



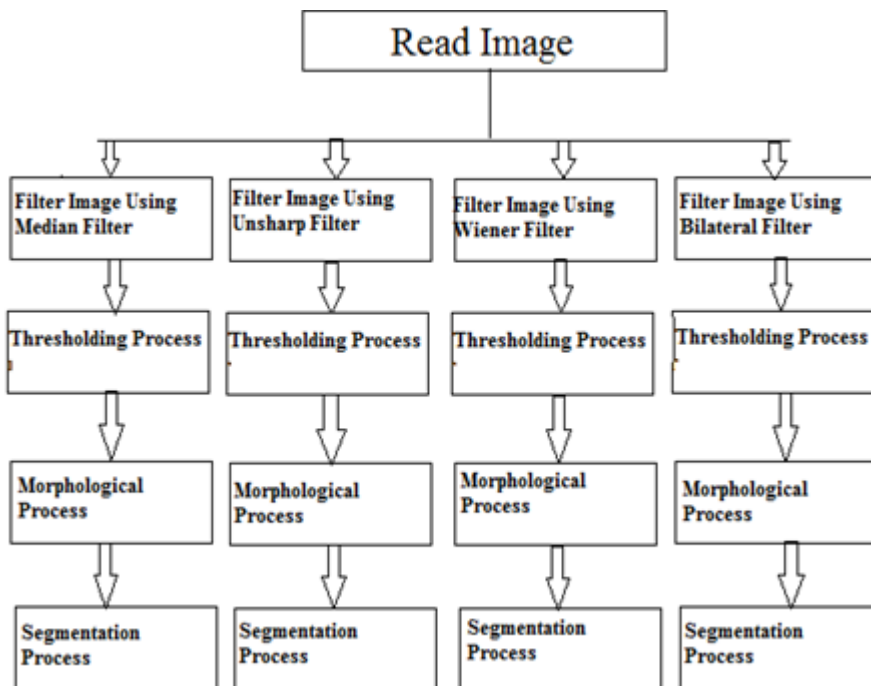
### 3. Results and Discussion

- A comparison of the images, shows that the images were blurred after applying the Median and Wiener filtering techniques. The blurring in Median filtering reduces the speckle noise while keeping the image edges. However, the resulting blurring in wiener filtering is different from Median filtering.
- In the median filtering, the speckle noise reduced but the image edges were maintained. By using Wiener filtering, the speckle is reduced but the image edges are intact. Also, the images are sharper compared with Median filtering. Although speckle is reduced well and structures

are enhanced using Wiener filter, however, some details are lost and some are over-enhanced.

- But viewing the results of unsharp and bilateral filters we can notice that most of the information from the original image is lost, so using these filters in the pre-processing is not suitable
- But the results provided by median and wiener filter are able to remove noise, reduce speckles, preserve edges and can be used in real time application.

