



Transform is used. Then for feature extraction they have used Hu's seven moments, Zernike moments and Zernike moments with zoning. They got 70-80% of accuracy in recognizing modi characters and they conclude that the accuracy with Hu's moment is 71.52, with Zernike moment is 76.74% and with zoning it is up to 82.61.

**2.3 Comparison Table**

**Table1:** Comparison Table

<i>Researchers</i>	<i>Method</i>	<i>Result</i>
D.N.Besekar	Chain code and two layer feed forward network (for vowels)	Accuracy is near about 65%-75%
SadanandA.Kulkarni Prashant L.Borde R.Manza, Pravin L.Yannawar	Hu,Zernike moments with zoning	Accuracy is near about 70%-80%

**3. Proposed System**

In proposed system for extracting features from modi characters I used boundary descriptor bounding box. By using this bounding box I calculated all its scalar points like area, majoraxislenth, minoraxislenth, etc.

**3.1 Preprocessing**

First of all for database collection I collected images of modi characters then segmented each character and stored them in database. Then by taking one by one character applied following steps

1. Take input image

**Figure 4:** Input image

2. Converted to binary image

**Figure 5:** Binary image

3. Noise is removed using median filter

**Figure 6:** After removing noise

4. Edges are detected using canny edge detection

**Figure 7:** Edge Detection

**3.2 Feature Extraction**

For extracting features from these characters I used boundary descriptor i.e. Bounding Box as shown in below.

**Figure 8 :** Bounding Box

Following are the features calculated from bounding box

```

Area: 774
Centroid: [38.8475 30.4031]
BoundingBox: [9.5000 8.5000 56 47]
SubarrayIdx: ([1x47 double] [1x56 double])
MajorAxisLength: 57.5865
MinorAxisLength: 48.3543
Eccentricity: 0.5431
Orientation: -31.1183
ConvexHull: [19x2 double]
ConvexImage: [47x56 logical]
ConvexArea: 1830
Image: [47x56 logical]
FilledImage: [47x56 logical]
FilledArea: 1613
EulerNumber: -38
Extrema: [8x2 double]
EquivDiameter: 31.3925
Solidity: 0.4230
Extent: 0.2941
PixelIdxList: [774x1 double]
PixelList: [774x2 double]
    
```

**Figure 9:** Feature Extracted Points

Area → It calculates the actual number of pixels in the region.

MajorAxisLenth→It calculates the length of the major axis of the ellipse.

MinorAxisLength→It calculates the length of the minor axis of the ellipse.

Eccentricity→ It calculates the ratio of the distance between the foci of the ellipse and its major axis length.

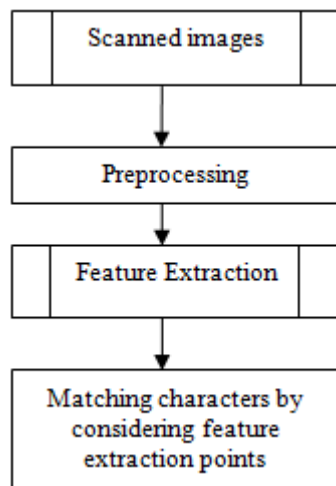
EulerNumber→It finds difference between number of object in the region and number of holes in the objects.

Extrema→It consist extrema points in the region.

Solidity→It is computed using the formula  $\text{Area}/\text{ConvexArea}$

EquivDiameter→It is computed using the formula  $\sqrt{4*\text{Area}/\pi}$

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**Figure 10:** Block Diagram of Feature Extraction

#### 4. Conclusion

By using these features we can recognize modi characters Millions of modi documents were waiting to unfold the history of Maratha History. There are very few people who know the modi script. There is need to work on modi characters so we can get more knowledge about our history.

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#### References

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