# Rust Image segmentation by "K means Clustering" Algorithms

K is number of clusters

K is number centroid for each cluster

$$J = \sum_{i=1}^{m} \sum_{k=1}^{K} w_{ik} \| x^i - \mu_k \|^2$$

where $w_{ik}$==1 for data point $x^i$ if it belongs to cluster $k$; otherwise, $w_{ik}$=0. Also, $\mu^k$ is the centroid of xi's cluster.

## Find out optimal "K" value by using elbow method

For each value of K, I am calculating WCSS (Within-Cluster Sum of Square).

WCSS is the sum of the squared distance between each point and the centroid in a cluster
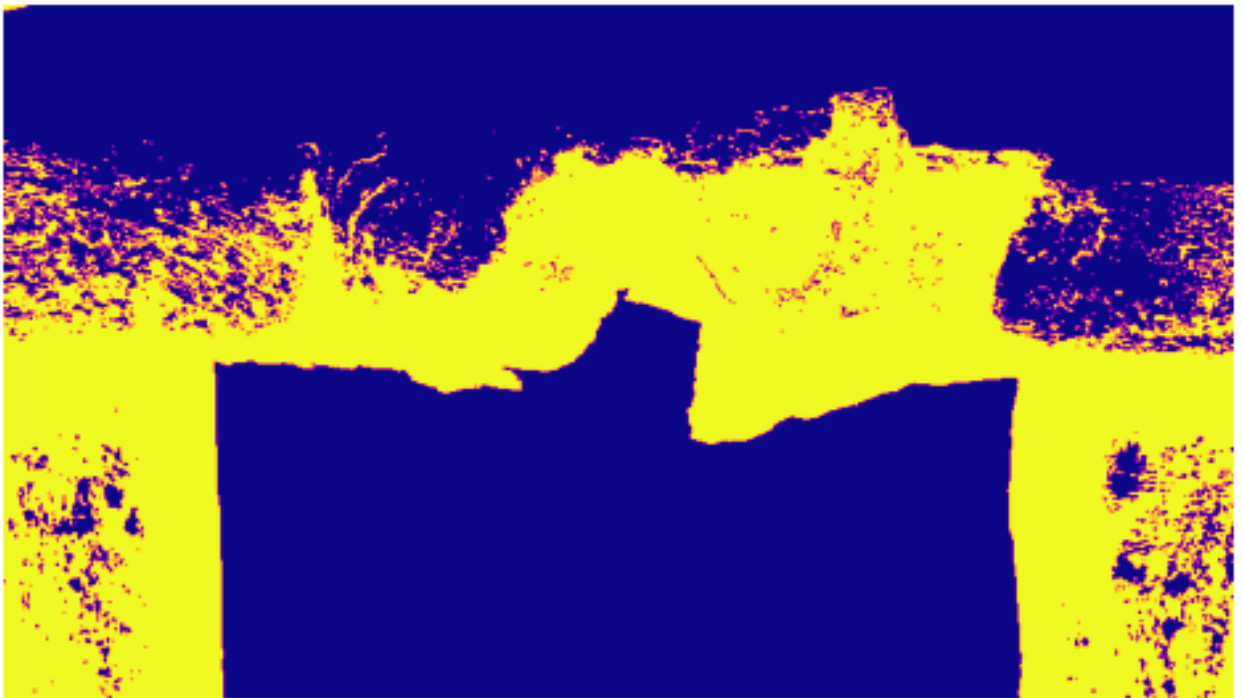
$$WCSS(k) = \sum_{j=1}^{k} \sum_{x_i \in \text{cluster } j} \| x_i - \bar{x}_j \|^2,$$

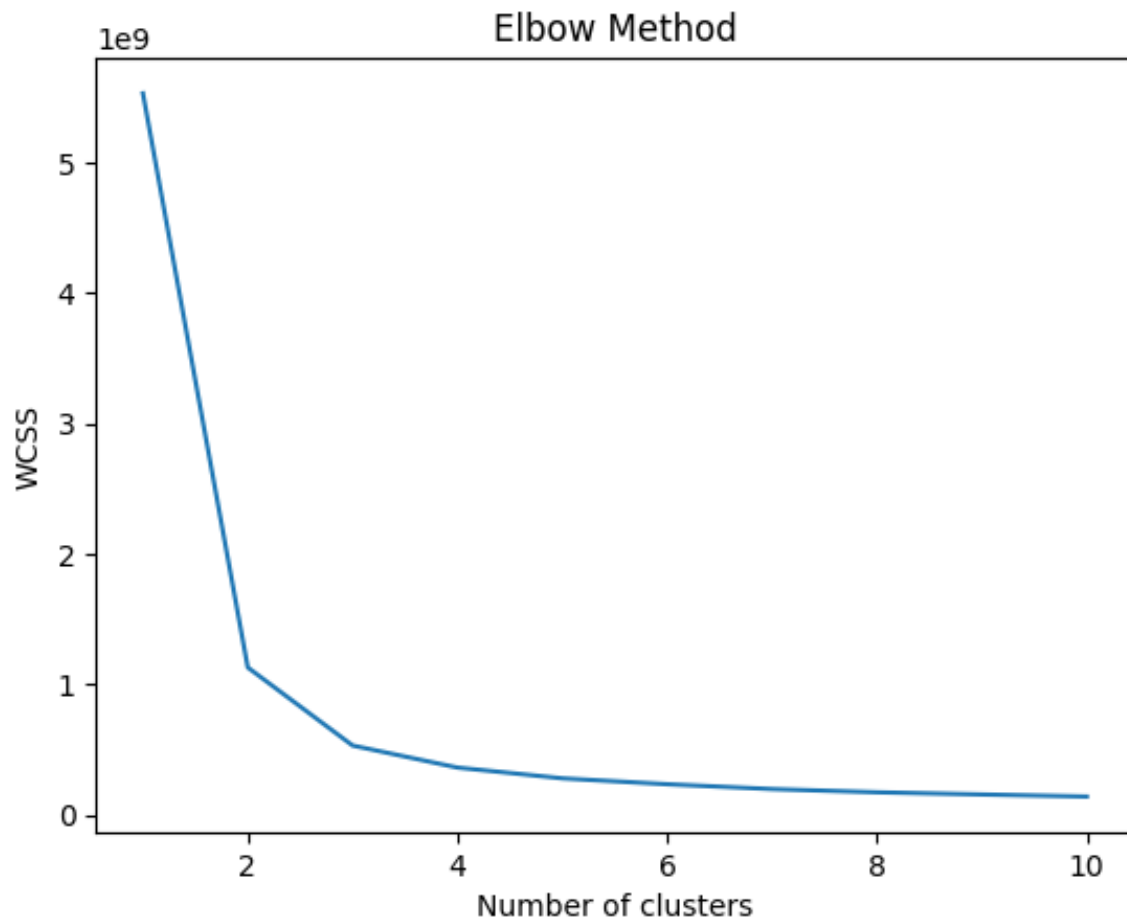where $\bar{x}_j$ is the sample mean in cluster $j$

input Image

Segmented Image (k=2)



Output Image where K=2

**Find out the optimal value of K by elbow method**



As we can see optimal value of K is 2