Identification of hand mudras for Indian classical dance forms

Presented by:

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Problem Statement

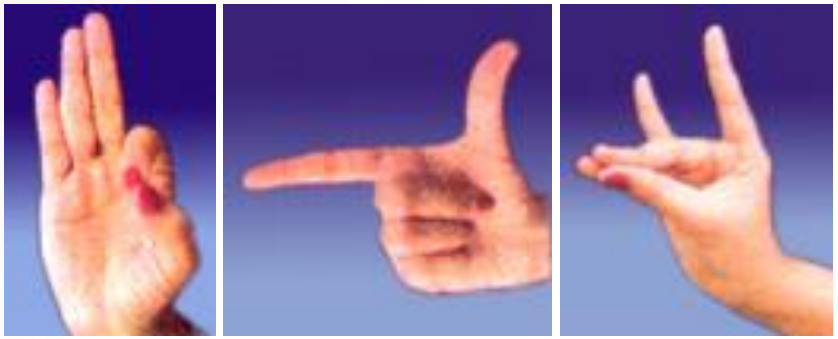
Given an image depicting a hand mudra for an Indian classical dance form, identify the mudra and provide a short description explaining its significance.

References

- J.C. Terrillon, M.N. Shirazi, H. Fukumachi, and S. Akamatsu, “Comparative performance of different skin chrominance models and chrominance spaces for the automatic detection of human faces in color images”, Proceedings of the Fourth IEEE International Conference on Automatic Face and Gesture Recognition, March 2000, IEEE Computer Society, pp 54-61.
- Singh, Devendra. "Human Face Detection by Using Skin Color Segmentation, Face Features and Regions Properties." Http://research.ijcaonline.org/volume38/number9/pxc3876881.pdf. N.p., n.d. Web.
- Asamyukta - Single Hand Gestures- Dances of India-Angika Abhinaya." Asamyukta - Single Hand Gestures- Dances of India. N.p., n.d. Web. 31 Oct. 2012. http://www.webindia123.com/dances/abhinaya/angika_bhinaya/asamyukta.htm

