# How to use symmetry\_final

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1. Select Image Type (Patient or Volunteer)
2. Select User (for file location recognition)
3. Enter DBSCAN properties
   1. Epsilon – Closeness value (how close pixels must be to be considered same cluster. Default value is 5.
   2. MinPts – the dedicated minimum number of pixels for a cluster to not be considered noise. Default value is 10.
   3. Threshold Percentage – the upper-bound intensity threshold for the patient image clustering (e.g. 5% takes the highest 5% of pixels intensity-wise and clusters them spatially)
4. Nipple Selection (for known truth data)
   1. Patient image displayed with arrow as label, indicating which nipple is to be selected on the image.
   2. User input (via ginput) for nipple location, please select center of nipple for best results.
5. DBSCAN Clustering (symmetry\_cluster)
   1. Based on user input values, all patient images are analyzed and the pixels spatially clustered.
6. Midline Identification (symmetry\_midline)
   1. Searching through middle 50% of the image (column-wise), the shortest non-zero column is identified as the midline
7. Cluster Checks
   1. Midline
      1. If a cluster crosses the midline of the image, it is marked for ‘removal’
   2. Reflection
      1. If a cluster has another cluster opposite (reflected about the midline), it is marked for removal
   3. Bottom Boundary
      1. If a cluster has any pixels directly below it (spatially) that have an intensity of 0, then it is ‘removed’.
8. Display Clinically Important Clusters
   1. Display patient images without the clusters marked for removal.
   2. These clusters are, in theory, ones of clinical importance.
9. Align clusters temporally (symmetry\_alignClusters)
   1. Compare the centroid location of all the remaining clusters over time and identify the clusters that are consistent in each image. Renumber the clusters to reflect this consistency and display the intensity of each cluster over time.