

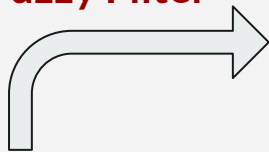


# Particle swarm optimisation K-means clustering segmentation of foetus ultrasound image

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- Medical image segmentation to extract information such as volume, shape, motion of organs for detecting abnormalities.
- Impulsive noise inherent in ultrasound image removed using fuzzy filter.
- Segmentation of foetus ultrasound image by particle swarm optimisation (PSO) K-means clustering algorithm with fuzzy filter.
- Comparing Ultrasound images of a healthy foetus with that of diseased one for detecting the abnormalities.

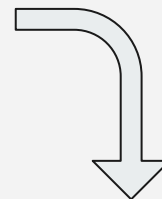
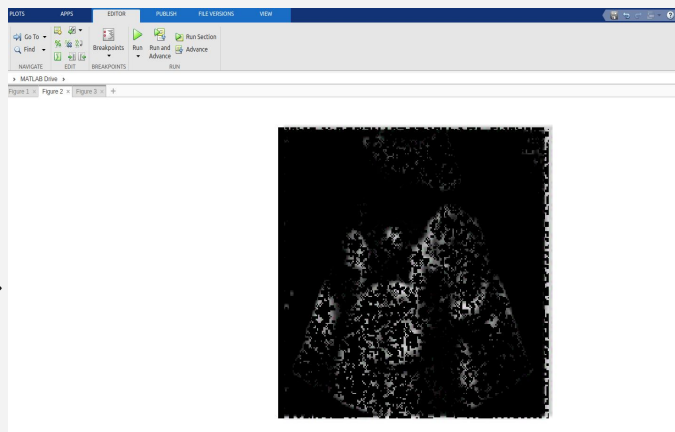
Fuzzy Filter