Datasets

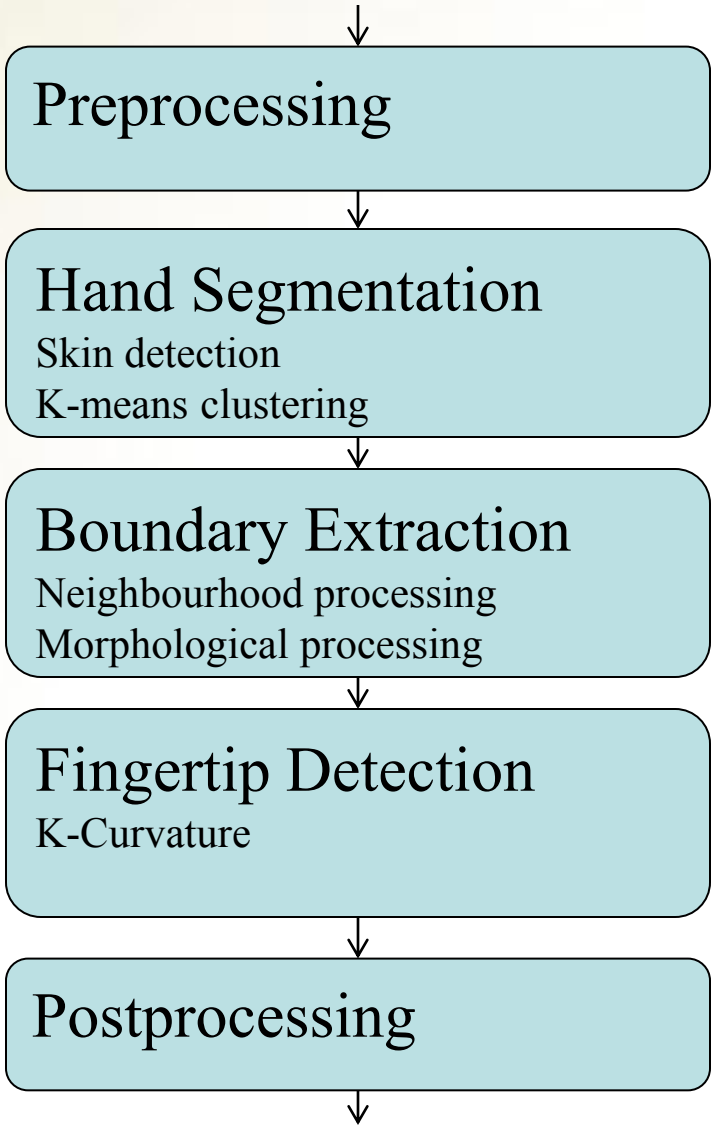
Type I



Type II

Type III

Image Processing Pipeline



Hand Segmentation

- Skin detection : YCbCr, HSV and RGB planes
- K-means clustering

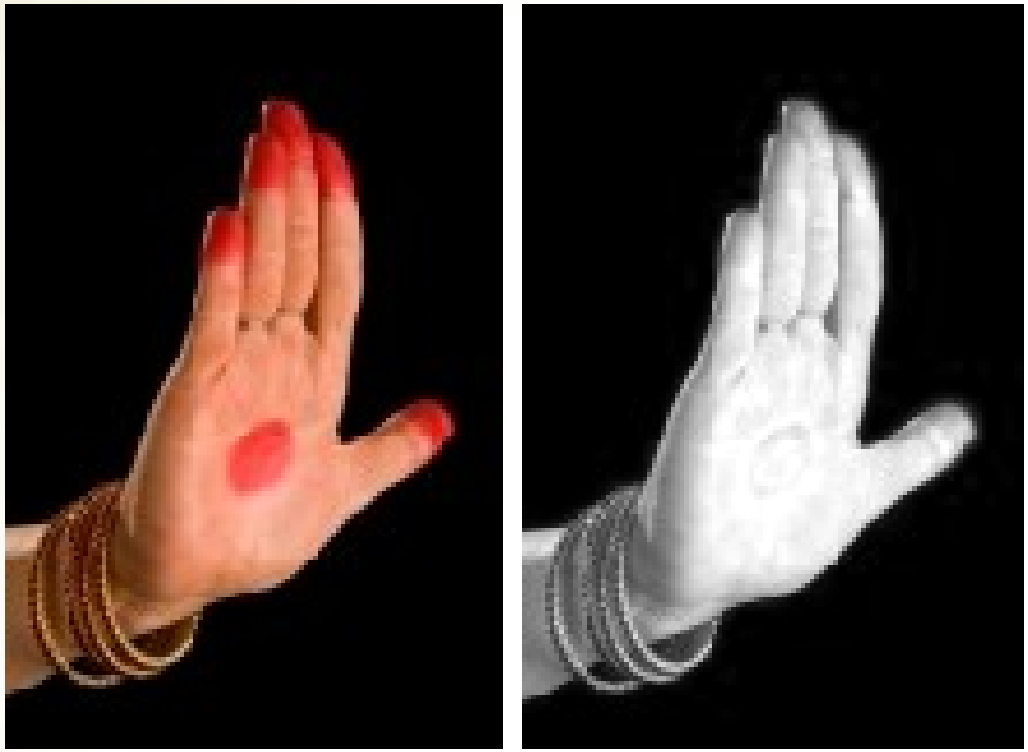
Challenges :

For Type II dataset, removal of mehendi.

For Type III dataset, additional objects in the background with similar color values are detected.

