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Real Time Live Fish Object Detection and Tracking In Under Water Stereo Videos

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ABSTRACT
The purpose of this paper is to present a rapid and efficient fish tracking method suitable for real world automatic underwater fish observation. In recent days computer vision based non extractive fish wealth estimation is get more attention in sea for underwater environment. Moving object in the low frame rate video tracking is much more difficult in underwater stereo camera system. Unstable clarification, unwanted noise and poor motion continuity in the underwater system, however, make conservative tracking methods unpredictable. In this paper, we present a multiple target fish tracking method for low contrast and low frame rate stereo videos with the use of trawl based underwater camera system. An automatic fish segmentation algorithm overcomes the low contrast issues by adapting active contour model approach on object detection images to determine an exact segmentation on fish shape boundaries. In addition, the object tracking uses the SVM classifier to classify the fish object before it tracked in the underwater stereo camera video frame. The efficient block matching perform stereo matching which enable an automatic fish body end compensation to reduce segmentation error and accurate length measurement, life time calculation.it enables the efficient, rapid removal of unwanted information from large scale fish video data. Experimental results show that the proposed method is able to achieve high accuracy.

Keywords
Fish estimation, low frame rate video, multi target tracking, stereo imaging, ACM, underwater video, SVM.

1. INTRODUCTION

Traditionally, fish abundance estimation in marine biologists determine the existence and quantities of various types of fish tracking using several methods, including casting nets in the ocean for collecting and tentative fish, the human underwater environment and camera works. Each of these methods has drawbacks it kills the collected fish, damages their happened and costs is high and waste large amount of time. This paper presents alternative approach by using video based technology to find fish object movement, length size and type of object measurements. Underwater video processing system for fish detection, tracking and counting using stereo cameras system. There are several challenges for underwater video analysis. First, the fast reduction make many foreground objects have low contrast with background and fish with similar ranges from the stereo cameras can have significantly different intensity because of the difference in angle of incidence. Second, unwanted noise is created by non-fish objects such as bubbles, organic waste. Third, low frame rate and low frame stereo videos of capturing results in poor motion continuity and frequent entrance and exit of the fish for target object tracking. The contribution of this paper include object segmentation algorithm that overcomes the challenges by low contrast and different illumination by modifying active contour model and histogram back projection method and multiple object tracking algorithm to track fish with sudden movement due to low frame rate. Inside of object detection process using gray level morphological gradient system is identify the correct locations and boundaries of all objects in the original image, thresholging by area and variance to remove noise and unwanted objects, post processing is used to filter the segmented objects, object mask must perform correct object shape. After object segmentation perform video tracking to track object using ACM based object segmentation with stereo matching object height blocks is to finding corresponding points between two offsets images of the same scene. Object Classifier is an algorithm that takes a set of parameters that characterize objects and uses them to determine the type of each object, Object classification using SVM (support vector machine) algorithm. SVM perform linear and nonlinear classification and is used for find character about multiple fish object.SVMs can efficiently perform a non-linear classification using kernel based classifier, implicitly mapping their inputs into high-dimensional feature spaces.Data association is process of associating uncertain measurements for Object tracking, Data association is to combining two object information for tracking the fish Object. In recent years underwater stereo video systems have been used in wild fish stock

assessment and in pilot studies to monitor length frequencies of fish in aquaculture cages.

2. RELATED WORKS

So far, research in underwater video processing has been mostly limited to constrained environments. here striking conditions are controlled and inactive, the background is static, and possible fish species are known. These video tracking technology is difficulty for underwater environments.however,underwater image processing has currently gained more interest for fish object tracking.Relevant works are these yi-haurshiau et al:[1] this paper present the efficient fish tracking method for real world underwater fish observation. These fish tracking is purely based on marine biologist to track fish object and their ecological environment. Fish tracking using bounding surrounding boxes method to find exact object tracking in underwater processing Srividya et al:[2],this paper present the video processing for detecting and tracking moving object. the goal of this paper is moving object is detected in unconstrained environments and under water on moving plants, low contrast. Moving object is using adaptive Gaussian mixture model and tracking method used kalmanalgorithm.Emmabeauxis-Aussalet et al:[3],the work of this paper is data retrieval framework for fish population monitoring.

