

Image Processing For Ice Floe Size And Its Distribution

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Abstract : Image processing for ice floes size and its distribution will help us to distribute the ice floe on the basis of its shape. The output of the project will be colored image of ice floes. We use matlab to build this project. Various algorithms such as k-mean algorithm, GVF snake algorithm etc. are used in it. The main advantage of our project is that it will help to find out the route via ice floes so it will decrease the probability of sinking of ships due to accident with large ice floes. In this the k-mean algorithm will form a cluster so that it will be easy to differentiate the dark ice and light ice. After that GVF snake algorithm will help to find out the boundary of each ice floes. Four layers will be produced such as ice floe, brash, slush, water. Then color segmentation will produce the output of the code in form of colored image.

IndexTerms - Floe size distribution, image processing, matlab,K-mean.

I. INTRODUCTION

System requires the input image of sea ice floes from satellite or UAV for the given processing using various methodologies.

The result of the image processing will be colored image of the distributed ice floes of certain region from Sea. After getting the image the various algorithm will process it for getting ice floe size and according to size its distribution also. Basically ice floes are range from certain meters to kilometers. Fluctuation in temperature, wind and wave are responsible for melting of ice floes. Estimation of small ice on basis of size is very hard task. Hence estimation of sea ice floes is very useful. The main task for having good result of particular region is to observe the ice floes continually. Colored image will estimate the region according to ice floe size.

II. EXISTING SYSTEM

Such a system is available which only work for ice floe distribution on the basis of melting rate. Existing system use unmanned aerial vehicle (UAV) to capture the real time footage of ice region. After getting images of seemingly connected ice floes system keep threshold value greater than ice water. After that boundary detection is implemented. Gradient Vector Flow (GVF) snake algorithm is used to detect boundary. Automatic contour initialization is used to solve problem of manual work and also reduce the time require to do it. Once the ice floes have been identified and the boundaries are detected the floe size distribution can be calculated from resulting data.

III. PROBLEM STATEMENT

Existing system is having only the problem related to distribution. It measures the size of the ice floes and distribute it according to it. But it does nothing after it. It is only limited to calculating the ice floes size with its distribution. For estimating the result it is necessary to take footage of ice floes continually using UAV. The UAV camera must be of high pixels with GPS technology. Here weather could be the main stumbling block. If weather is not good then the images will not be get cleared. Without clear images it is very difficult to estimate the result.

IV. PROPOSED SYSTEM

The aim of our proposed system is to develop an image processing based ice floes size distribution and detection system, which provides answer to the input image of the particular sea ice floes region very effectively. Just we have to put input image to the system which is used for estimation. The system will use the Matlab's various functions to give appropriate result to the user. If the output is found invalid, then some system to declare the answer as 'enter clear image'. After adding the cleared image the estimation process will be on the way. Image processing starts with adding image to system then it separate out ice water by using threshold value. K-mean algorithm forms cluster (k=2 or 3) of ice floes. Result of threshold value is subtracted from the k-mean result. So we get ice floes separate out from the sea water. Then GVF snake algorithm detects the boundaries of ice floes. After it undergoes color enhancement process where the colors are given to the ice floes according to their size. After getting the result in color image format it will be easier to make path via ice floes for navigation of the ships. For detection of flood due to ice floe melting process we require continues images of ice floes from particular region.

The basic algorithm that will be implemented for working of this proposed system is as follows:

Step 1: Start.

Step 2: Add input to the system.

Step 3: Threshold of the input image is calculated.

Step 4: K-Mean algorithm is applied to the input image to form cluster image.

Step 5: Subtraction of K-mean from threshold image results the ice floe separated from the ice water.

Step 6: GVF snake algorithm is used for detection of boundary.

Step 7: Color Enhancement is a final process done on the given image resulting then colored image according to distribution of ice floes

V. METHODOLOGIES

5.1 Implementation of Complete system

It is matlab based image processing system in which the given image will undergo various algorithms resulting the colored image. Graphical interface consist about the name of the system. After pressing proceed button it will show the main page on which we will get the resulting section for the image along with input panel. The input image must be added into the dataset folder. The main consist the various buttons such as browse image, threshold, k-mean, dark ice, segmentation. Browse image button is created to inserting the input image of ice region to the main page. Total six resulting sections are available on the main page.

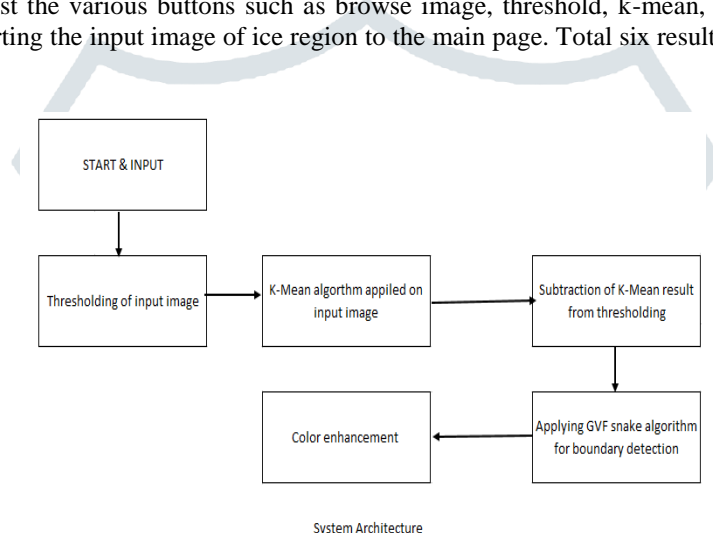


Figure 1: System Architecture

This figure is about system architecture of how it works? In this above figure there is six main part architecture, after the adding the image the system will start to process the image.

