Object Recognition and Compression in Underwater Images

Masoud Salehi (NU), Haerudin Akill (NU), Muhammad Amanuddin (NU)

Objective

To recognize areas containing objects of interest in underwater images. In particular, recognition of objects of interest in images taken by WHOI in underwater archeological missions.

- Decomposition of image into areas that contain objects and those that do not contain objects.
- Encoding of the image using higher rates for areas containing objects and lower rate for areas without objects of interest.

Significance

- Reduction of the data rate requirement for storage and transmission of the images.
- Consequently, ability of transmission of the images over low capacity underwater channels.

Technical Approach

- To find a function and a threshold value that recognizes the areas containing objects from the areas that do not contain objects.
- To use a tree decomposition of the image by applying the criterion function and decompose the image into important and background areas.
- Representation of the two areas at different rates, i.e., using finer quantization for important areas and coarser quantization for less important (background) areas.

Relation to ERC

- Data collected by sensors should be stored or transmitted to a remote site for processing and recognition.
- The amount of data in images is very large and has to be compressed with a goal of preserving the basic features pertinent to the recognition process.
- Compression and recognition of the location of important objects in images is an essential part of ERC.
Current Status

• Currently the emphasis is on applying different compression schemes to the recognized areas of the images supplied by WHOI.

Plans and Project Evolution

• Development of a statistical approach to the problem based on larger image data.
• Development of source-channel coding algorithms for recognition. This should considerably improve the performance of compression-transmission scheme.
• Development of compression-transmission coding algorithms for multiple sensor data collection (e.g., images and sonar data).
• The extended vision is to develop algorithms that can efficiently, and at low rates, extract main features of objects from multiple types of data.

PI Contact Information
Masoud Salehi
Associate Professor
Northeastern University
Boston, MA 02115
phone: (617)373-2446
fax: (617)373-8970
email: salehi@ece.neu.edu