IMAGE SEGMENTATION METHOD USING KMEANS AND KNN

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Supervised

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OUTLINE

- Image Segmentation Method

- Methodologies

- Tools and Packages

- Preposed Algorithm

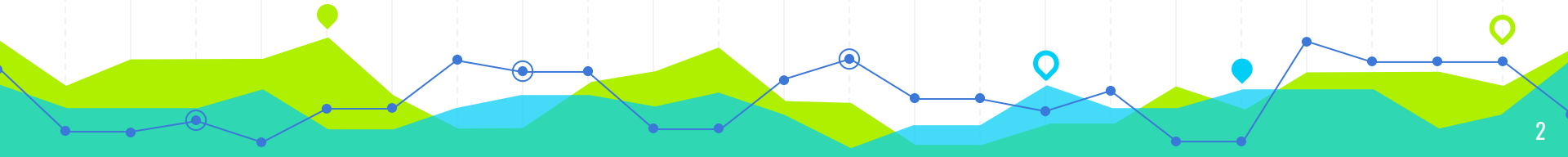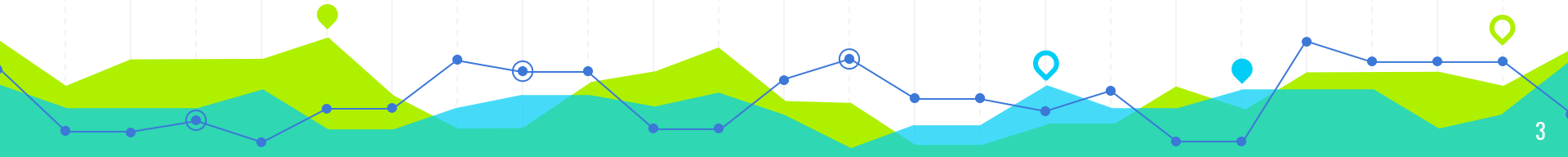- Results

- Conclusion

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IMAGE SEGMENTATION METHOD

Image segmentation is considered as the first step in the image processing and therefore, a better segmentation will make it easier to analyze in the subsequent image processing steps.

METHODOLOGIES

We used in our project this algorithms for image segmentation:

- Kmeans

- KNN

- PCA

The k-means algorithm is the powerful clustering algorithm but it need some optimization on it. So we combine KNN algorithm for optimize the output of K-Means results.

Also we used PCA method for decomposition and clean image data before segmentation.

KMEANS ALGORITHM

- K-Means Clustering is an unsupervised learning algorithm that is used to solve the clustering problems in machine learning or data science.

- K-Means main goal is to group similar elements or data points into a cluster.
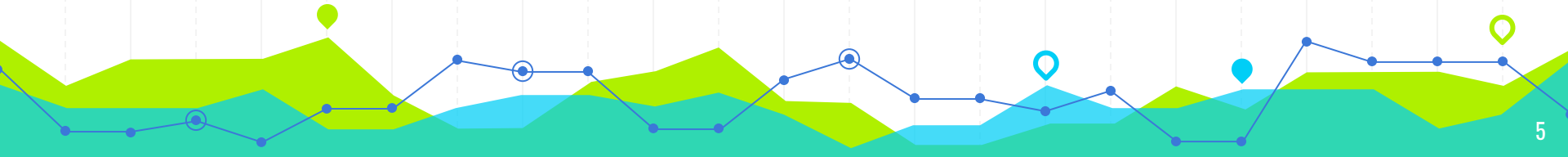
KNN ALGORITHM

- K-Nearest Neighbor is one of the simplest Machine Learning algorithms based on Supervised Learning technique.

- K-NN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories.

- K-NN algorithm stores all the available data and classifies a new data point based on the similarity.
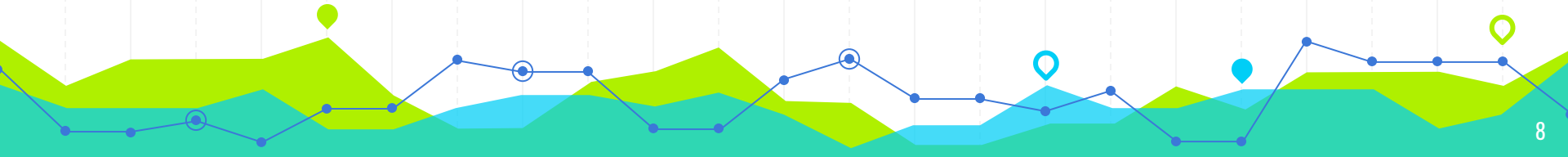
PCA ALGORITHM

- Principal component analysis (PCA) is a technique to bring out strong patterns in a dataset by suppressing variations.

- It is used to clean data sets to make it easy to explore and analyze.

TOOLS AND PACKAGES

- Visual Studio Code as editor.

