



New Approach For Disease Fish Identification using Augmented Reality and Image Processing Technique

Hitesh Chakravorty

Science Teacher

Abstract

The Augmented Reality and Image Processing Technique to detect fish disease using smart phone. The diseased detection at early stage to prevent fish fatality and transmission of diseases. The AR technique has resolved problem for diseased fish identification on the ground level. In the propose study taken one Epizootic Ulcerative Syndrome (EUS) diseased fish for Mobile AR App. The Image Processing Technique of disease fish is carried out on the spot not practicable. The images taken with the AR technique for Image Processing HSV for diseased detection for further verification.

Key words- Augmented Reality(AR),Blender, Unity, Vuforia, Python

INTRODUCTION

The Augmented Reality technique comes into reality. The word 'Augment' meaning to add or enhance. Augmented Reality (AR) is a latest concept to allow virtual model in real surrounding in real time. Augmented Reality (AR) is overlapping of digital images on real world objects. Augmented reality uses for the assessment, formularize tracking, refinement computing and 3D identification. The mobile-generated recognition is a type of augmented reality that uses the recognition virtual information to the user in real-time. Mobile Augmented Reality as a system combines real and virtual objects in a real environment, runs interactively and real time, registers real and virtual objects with each other. To applying AR technique in various mobile applications come into reality like map-reading, publicity, layout information, pedagogy, innovation, games and fish disease detection. [1] [2] [3]

Fish is the primary food for protein some parts of the world. The available fresh water healthy fish is sometime infected with disease. Epizootic Ulcerative Syndrome (EUS) is considered to be an infection of fish. The indication EUS red spot visible on the fish. The drop of scale bear the fish body result to ulcer infected fish live for short period. The early recognition can stop fish fatality and enhance productivity. To diagnose disease fish using Image Processing Technique, Machine Learning come into existence. [4] [5]

Mobile Augmented Reality of virtual model of disease fish with real-time detection Epizootic Ulcerative Syndrome (EUS) *Labeo bata*. The Image Processing Technique use for further verification.

MATERIALS AND METHODS

Epizootic Ulcerative Syndrome (EUS) of *Labeo bata* was collected from Hailakandi, Assam and identified by expert. One image of disease fish use to make fish 3D model for Mobile AR App. Pictures of twenty four (24 Nos) (Fig1) of diseased fish were taken by the Mobile AR App. Images were 200 by 200 pixels so that processing time of algorithms and clarity retention of input images.

Resource utilised to perform the study:

A. The steps use to build AR App

(i) Blender: Blender is open-source free and 3D computer graphics software toolset. It is used to create many applications like animated films, visual effects, art, 3D printed models, motion graphics, interactive 3D applications,

and computer games. Blender 2.8 is used to make 3D fish model from disease fish image and run it on open-source game engine Unity.

(ii) Unity: Unity is a graphics and physics engine that used to built applications for multiple platforms with the same code. Unity is the world's best real-time development platform. Unity is supported most platforms including Windows, MacOS and Android. Unity uses C# for internal scripts and logic [9]. The mobile app is developed and deploy in Android based smart phone.

(iii) Vuforia: Vuforia makes it easy to develop cross-platform apps. Vuforia is an SDK to build Augmented Reality Android, iOS, and UWP applications for mobile devices and AR glasses[10]. It is available as a plug-in for Unity 2019 use for Mobile Vuforia AR App.

(iv) Smartphone: The smartphone capable of run Vuforia AR App.

B. Operating System

The Operating System-Windows 10 64 bit is used in this project. Hardware requirements includes 7th Generation Intel core processor, 4 GB RAM, 8GB memory.

C. To perform Image Processing Techenique using OpenCV and Python

HSV Feature Extraction: The HSV space component to reduce computation and improve efficiency In accordance with the different colors and subjective color perception quantification, quantified hue (H), saturation (S) and intensity (V) are obtained. Hue ranges from 0 to 360 degrees, with variation beginning with red, going through yellow, green, cyan, blue and magenta and black to red[6] [7][8].

