S. B. JAIN INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NAGPUR.
(An Autonomous Institute, Affiliated to RTMNU, Nagpur)
DEPARTMENT OF EMERGING TECHNOLOGIES (AI&ML and AI&DS)
"Become an excellent center for Emerging Technologies in Computer Science to create competent professionals"

Blood Group Detection Using Image Processing

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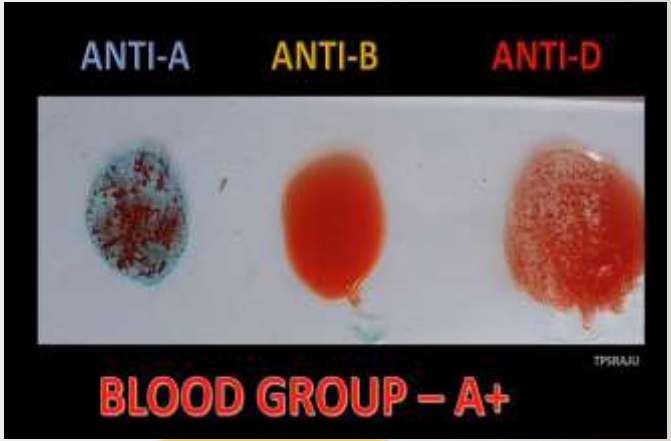
Introduction to Blood Group Detection

Understanding different blood groups and their detection methods is crucial for various medical procedures and transfusions.



- Domain of image processing is progressing a lot and has achieved tremendous milestones.
- Various diseases have been identified using image processing techniques and thus have provided early phase detection
- Image Processing techniques can be used for blood group identification
- The system can help a lab technician or a novice user with no prior knowledge to detect blood group