- Python programming language.
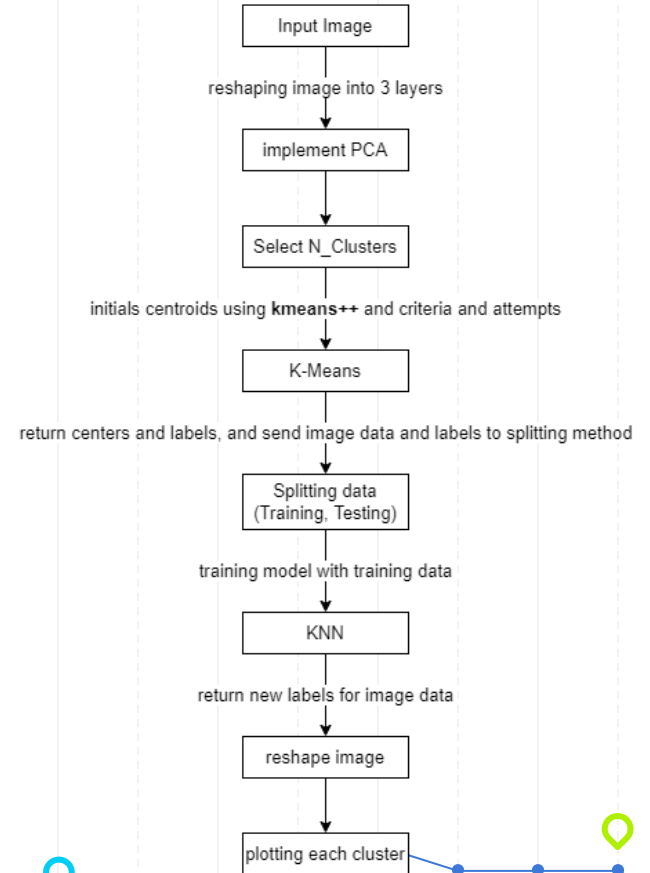
- Matplotlib.

- CV2.

- Numpy.

PROPOSED ALGORITHM

Flowchart:

Algorithm:

1- Input image (reshape the image data)
2- Implement PCA (3 components)
3- Selecting N_Clusters
4- K-Means (initialize centroids using kmeans++ and criteria and attempts)
  - Retuning labels and centers
5- Splitting data into training and testing data
  - Returning Training and Testing data and labels
6- KNN – training model with training data and labels (TrainX, TrainY)
  - Returning results (new labels)
7- Reshape image
8- Showing each cluster depending on labels.

Input Image

reshaping image into 3 layers

implement PCA

Select N_Clusters

initials centroids using **kmeans++** and criteria and attempts

K-Means

return centers and labels, and send image data and labels to splitting method

Splitting data
(Training, Testing)

training model with training data

KNN

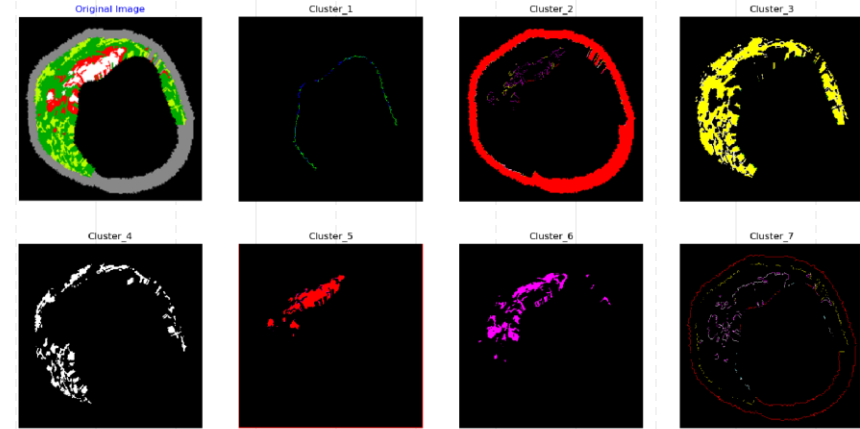return new labels for image data

reshape image

plotting each cluster

RESULTS

- Here is the subplot for each cluster depending on N_Clusters, showing all layers for original image after segmentation.
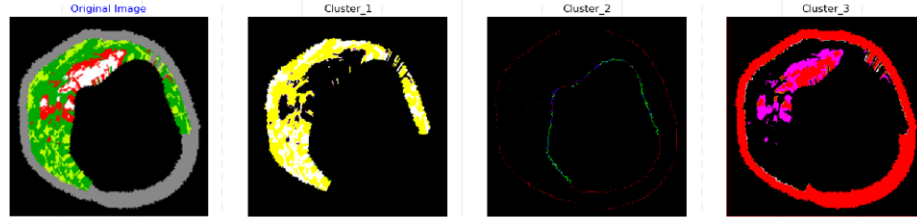
3 Clusters

7 Clusters

CONCLUSION

In this project we try our way for image segmentation based on the k-means and knn algorithms. And that made a some optimization and segment the image into there layers based on number of clusters. As we see the accuracy for 3 clusters is 99.96% and for 7 clusters 99.60%. This accuracy values shows how much there is similarity between the k-means output labels and knn output labels. So there is 0.04% optimization on k-means for 3 clusters and 0.40% for 7 clusters.

REFERENCES

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THANKS