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PERFORMANCE EVALUATION OF BATHYMETRY DATA TO REMOVE UNDERWATER NOISE

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Abstract - *There is a high demand for underwater communication systems due to the increase in current human underwater activities. Analysis of bathymetry data is a challenging task due to several reasons. The data is collected remotely which is enormous in size. Bathymetry data contains the depth values of water body at various locations. This data is processed to generate a 3D plot by interpolating the intermediate values of the plot. The bathymetry data consists of multiple noise which is removed by applying noise removal algorithms. There are some frequency with underwater acoustics are between 10 Hz and 1 MHz. There are some major steps for underwater signal de-noising. The first step deals with signal pre-processing which including amplifying, filtering, and take use of analog / digital (AD) technique to save signals as digital file. The underwater acoustic signal is affected by ocean interference and ambient noise disturbance during its propagation in ocean. Acoustic signal are the most important.*

Key Words: bathymetry data, gridding, interpolation

1. INTRODUCTION

Bathymetry is the study of underwater depth of lake or ocean floors. In other words, bathymetry is the underwater equivalent to hypsometryor topography. The name comes from Greek βαθύς (bathus), "deep", and μέτρον (metron), "measure". Bathymetric (or hydrographic) diagrams are regularly created to help wellbeing of surface or sub-surface route, and generally indicate ocean bottom alleviation or terrain as contour lines (called depth contours or isobaths) and selected depths (soundings), and typically also provide surface navigational information. Bathymetric maps (a more general term where navigational safety is not a concern) may also use a Digital Terrain Model and artificial illumination techniques to illustrate the depths being portrayed. The global bathymetry is sometimes combined with topography data to yield a Global Relief Model. Pale bathymetry is the study of past underwater depths.

Ocean ambient noise is an inherent characteristic of the medium having no specific point source. It is the residual noise background in the absence of individual identifiable sources that may be considered as the natural noise environment for hydrophone sensors. It comprises of number of components that contribute to the Noise Level (NL) in varying degrees depending on the location of measurements. The sources include geological disturbances, non-linear wave interaction, turbulent wind stress on the sea surface, shipping, distant storms, seismic prospecting, marine animals, breaking waves, spray, rain, hail impacts and turbulence. By and large finished a wide recurrence run, the encompassing commotion range trademark shifts relying upon the sources and conditions winning at the estimation area.

2. LITERATURE REVIEW

Precise forecast of volume of the water is fundamental for repository water administration. This paper exhibits a relative investigation of different interjection and commotion evacuation strategies that are connected on bathymetry information of a supply. The systems are assessed on the bathymetry information with salt-and-pepper clamor show produced due to multipath commotion included while information accumulation. Four distinctive insertion procedures in particular closest neighbor introduction, direct addition, characteristic interjection and cubic interjection and three clamor expulsion methods, to be specific, low-pass channel, Gaussian channel and middle channel are assessed. Results show that middle channel with Natural insertion system is the best blend for multipath commotion expulsion and precise supply base surface plot forecast, at long last bringing about exact water volume count [1].

Multi shaft Echo sounder and dynamic sonar are utilized for submerged correspondence for getting bathymetric information in XYZ co-ordinate frame. Factual examination is done to perceive clamor in introduced information. For picture reproduction addition procedures are utilized and 3D plot is plotted utilizing MATLAB. At that point volume of need or supply is computed and comes about we can contrast and SURFER 8 programming which is roughly same. [2]

In Savitzky-Golay Filter, investigation is improved the situation distinctive requests of polynomial and edge sizes which demonstrate that with higher request of polynomial and lesser casing size PSNR is high. The outcomes from surfer plots demonstrate that the harr wavelet with decay level up to 5 and Savitzky-Golay channel with arrange 4 and casing size 31 can be successfully utilized for smoothing the

information got which can prompt estimation of profundity with least mistake utilizing observational equation intended for a specific application. [3]

4. PROPOSED SYSTEM

The description of the block Diagram is given below.

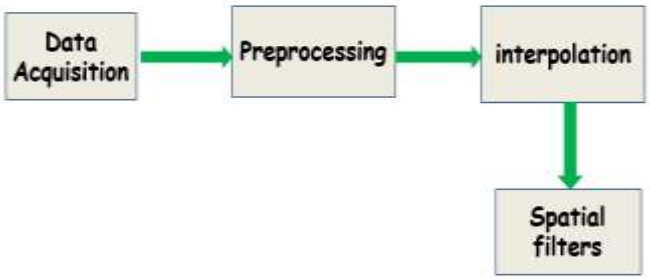

Fig.1. Block Diagram of proposed system

Read the given data and split it into XYZ then apply the following process:

- Stationary wavelet transform

The Stationary wavelet transform (SWT) is a wavelet transform algorithm designed to overcome the lack of translation-invariance of the discrete wavelet transform (DWT). Translation-invariance is achieved by removing the down samplers and up samplers in the DWT and up sampling the filter coefficients by a factor of $2^{(j-1)}$ *in the* j^{th} level of the algorithm.

