Artificial Intelligence and Machine Learning Fundamentals

Activity 13: Shape Recognition with the Mean Shift Algorithm

In this section, we will learn how images can be clustered. Imagine you are working for a company that detects human emotions from photos. Your task is to extract pixels making up a face in an avatar photo.
Create a clustering algorithm with Mean Shift to cluster pixels of images. Examine the results of the Mean Shift algorithm and check whether any of the clusters contain a face when used on avatar images.
Then, apply the k-means, algorithm with a fixed default number of clusters (8, in this case). Compare your results with the Mean Shift clustering algorithm:

1. Select an image you would like to cluster and load the image.
2. Transform the pixels into a data frame to perform clustering. Perform Mean Shift clustering on the image using scikit-learn. Note that, this time, we will skip normalizing the features, because the proximity of the pixels and the proximity of the color components are represented in a close to equal weight. The algorithm will find two clusters.
3. Depending on the image you use, notice how the Mean Shift algorithm treats human skin color, and what other parts of the image are placed in the same cluster. The cluster containing most of the skin in the avatar often includes data points that are very near and/or have a similar color as the color of the skin.
4. Let's use the k-means algorithm to formulate eight clusters on the same data.

You will see that the clustering algorithm indeed located data points that are close and contain similar colors.