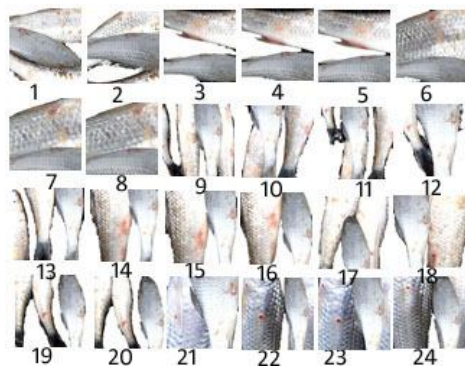


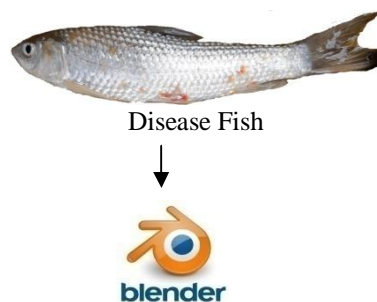
Fig 1: Test Image using Mobile AR App

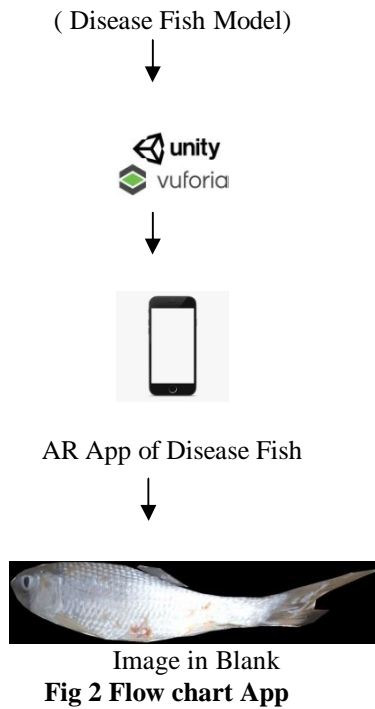
EXPERIMENTAL FINDING

To detection of fish disease using Mobile Augmented Reality model (Fig 2)

- a) Blender 2.8 use for 3D model for disease *Labeo bata*
- b) Mobile Augmented Reality App of disease *Labeo bata* created using Unity and Vuforia
- c) Mobile Augmented Reality App of disease *Labeo bata* Test Image for visully comparison and further investigation using Image Processing Technique

FLOW CHART





HSV and Segmentation

For HSV, Hue range is [0,179], Saturation range is [0,255] and Value range is [0,255]. Different softwares use different scales. To convert BGR image to HSV, can use to extract a colored object. In HSV, it is more easier to represent a color than RGB color-space. In this present study extract a red colored of the effected fish. The method used here (Fig 3)

- i) each sample image convert from BGR to HSV color-space,
- ii) the threshold HSV image for a range of red color,
- iii) extract the red region represent the disease effected area