5.2 Image processing methodology

5.2.1 Ice pixel extraction

Ice is brighter than sea water so it can be easily detected as it has higher intensity values. So threshold method is useful to extract it. But both dark ice and bright ice is required to analysis. K-mean algorithm is used to detect dark ice. It forms the cluster. Ice pixel extraction gets completed by subtracting this from threshold image.

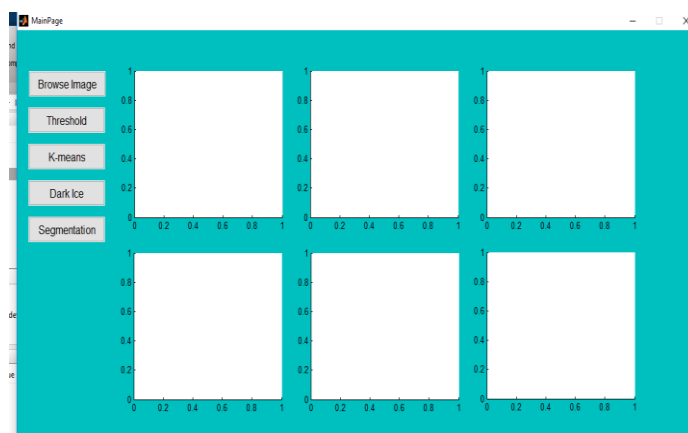


Figure 2: GUI (Start Screen)

5.2.2 Boundary detection by GVF

Boundary detection is very important after ice pixel extraction. For detection of boundaries of ice floes we may use traditional snake algorithm but it get failed when the ice image is not uniform. So for getting correct result we need to use GVF snake algorithm for it. GVF snake algorithm is named as Gradient Vector Flow algorithm which used contour method. Intimal contour is start and gradually increase. It stop when the internal and external forces get equal. After the successful running of GVF snake algorithm we will get the image of ice floes with boundaries. The accuracy of GVF snake algorithms is much higher than any other algorithms for detection of boundary.

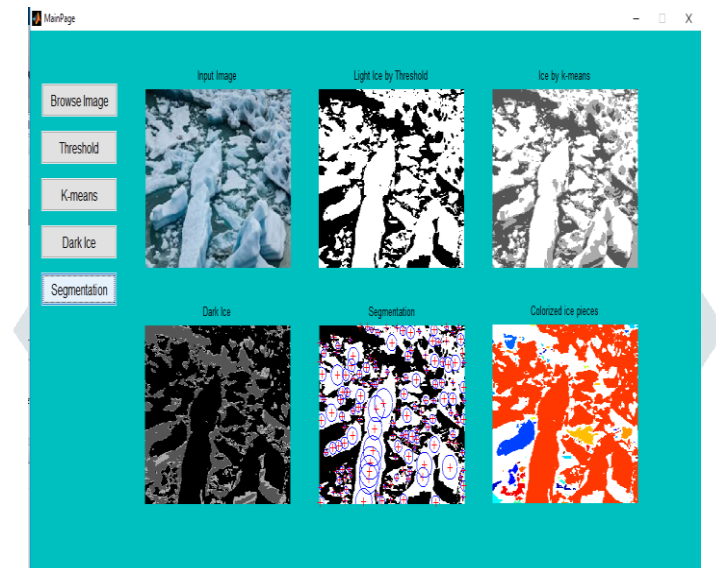


Figure 3: GUI (Output)

5.2.3 Color Enhancement

After ice pixel extraction and boundary detection the last step is color enhancement .In color enhancement the color is given to the ice floes according to its size distribution. Basically ice floes are distinguish as big ice,small and intermediate ice according to its size.

VI. SYSTEM REQUIREMENT

6.1 Hardware Requirement

1. RAM:Minimum 2GB
2. Storage : Minimum 1GB

6.1 Software Requirement

1. Matlab
2. Operating System:Windows10

VII. CONCLUSION

Sea ice can be distributed based on the size of ice floes. Various image processing algorithm can be applied to a few sample of collected sea ice floe image data for retrieve the more information of sea ice. We can identify the individual ice floes in a sea ice image using GVF snake algorithm. Collected information on sea ice floe distribution can be given to weather forecast and Risk management Department. Ship navigation is the second application of it. Result of the ice floes can be used to determine the path for the ships from the particular ice floes region.

VIII. CONCLUSION

1. Risk of flood due to ice floe melting can be detect by using this system. For that we required continuous observation of footage of ice floe region.
2. Sea navigation map can be prepared by using the final output of the system

IX. REFERENCES

- [1] Ahamed shafeeq B M , Hareesha K S International conference on Information and Computer Network, Volume 27, pp.221-225, 2012.
- [2] Jian Zhu , hanshi Wang “An improved K-mean Algorithm” 2010 IEEE.
- [3] Kim W & Kim C ,”Active contours driven by the salient edge energy model” IEEE transaction on Image Processing , vol.22, No.4 ,pp.1667-1673 (2013).
- [4] Zhao J, Chen B,Sun M,Jia W &Yuan Z,”Improved Algorithm for gradient vector algorithm flow baed active contour model usingglobal and local information”, The scientific World Journal (2013).
- [5] Mahmoud MKA & AI-Jumaily A,”Images based on GVF snake algorithm”, IEEE International Conference on mechatronics and automation,pp216-220,(2011).
- [6] Q. Zhang , R. Skjetne , S. Løset, and A. Marchenko, “Digital image processing for sea ice observation in support to Arctic DP operation,” presented at the Proc. 31st International Conf. Ocean, Offshore Arctic Engineering, Rio de Janeiro, Brazil, 2012, Paper OMAE2012-83860.