Hand Segmentation : Challenges

Type II dataset : Removal of mehendi



Hand Segmentation : Challenges

Type III dataset : Undesired objects detected

Boundary Extraction

- Neighbourhood processing

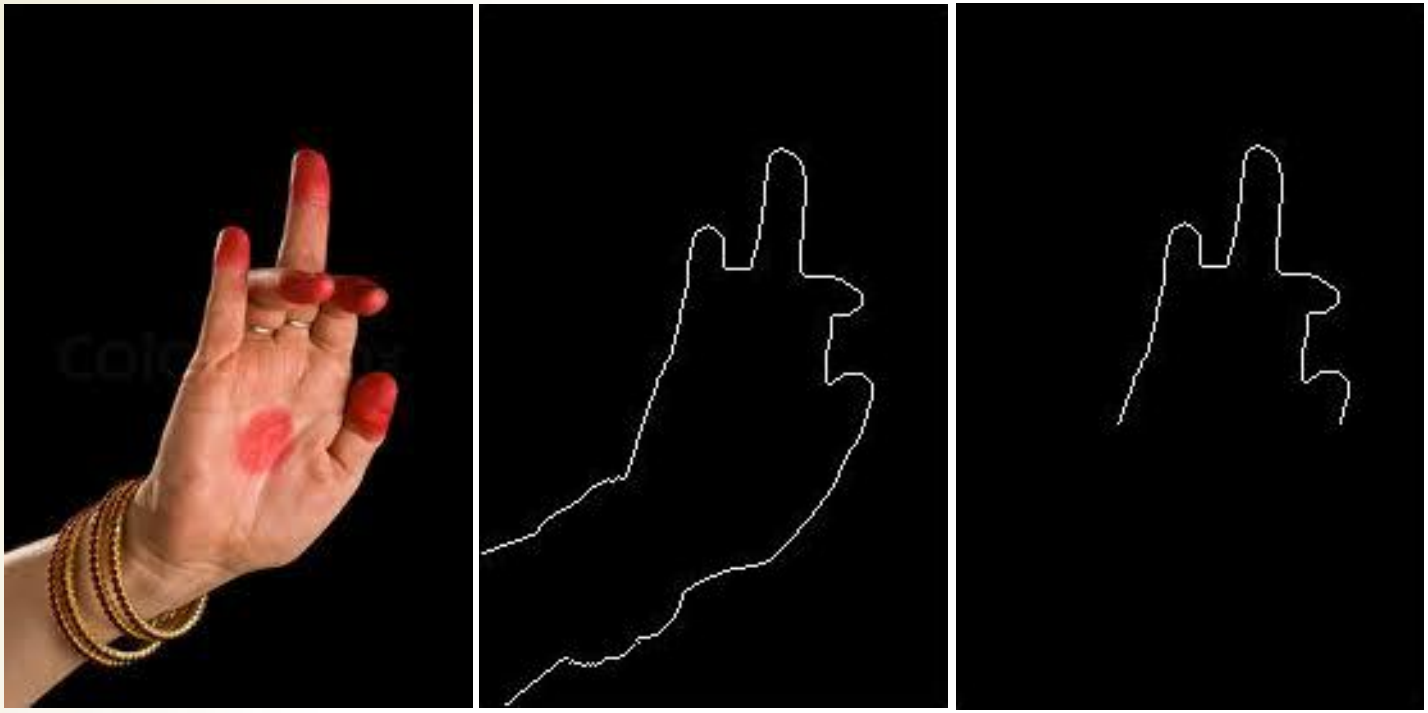
Challenges :

For both Type II and Type III dataset, bangles distort the boundary.

For Type III dataset, background objects to be removed.

