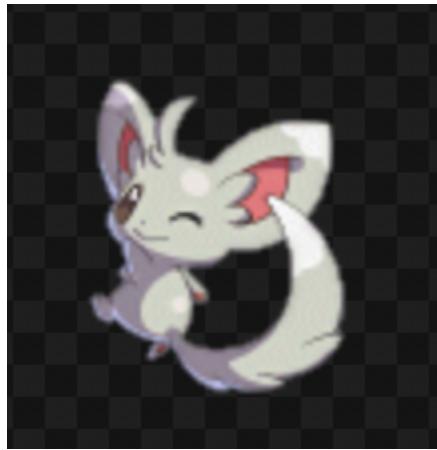


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572.png

SSD + HoG

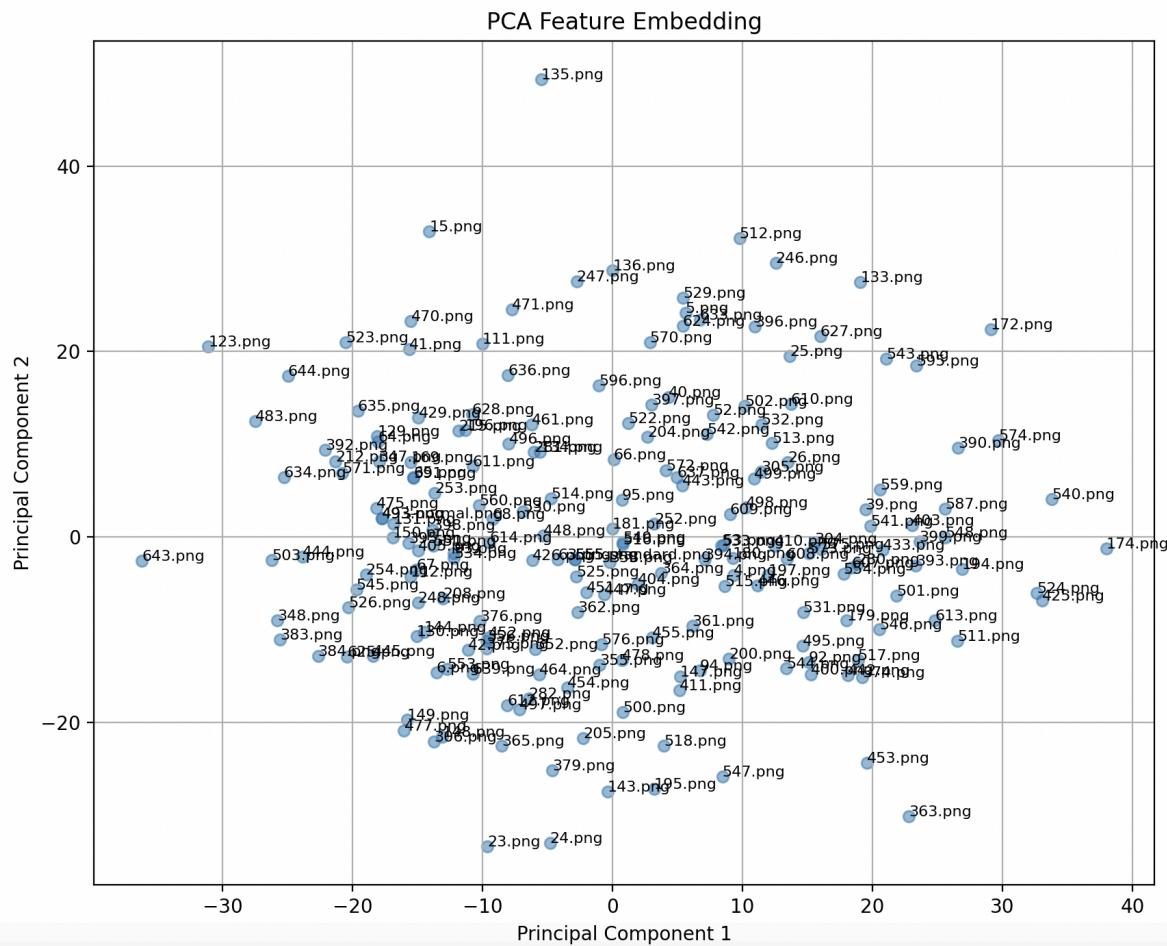




Qualitative Evaluation

It seemed the algorithm performed best when using HoG and histogram of colors feature extraction methods. These are where the algorithm was able to retrieve the respective evolutions of pokemon. As expected, the average and spatial color categories were not as effective in identifying evolutions, but did accurately retrieve pokemon who followed similar color schemes as the input image. This is because evolutions of pokemon don't necessarily all follow the same color scheme (e.g, Charmeleon is a scarlet shade of red whereas Charmander is more orange). The latter two feature extraction methods, however, are better at identifying a pokemon's figure and semantics. This was asserted as Charmander correctly returned Charmeleon, and Charizard even returned Dragonite, an unrelated pokemon which at face glance does bear a strong resemblance to it.

Embedding Output



Embedding Analysis

There seems to be a few outliers, notably Reshiram, Jolteon, Ekans, Arbok, and Spheal. Besides that, there appears to be a clustering around the center of the plot, which indicates that many pokemon share a similar color or figure pattern. The outliers make sense because they all have relatively distinct figures (e.g Spheal is almost fully circular, which isn't common amongst many Pokemon).