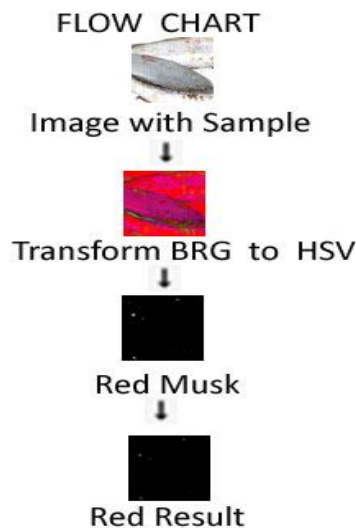


Fig 3: Complete Process of HSV

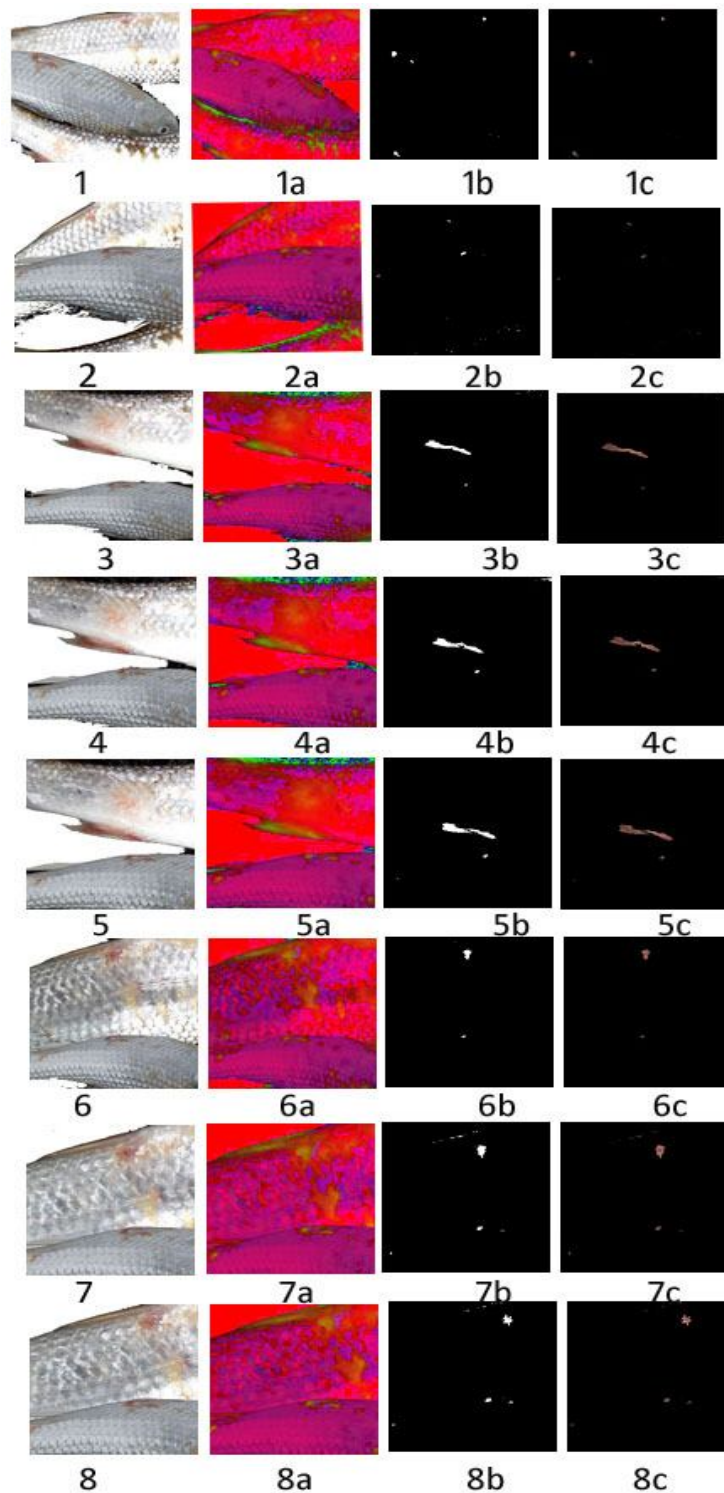


Fig 4 Test Image of *Labeo bata* infected with EUS (a) HVS of Sample (b) Red Musk (c) Red Result