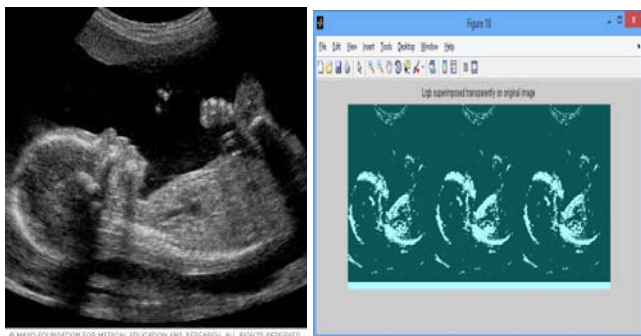
### 4. Flow Diagram



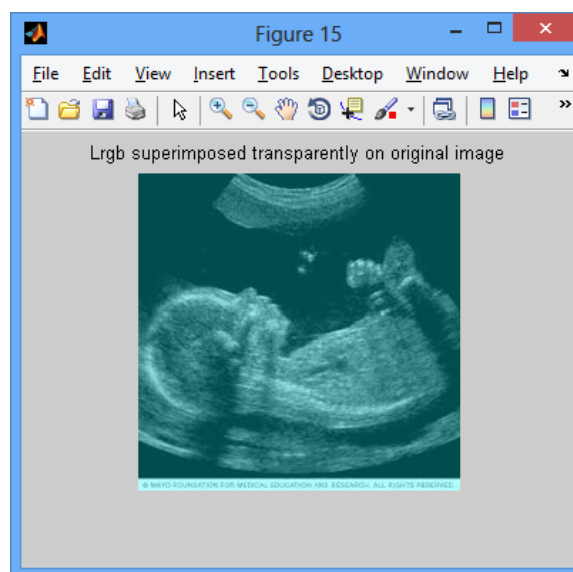
### 5. Output

#### 5.1 Output Images

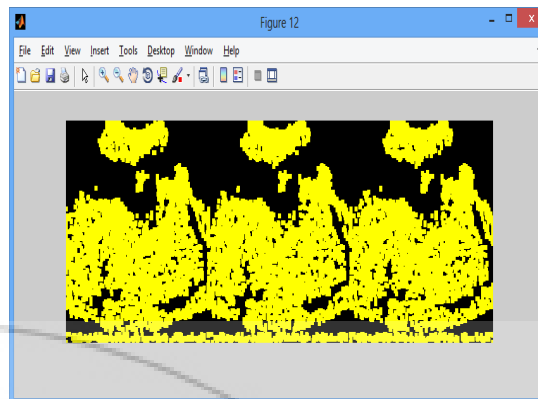
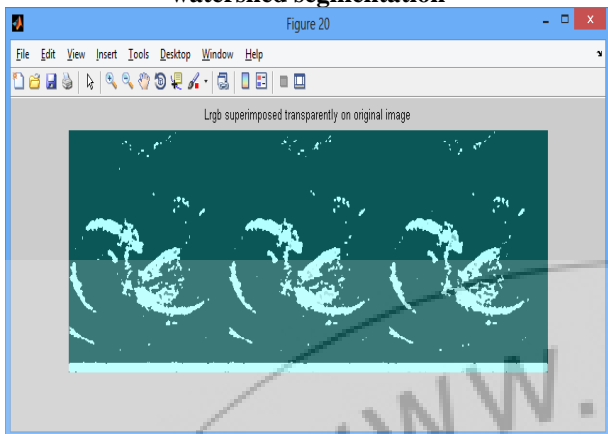
##### 5.1.1 Original Ultrasound Image Output Image without using Filters



##### a. Output of US image only undergone through marker controlled watershed segmentation

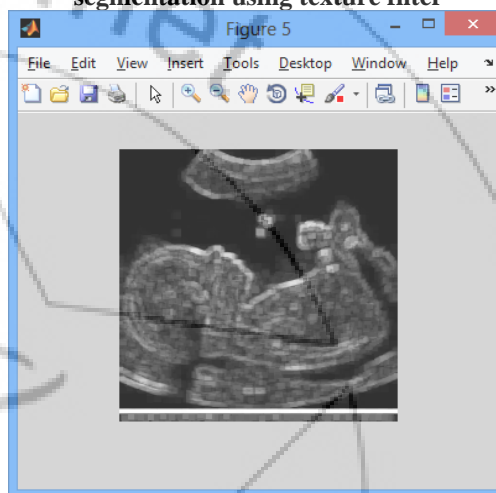
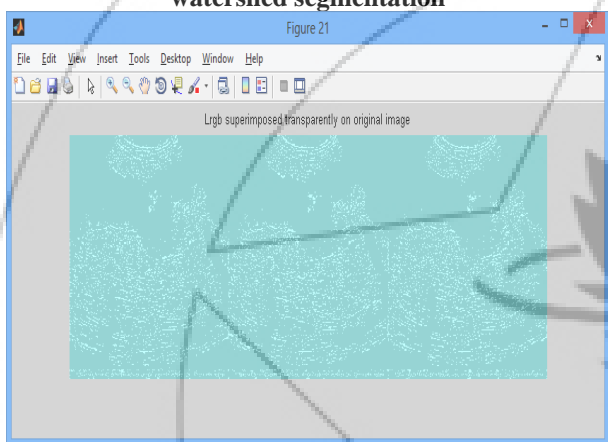