3. VIDEO PROCESSING

The most level of data gathering in the system is video processing for underwater environment with computer vision algorithms for fish object segmentation, fish object tracking and object extraction. The video processing used these methods for finding shape of the object and moving fish object.

- Video frame acquisition and Preprocessing.
- Object detection and extraction.
- Stereo videos.
- Object feature extraction.
- Object classification.

4. FISH OBJECT DETECTION

The fish segmentation algorithm divides three steps, as shown in fig.1.first step is object detection. Next is thresholding by area and variance is to remove noise and unwanted objects. After that, post processing step is filtering the segmented objects. Object detection is identifying the each frame location for all moving objects. it consists of:i)motion detection phase: image frame pixels are individually analyzed and marked as part of the background scene or of the foreground scene and ii)blob extraction phase, where all the regions of foreground pixels are joined into blobs.

PREPROCESSING

This technique is used to remove low frequency background noise, removing reflections and image resampling (reduce number of pixels of data),gray scale contrast. This method enhance the visual appearance of the image it improves manipulation of data's.it consist number of image file of input but this take one image file while shows foreground and background objects.

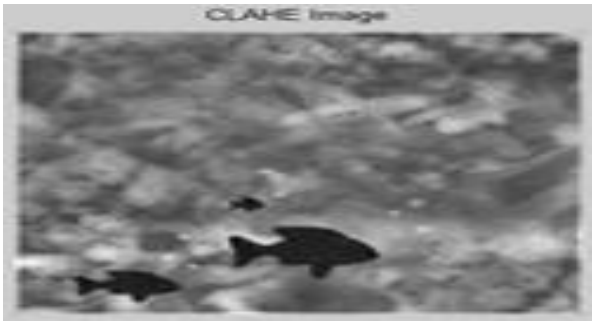

Fig 1: Snapshot of video with input image.

GRAY LEVEL MORPHOLOGICAL GRADIENT

Gray level morphological gradient operation is performed on the input video frame to roughly locate the fish object, is used to identify the correct locations and boundaries of all objects in the original image while each pixel value is indicate the contrast .it display the RGB colors, gray level must perform the black and white.

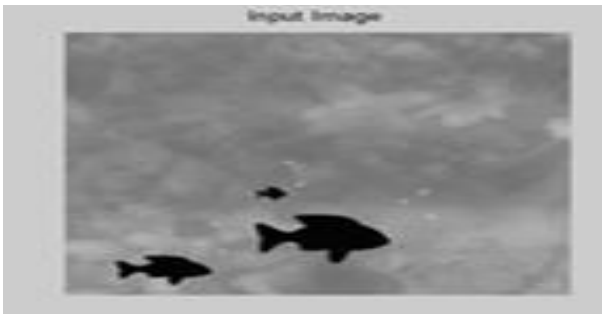

Fig 2: Snapshot of video with using gray level system

BOUNDARY REGION DETERMINATION

Image object are determined as a function of those boundary points found to correspond to an edge of the object (e.g., points include within a bounding region, at the expected angle, and not too far from a line connecting similarly expected points). Characteristics of the object, such as position, orientation, size, centre of mass, and boundary points, can be determined in the image reference frame.

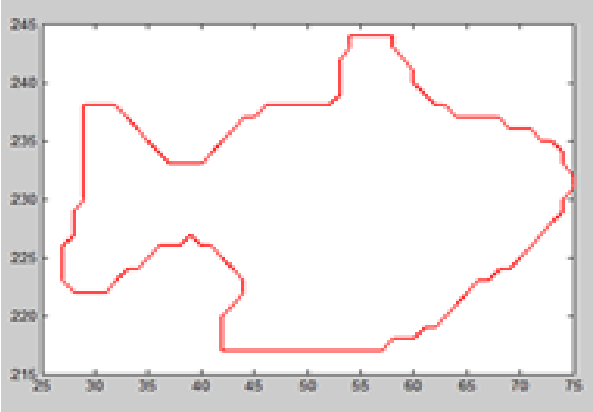

Fig 3: Snapshot of image using boundary region.