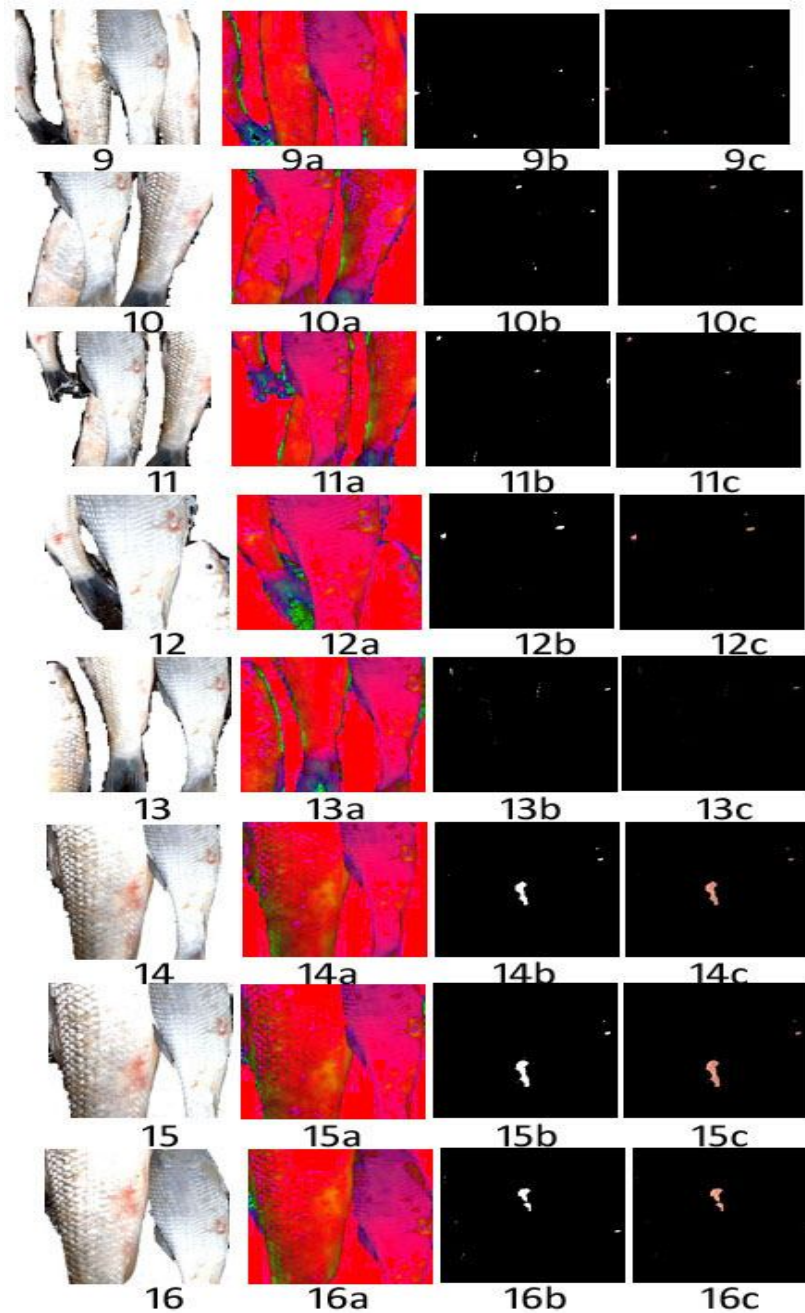


Fig 5 Test Image of *Labeo bata* infected with EUS (a) HSV of Sample (b) Red Musk (c) Red Result