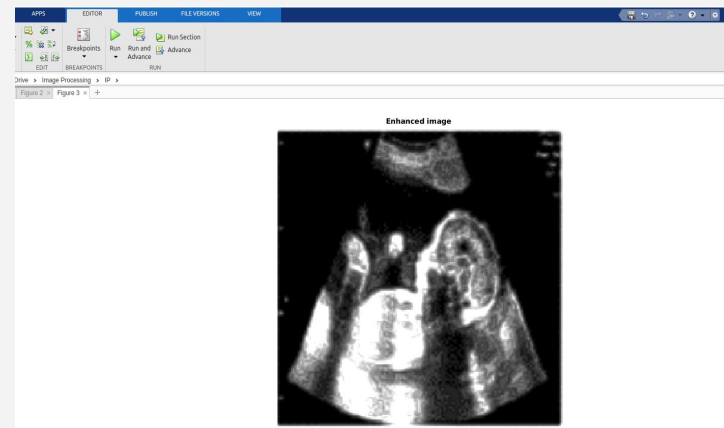
Impulsive Noise reduction



Ultrasound Image



PSO K-Mean Clustering

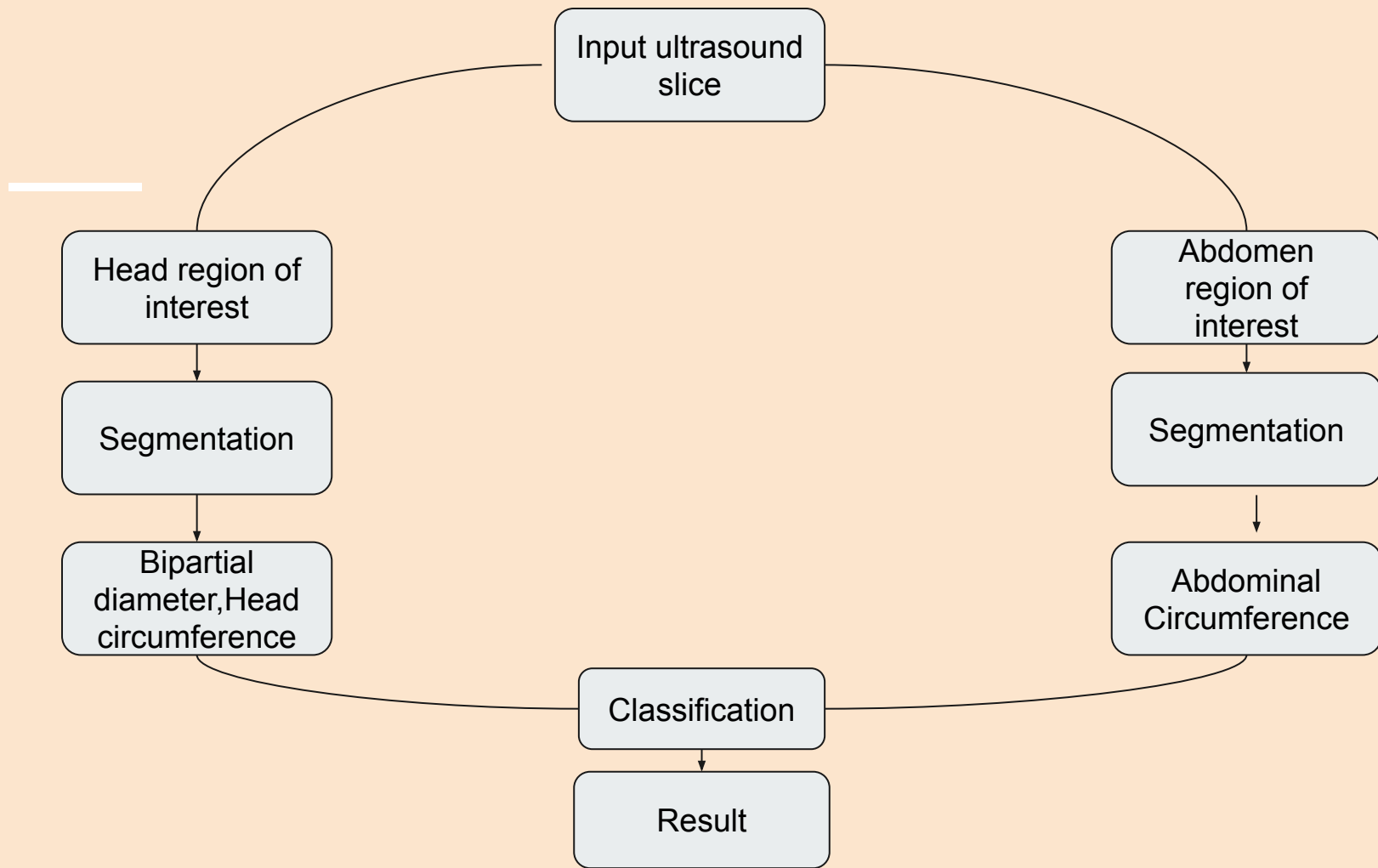


Output Image

# ABNORMALITY DETECTION-

Image segmentation, feature extraction and classification are used for the abnormality detection of the fetus. Convex Hull algorithm is used to the segmented image.

In the preprocessing, noises are removed by applying the Gaussian Filter. Then the thresholding technique is applied for segmentation of the head and abdomen of the fetus.



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The features like Bi-Partial Diameter (BPD) , Head Circumference(HC) and the Abdominal Circumference (AC) are extracted from the output of convex hull and calculate the Euclidean distance with this features from the standard database for finding the abnormality of the fetus and the estimated weight of the baby.



## Analyzed Standard Values (Female)

<i><b>GA (weeks)</b></i>	<i><b>BPD (mm)</b></i>	<i><b>AC (mm)</b></i>	<i><b>HC (mm)</b></i>	<i><b>Fetal weight (EFW) (g)</b></i>
17	39.65	118.79	139.56	195
18	42.88	130.47	153.35	244
19	46.99	144.48	167.96	312
20	49.31	152.99	176.90	356
21	52.48	162.81	187.25	419
22	55.43	174.13	199.24	497
23	58.44	183.07	209.12	572
24	62.30	193.89	221.99	686
25	64.23	205.52	231.56	792
26	67.63	217.55	243.54	926

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The ultrasound images of the fetus are collected from the conversion of scan video is used for this process. By using the Gaussian filter the noise can be removed. Gaussian smoothing the process to remove Gaussian noise.

In this work thresholding technique is used for the segmentation. Here Gray level image is trimmed to binary image. Then all the grey values below  $T$  belongs to black (0) and those above  $T$  belongs to white (1). Convex shape is the efficient representation designed using convex hull.





Image after applying PSO  
k-mean clustering

Head



Preprocessing  
(Thresholding)



Binary  
Conversion



Convex Hull

No of weeks : 20

Abdomen



# Observed Results

Fuzzy filter in the proposed system is based on detection and filtering. It is seen that fuzzy filter is giving good result in terms of removal of noise. K-mean clustering using PSO is applied on the filtered image to find out the optimum centres for each cluster and then each cluster was found using Euclidean distance between centre and the other pixel nearer to them.

The abnormality of the fetus is detected by measuring the euclidean distance between standard feature values and extracted feature values. This method can be applied in detection of abnormality of fetus based on its growth.

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