SYSTEM ARCHITECTURE

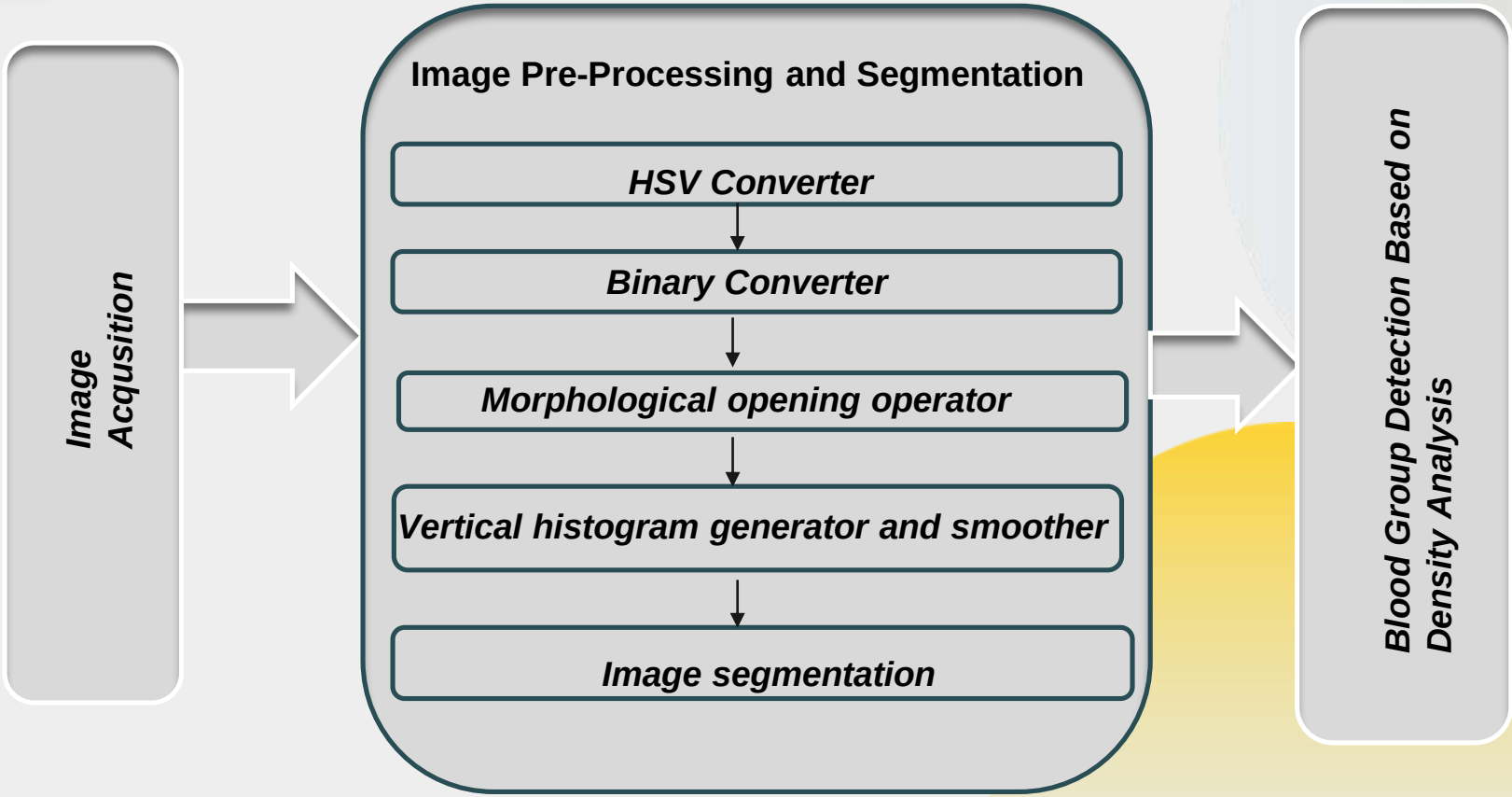


Image Acqusition and pre-processing

HSV conversion and Binary conversion

RGB ⟶ Hue Saturation Value image ⟶ Binary

Hue value ID : 0 – 360

Saturation : 0 – 1

Brightness : 0 – 1

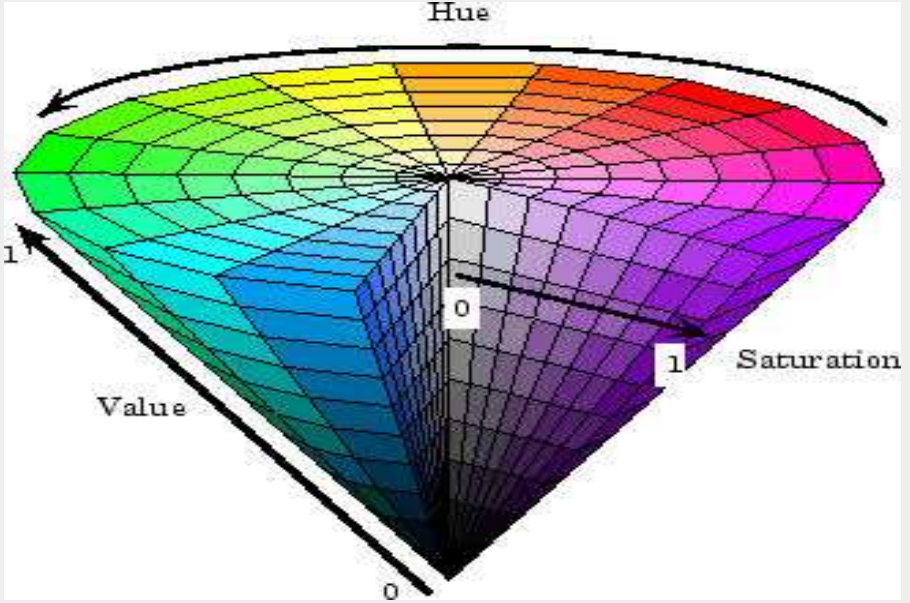
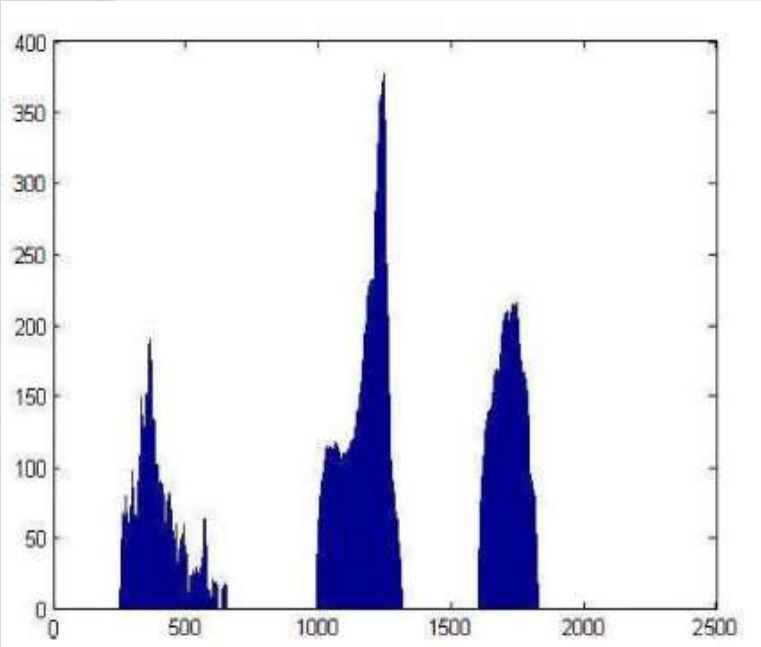