**Output of Median Filter using marker controlled watershed segmentation**

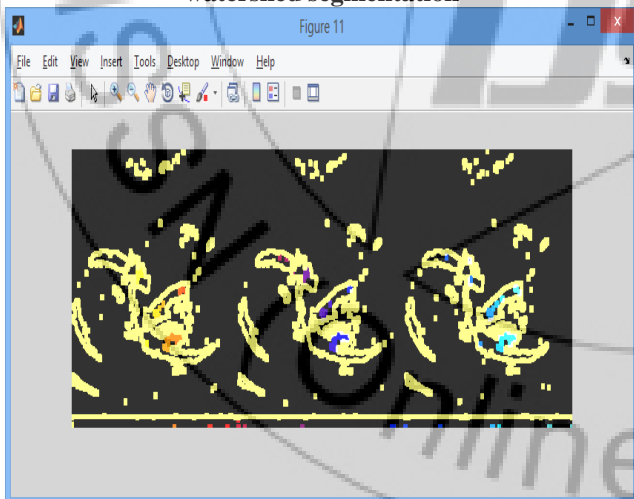


**b. Output of US image only undergone through texture segmentation using texture filter**

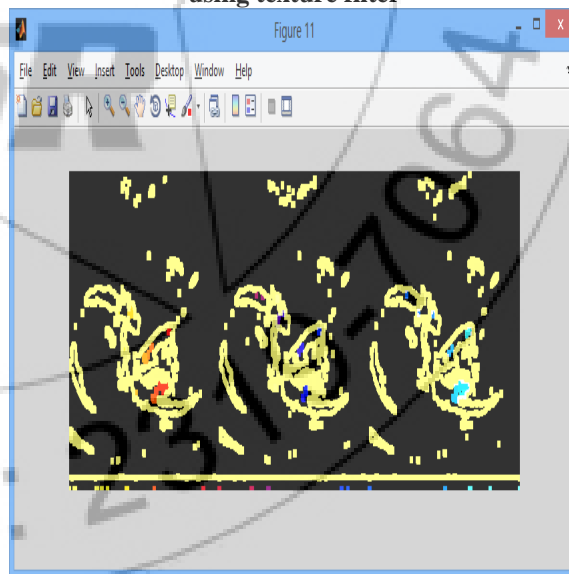
**Output of Unsharp Filter using marker controlled watershed segmentation**