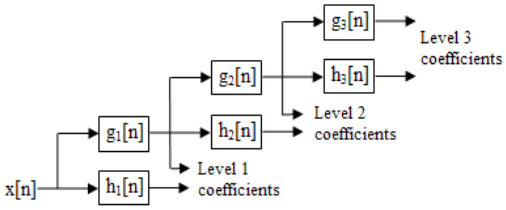

Fig 2 digital implementation of SWT

5. RESULTS AND DISCUSSION

The proposed system is developed in MATLAB. The gridded data bathymetry data collected using echo sounder and GPS in large size. The data is near about 3032 points. It shows sharp variation in the depth values .The values in negative show depth and height below the surface of water.

The data is passed from wavelet decomposition by using stationary wavelet transform for the denoising. Its shows the ridge in the data. Figure 3 shows after Wavelet Decomposition.

The approximation coefficient of the decomposition data are than passed through Delaunay triangulation. To prevent bottom of surface. Figure 4 shows after Interpolation.

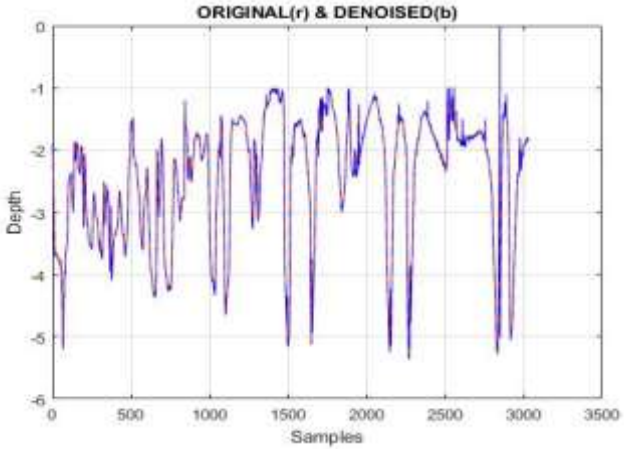

Figure3.Wavelet Decomposition

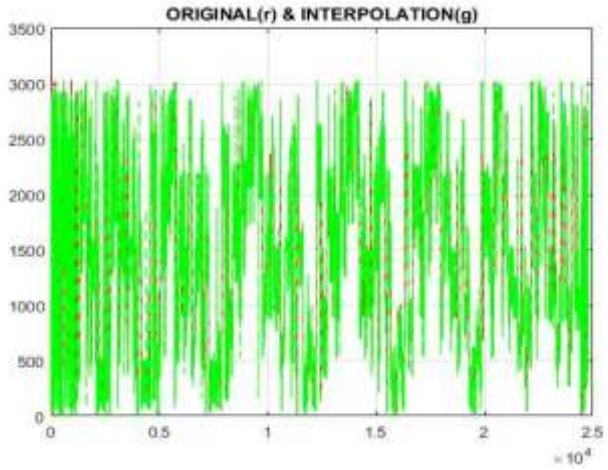

Figure4.Delaunay triangulations

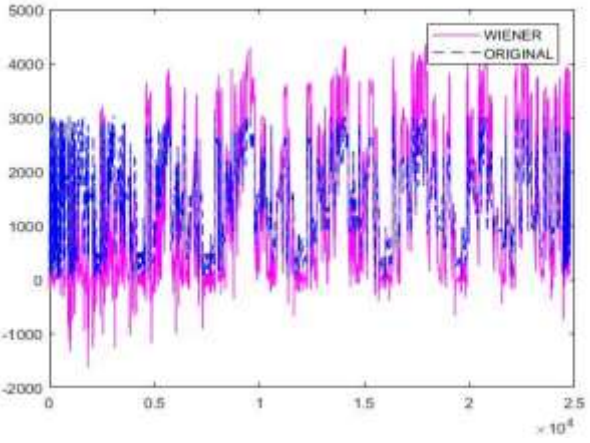

Figure5.Filtered output

6. CONCLUSIONS

This paper presented a system for analysis of bathymetry data and statistical analysis also done by calculate PSNR and MSE. The System includes noise removal by using different noise removal algorithm and interpolation Techniques are predict the bottom surface of reservoir and river. By using wiener filter we remove noise. The Wiener filter is based on a statistical approach, and a more statistical account of the theory is given in the minimum mean square error (MMSE) estimator article.

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