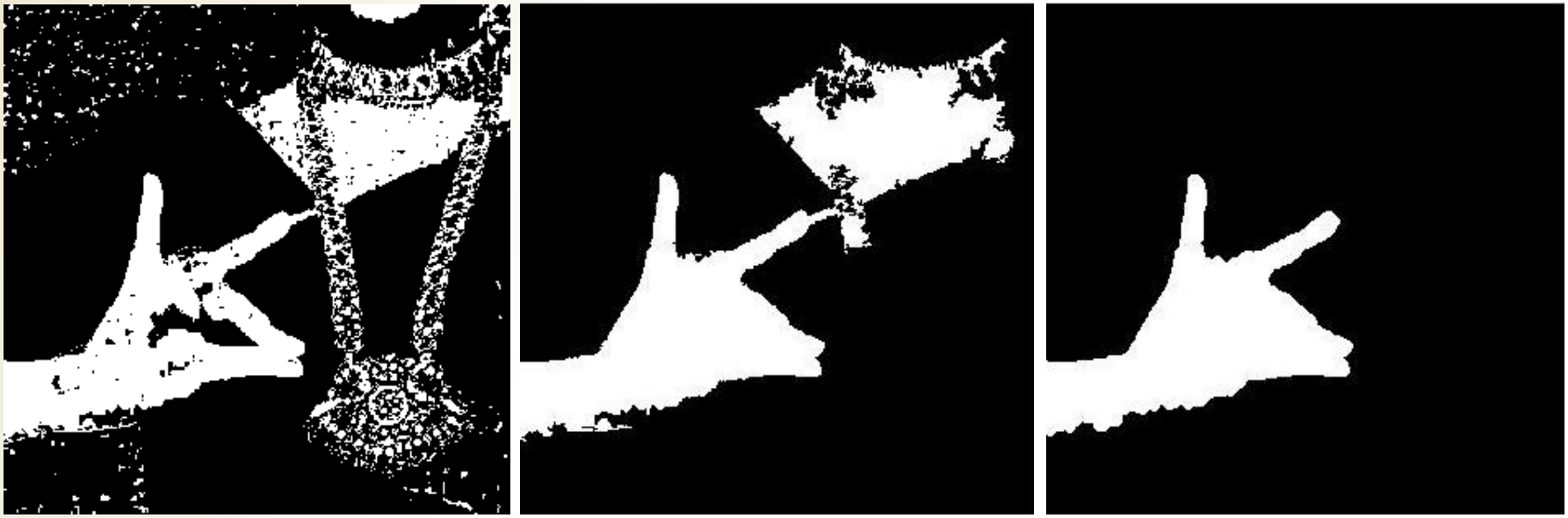
Boundary Extraction : Challenges

Bangles cause boundary distortion



Boundary Extraction : Challenges

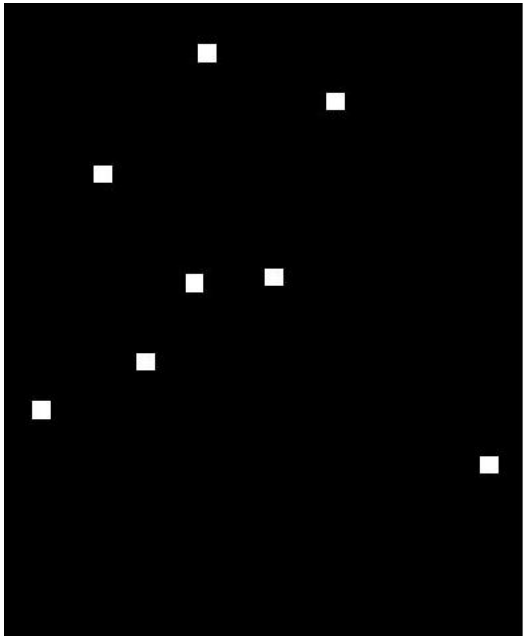
Undesired object removal



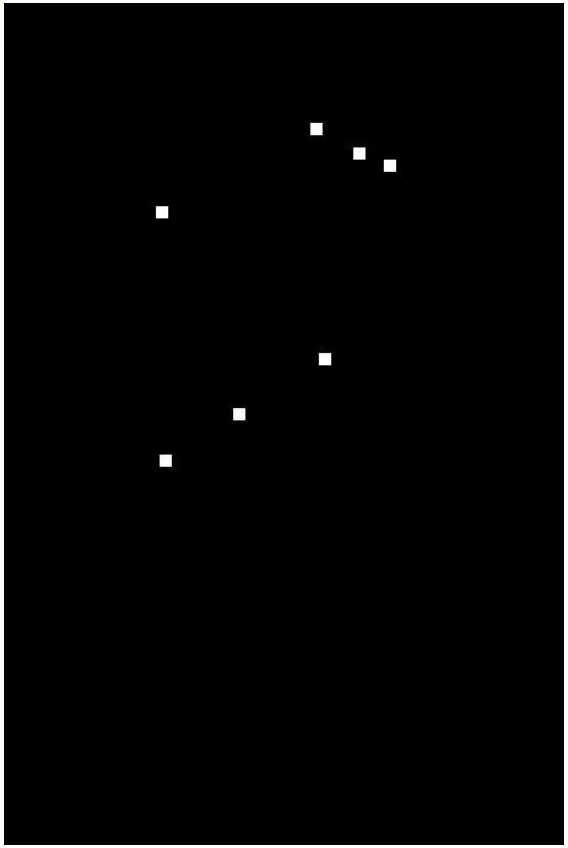
Fingertip Detection

K – Curvature

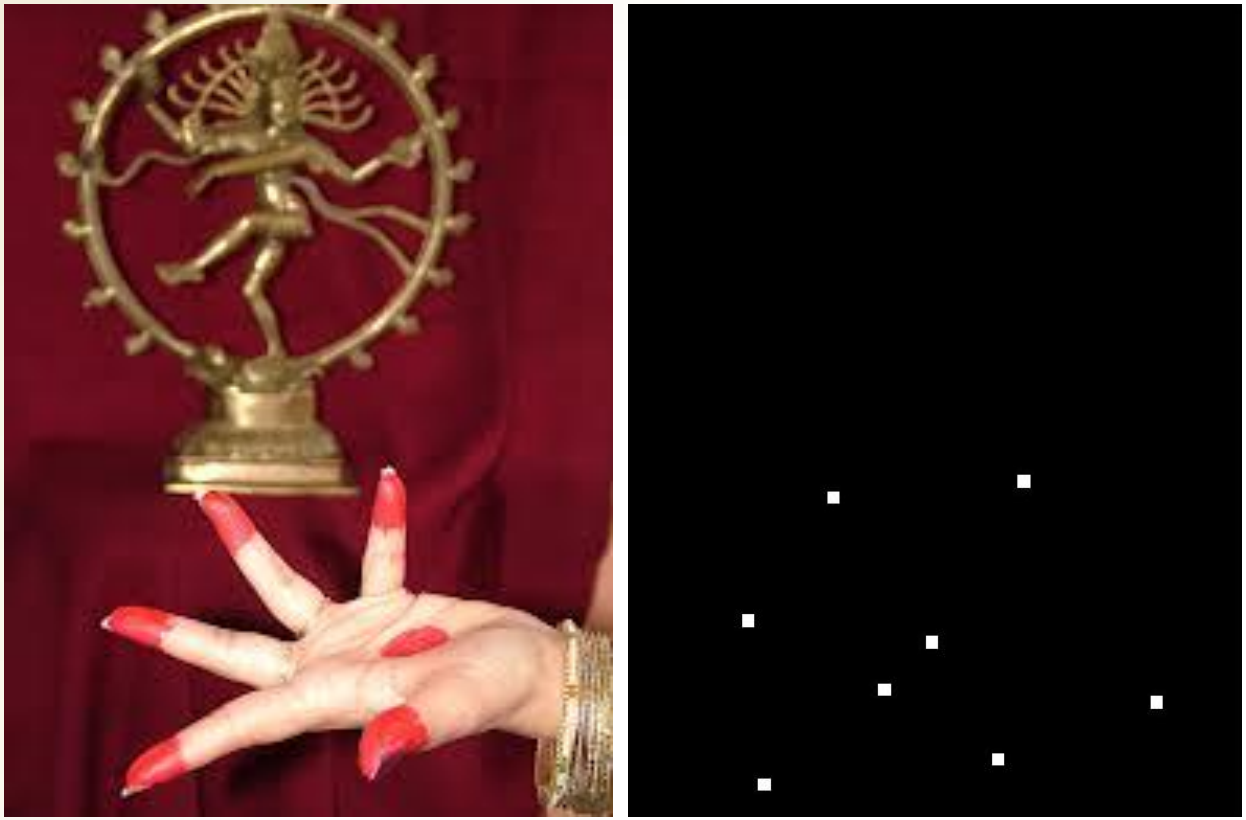
Type I



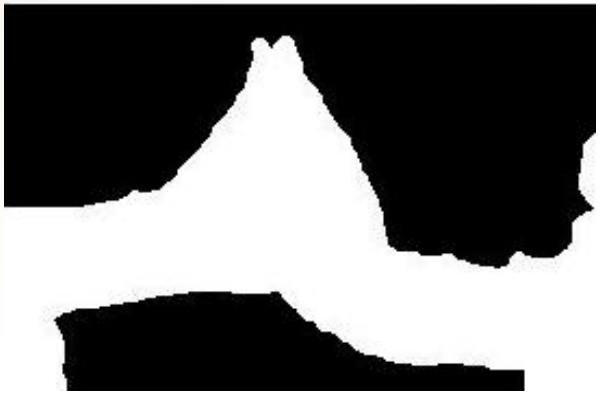
Type II



Type III



Two hands



Further work

- ✓ Two hand segmentation with discernible hands.
  - ✓ Edge detection
  - ✓ Watershed Transform
- ✓ More embellishments
- ✓ Identification of best approach for recognition

Work Division

Interim 1 :

Varsha : Dataset Identification, basic thresholding, Skin detection

Prateek : Fingertip Detection (Distance metrics)

Aditya : Boundary Extraction (Morphological Operations)

Interim 2 :

Varsha : Dataset Identification, K-means clustering, two hands – edge detection and Watershed transform

Prateek : Fingertip detection (K-curvature), Type II dataset challenges

Aditya : Boundary Extraction (Neighbourhood processing), Type III dataset challenges

Thank You!