**Output of Weiner Filter using marker controlled watershed segmentation**

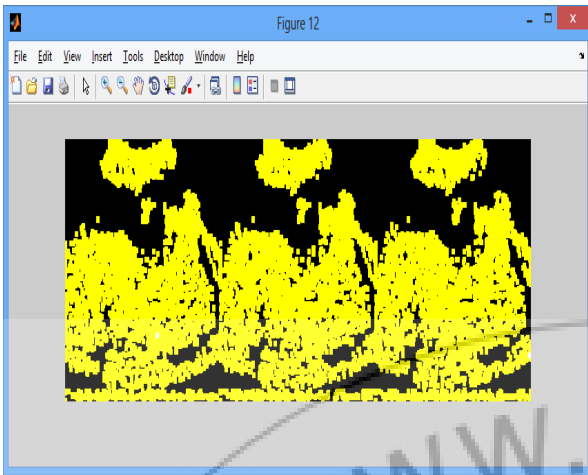


**Output of Median Filter using texture segmentation using texture filter**

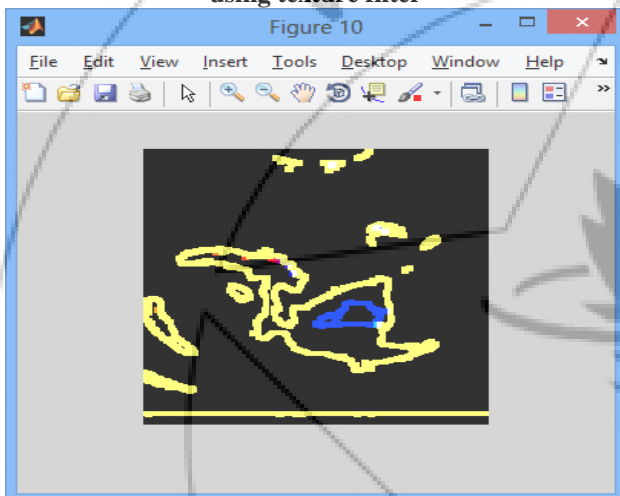


**Output of Bilateral Filter using marker controlled watershed segmentation**

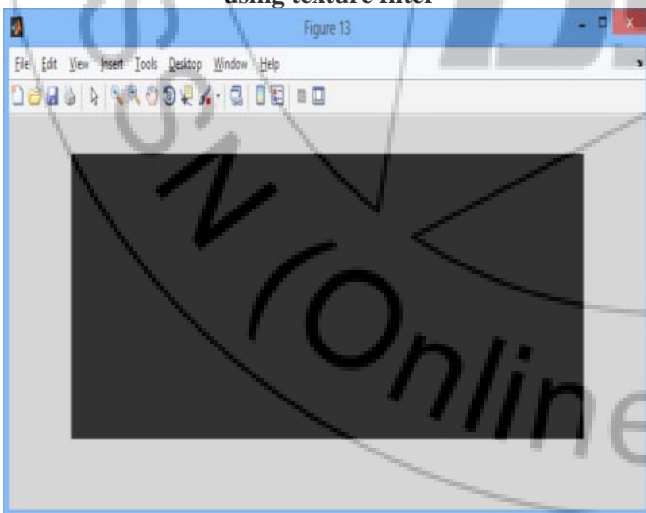
**Output of Unsharp Filter using texture segmentation using texture filter**



Output of Wiener Filter using texture segmentation using texture filter



Output of Bilateral Filter using texture segmentation using texture filter



- The results provided by median and wiener filter are able to remove noise, reduce speckles, preserve edges and can be used in real time application.
- Therefore there is no ideal filter, It is empirically known that a certain filter works excellently for a certain type of original image or degradation while it may not be suitable for other images. It means there is no universally optimal filter. Therefore, the choice of the right filter is important as it will determine the final result of the images and the choice of filter depends on our application and we need to consider the accuracy, real time applications, feasible modifications, computational speed, to improve the SNR we need to take more number of iterations.

## References

- [1] Comparison between Median, Unsharp and Wiener filter and its effect on ultrasound stomach tissue image segmentation for Pyloric Stenosis -International Journal of Applied Science and Technology Vol. 1 No. 5; September 2011
- [2] Comparison of Segmentation Methods for Ultra Sound Images, by Hemanth Kumar P, Stafford Michahial, Prathibha AM, International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 2, April 2012
- [3] Wyllie R. (2012). Pyloric stenosis and congenital anomalies of the stomach. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, eds. Nelson Textbook of Pediatrics. 18th Ed. Philadelphia, Pa: Saunders Elsevier.
- [4] Kalpana Saini, M.L.Dewal, Manojkumar Rohit. (2010). Ultrasound Imaging and Image Segmentation in the area of Ultrasound: A Review. International Journal of Advanced Science and Technology
- [5] Digital Image processing by Rafael C. Gonzalez University of Tennessee and Richard E. Woods

## 6. Conclusion

- Viewing the results of unsharp and bilateral filters we can notice that most of the information from the original image is lost, so using these filters in the pre-processing is not suitable