

Simulation results of the other images Boat and Gold hill can be seen in Fig.4

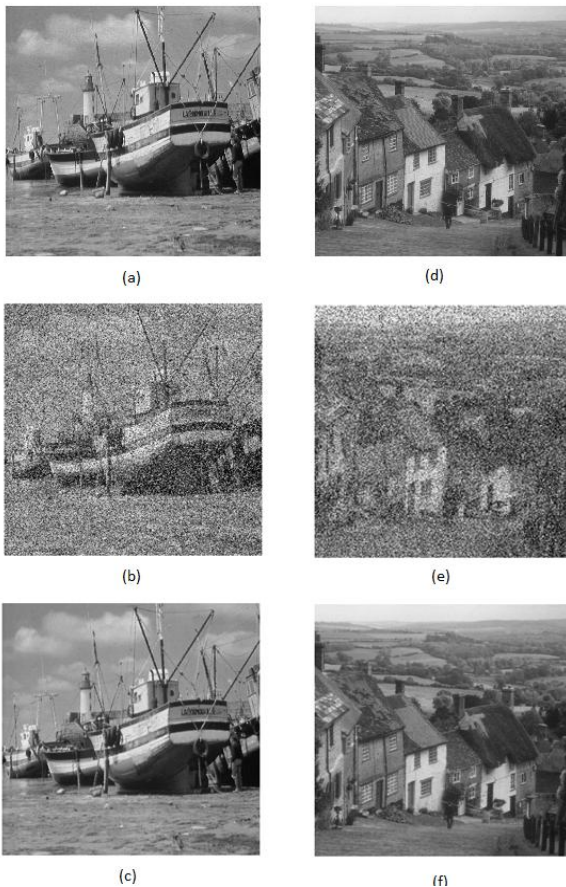


Fig 4. (a) original boat image (b) Image with 40% noise (c) Restored image (d) original Goldhill image (e) Image with 40% noise (f) Restored image

6. CONCLUSION

A morphological approach based on pixel connectivity is used in dealing with high density salt and pepper noise. Connectivity is established between centre and adjacent pixels and based on how many no. of pixels are connected, noise is determined. Performance of this scheme is tested on various standard images. The proposed algorithm gave good results when compared to others. Further, it is seen that all the texture and edge information of the image is preserved in this method.

7. REFERENCES

- [1] W. K. Pratt, Digital Image Processing. New York: Wiley Interscience, 1991.
- [2] Toh, K.K.V. and Isa, N.A.M., 2010. Noise Adaptive Fuzzy Switching Median Filter for Salt-and-Pepper Noise Reduction. *IEEE Signal Processing Letters*, vol. 17, no. 3, pp. 281-284.
- [3] Nair, M.S., Revathy, K., and Tatavarti, R., 2008. Removal of Salt-and-Pepper Noise in Images: A New Decision-Based Algorithm. In *Proceedings of the International MultiConference of Engineers and Computer Scientists*, vol. I.
- [4] T. Nodds and N. Gallagher, "Median filters: Some modifications and their properties," *IEEE Trans. Acoust., Speech, Signal Process.*, vol. ASSP-30, no. 5, pp. 739-746, Oct. 1982.
- [5] W. Luo, "An efficient detail-preserving approach for removing impulse noise in images," *IEEE Signal Process. Lett.*, vol. 13, no. 7, pp.413-416, Jul. 2006.
- [6] P. Civicioglu, "Using uncorrupted neighbourhoods of the pixels for impulsive noise suppression with ANFIS," *IEEE Trans. Image Process.*, vol. 16, no. 3, pp. 759-773, Mar. 2007
- [7] Esakkirajan, S., Veerakumar, T., Subramanyam, A.N. and Premchand, C.H., 2011. Removal of High Density Salt and Pepper Noise Through Modified Decision Based Unsymmetric Trimmed Median Filter, *IEEE Signal Processing Letters*, vol. 18, no. 5, pp. 287-290.
- [8] Gonzalez, R.C., and Woods, R.E., 2004. *Digital Image processing* (2nd edition), Pearson Education.
- [9] Xin Zangju, Wang Shoujue, Deng Haojiang, Luo Yujing, "A new filtering algorithm based on extremum and median value", *Journal of Image and Graphics*, 2001,6(6),pp.25-28.
- [10] Gou Zhongkui, Zhang Shaojun, Li Zhongfu, Jin Jian, "New adaptive median filter algorithm based on extreme value", *Infrared and Laser Engineering*, 2005, 34(1), pp.98-101.
- [11] H. Chan, H. Chung-wa, and M. Mikolova, "Salt and pepper noise removal by median type noise detectors and detail-preserving regularization," *IEEE Transactions on Image Processing*, vol. 14, pp.1479-1485, Oct. 2005.
- [12] A. K. Jain, "*Fundamentals of Digital Image Processing*," Englewood Cliffs, NJ: Prentice-Hall, 1989.