Image acquired using digital camera during blood test at laboratory

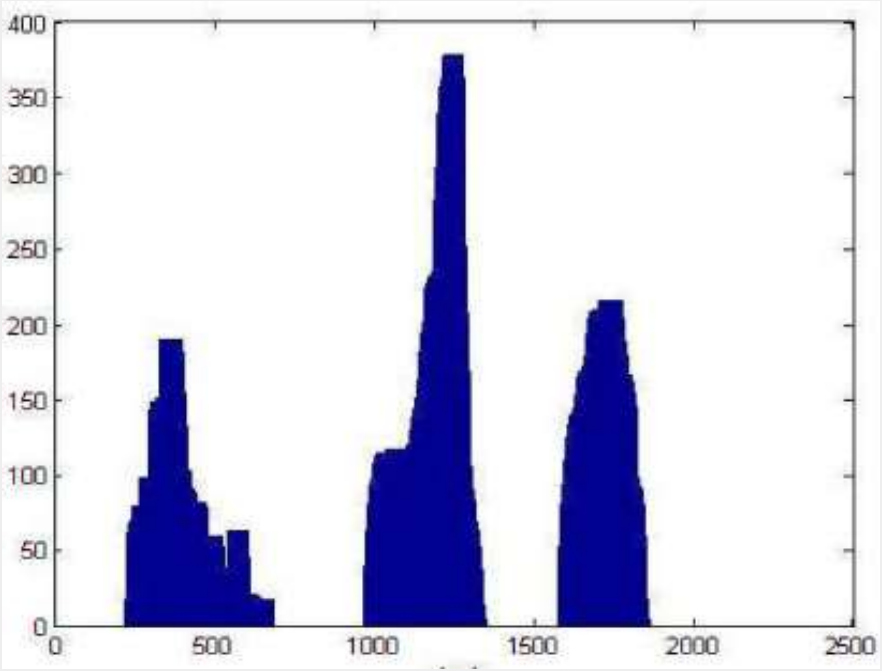
Conversion of RGB image into HSV

Vertical Histogram



$$h(img) = \sum_{i=1}^{c} \sum_{j=1}^{r} whitepixel_j$$

Histogram Smoothing



Done using dialation equation

$$A \oplus B = \bigcup_{b \in B} A_b$$

Histogram Derivation & Segmentation

- First derivative of histogram is taken using equation

$$\frac{\partial f}{\partial x} = f(x+1) - f(x)$$

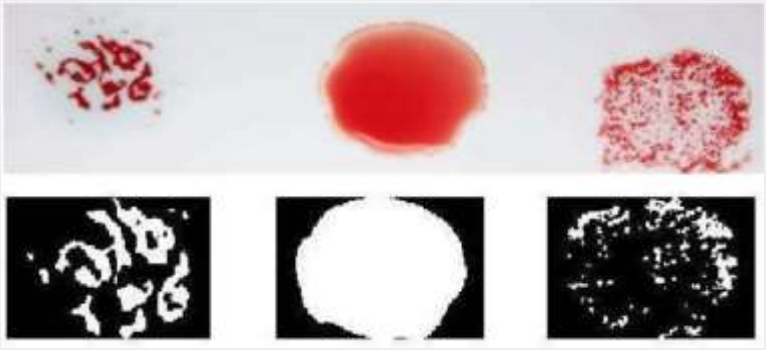
- Based on information of edges segmentation is done

Detection

- Density of white pixel of each segmented region
- Total number of elements in each segmented image

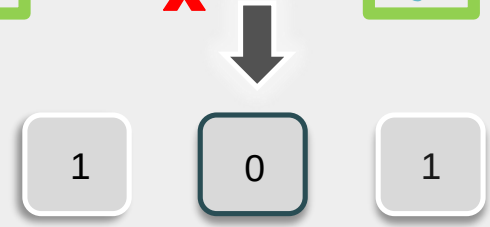
Threshold for Density to accept a region
< 13000

Threshold for number of elements to accept a region
> 5



Density of White pixels in Region One	Density of White pixels in Region Two	Density of White pixels in Region Three
7202	43092	5359

No. of objects in Region One	No. of objects in Region Two	No. of objects in Region Three
18	1	145



Detection

Anti-A	Anti-B	Anti-C	Blood Type
0	0	1	O – Positive
0	0	0	O – Negative
1	0	1	A – Positive
1	0	0	A – Negative
0	1	1	B – Positive
0	1	0	B – Negative
1	1	1	AB – positive
1	1	0	AB – negative

Tools & Technologies

- **Image Processing Libraries:** OpenCV, SciKit-Image, or Pillow for loading, resizing, enhancing, and manipulating images.
- **Machine Learning Frameworks:** Scikit-Learn for building classification models.
- **Data Preparation Tools:** Pandas, NumPy, or Seaborn for organizing and exploring your dataset.
- **Web Development Framework:** Flask for deploying application as a web service.
- **Database Management Systems:** MySQL for storing and querying your data.
- **Version Control:** Git for tracking changes to your source code and collaborating with others.
- **Datasets:** Public repositories like Kaggle

Conclusion and Future scope

- The colored image taken will uploaded into application and will be converted to HSV format.
- Then image will be rendered for the development of histogram then taking the derivative and focusing the area of blood image.
- Using the image blood group will be classified.

In future a small hardware device can be made like diabetes checking machine that we see in our daily life and that small machine could be used by novice users in disaster or other remote areas where expert staff is not available.

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THANK YOU