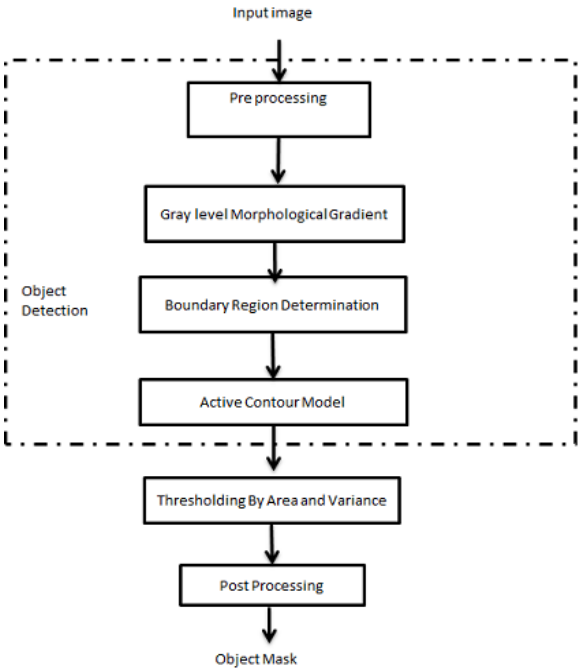

Figure 5: Flow chart of the proposed fish object detection algorithm.

ACTIVE CONTOUR MODEL

ACM is a framework for defining an object outline from possibly noise 2d images. Contour is to fit the exact object boundary. Framework attempts to minimize energy, that is internal energy and external energy. Internal energy is encouraged previous shape preferences that is, smoothness and elasticity then particular known shape. External energy is encourage contour to fit on places where image structures exist, e.g., edges.Active contour models have widely been used for image segmentation in active contours increases the elasticity. The idea in an active contour model is to find a curve, in order to detect objects in that image.

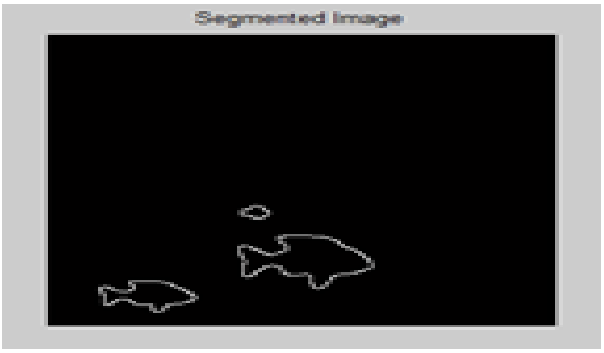

Fig 4: Snapshot of video with segmented object using active contour model.

THRESHOLDING BY AREA AND VARIANCE

Threshold value explains the area of an object and variance of pixel values with in the object. Whose areas are greater than an upper threshold value is related to targets, the image is close to cameras with partial fish body capturing. Less than upper threshold is related to noise the fish capturing is not measured.

5. FISH OBJECT TRACKING

Tracking parameters that characterize objects and uses them to determine the type of each object.Object classification using SVM (support vector machine) algorithm. SVM perform linear and nonlinear classification and is used for find character about multiple fish object.SVMs can efficiently perform a non-linear classification using kernel based classifier, implicitly mapping their inputs into high-dimensional feature spaces.

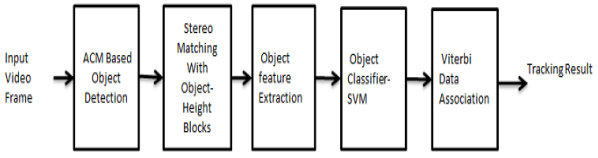

Figure 6: Flow Chart of the Proposed Object Tracking

VI FEATURE EXTRACTION

In the object matching approach is developed for correlating fish object observation and object targets. More useful features are considered for measuring difference between objects. Here vicinity cue, area cue, motion direction cue and histogram distance are used.

6. CONCLUSION

In this paper, real time underwater system is developed for fish object tracking and detection in the real world

.in particular, the active contour model method which enables integration and exactly find object outline for moving fish object for fish tracking in unconstrained area. In proposed fixing cameras must be utilized so most of the objects in the low frame rate video are much more difficult to track due to their poor motion continuity and frequent entrance and exit. Stereo camera is used to track moving fish object for match objects in two cameras. Fish object are tracked by the feature based kernel matching and the multi target Viterbi data association. The proposed tracking algorithm is SVM (support vector machine).Classifier is an algorithm that takes a set ofground objects such as moving fish can be efficiently tracking. The support vector machine is most used for object classification to find the object characteristics. The performance of the method is computed by a classification success rate of approximately 95%.

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