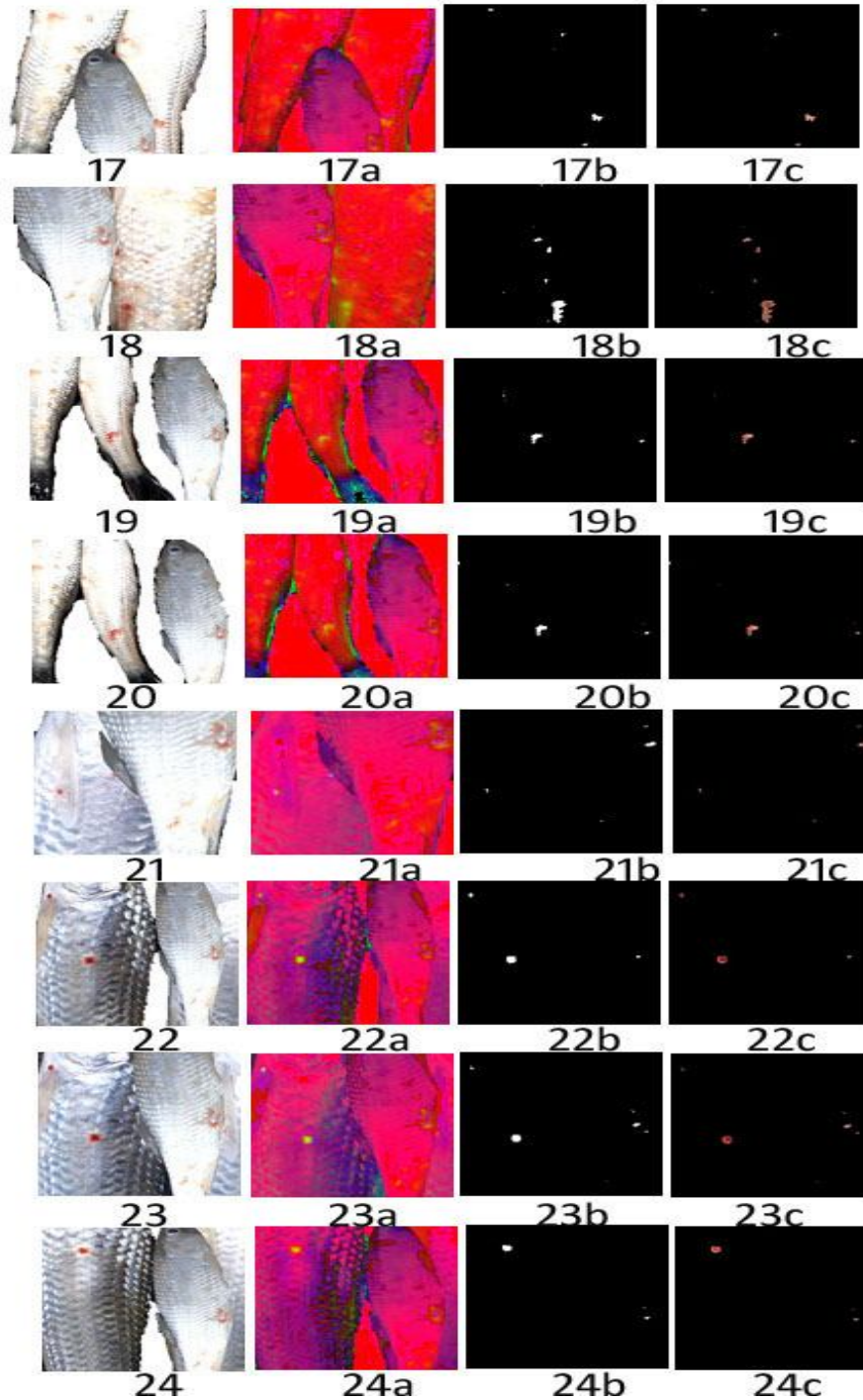


Fig 6 Test Image of *Labeo bata* infected with EUS (a) HVS of Sample (b) Red Musk (c) Red Result

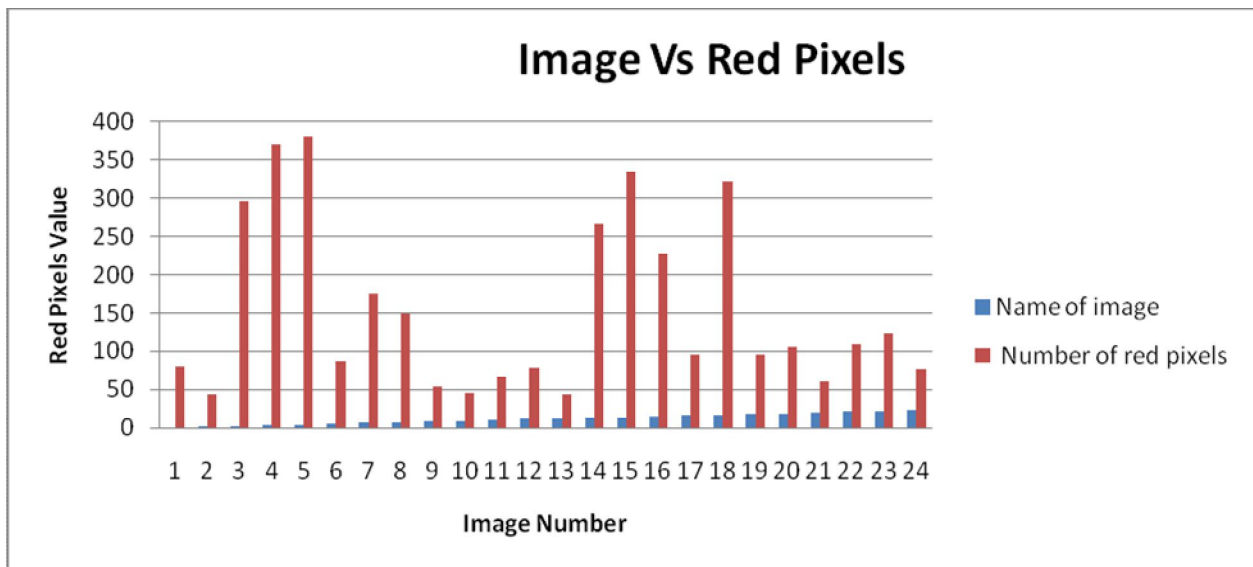


Fig 7 Image Vs Red Pixels

RESULTS AND DISCUSSION

The early detection of fish disease leads to prevention of fish disease as well as increase fish production. The current technique 3D model of disease fish is use in Mobile AR App of *Labeo bata* for visual matching and identifying disease fish on the ground level. To compare Mobile AR App with Test Fish *Labeo bata* is suffering from Epizootic Ulcerative Syndrome (EUS).

HSV of diseased fish images show the diseased area clearly in Mobile AR model. The dominant red colour of fish diseased area.

The results of the Fig 4, Fig 5, and Fig 6 for diseased segmentation precisely and the Fig 7 showing the red value of pixels each image that only three images pixels value below fifty out of twentyfour images. The reason for low red pixel value due to position and the distance for image taken of the sample disease fish. The proposed method taken for the study is tested with success rate above eighty five percent.

CONCLUSION

The efficiency of the fish disease early identification and prevention one of the priority for fish production. This paper one disease fish of Augmented model successfully detect the disease fish at ground levels as well as later Image Processing Technique use segmented disease area of diseased fish.

The AR App not run on all Anriod mobile due to limitation of hardware capabilities. It is essential to make ideal 3D model for disease fish use in Mobile AR for better efficiency.

To address these limitations properly the Augmented Reality and Image Processing Technique has brighter prospect for future.

REFERENCES

- [1] H. Chakravorty, 2020, "To Detection of Fish Disease using Augmented Reality and Image Processing" *Advances in Image and Video Processing*, Volume 8 No 1, February (2020); pp: 1-4
- [2] Kumar, Pavan & Mantri, Archana. (2019). *Innovations in Tourism Industry & Development Using Augmented Reality (AR), Virtual Reality (VR)*. 10.1109/TENCON.2019.8929478.
- [3] R. Aggarwal and A. Singhal, "Augmented Reality and its effect on our life," *2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence)*, Noida, India, 2019, pp. 510-515.
- [4] D. Kar, S.C. Dey and A. Roy, 2000. "Epizootic Ulcerative Syndrome In Fish at Barak Valley, Assam, India", Section-8 Sustainable Water Resource Management, Policies And Protocols.
- [5] H. Chakravorty, R. Paul and P. Das, 2015, "Image Processing Technique to Detect Fish Disease", *International Journal of Computer Science and Security (IJCSS)*, Volume (9) : Issue (2) : 2015, pp 121-131.
- [6] https://opencv-python-tutorials.readthedocs.io/en/latest/py_tutorials/py_imgproc/py_colorspaces/py_colorspaces.html



[7]<https://stackoverflow.com/questions/10948589/choosing-the-correct-upper-and-lower-hsv-boundaries-for-color-detection-withcv>

[8]<https://stackoverflow.com/questions/19623132/calculating-the-number-of-blue-pixels-in-a-picture>

[9]“Unity3d”, [online] Available: <http://unity3d.com>.

[10]<https://developer.vuforia.com>

AUTHOR

Hitesh Chakravorty, MCA Sikkim Manipal University in 2011, M.Phil in Computer Science Assam University 2016 , presently working as Science Teacher , Government Middle School, Assam,India