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Wild animal Detection and Recognition from Aerial Videos using Computer Vision Technique

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ABSTRACT

This paper points to address animal movement detection and tallying with assistance of airborne videos with the help of global pixel from the wide motion recordings. From the aerial videos, through the movement in the background motion and PIXEL VELOCITY DETECTION segmentation images will be extracted. Through applying threshold, negative are being eliminated. This paper mainly focuses on animal detection following on animal tracking. This Jobs taken after on by either physically or by in spite of the fact that kept an eye on flying machine which are exceptionally moderate, requires manual control and time consuming too. Here we are mainly focusing with object spotting and tracking from aerial recordings and images that can prove viable for wildlife conservation**.**

Key words: Detection, Hungerian, Kalman-Filter, Tracking,

1. INTRODUCTION

Presently a day's natural life overviews are extremely overwhelming to get the careful creature populace and a lot of data or to screen alerts to creatures. For some notorious natural life like elephant, tiger hunting illegally has achieved extents that places causing tall risk for nearby terminations , for a few of them all out vanishing. This sort of creature location overviews are normally directed on the ground staff by upkeep specialists. It is work power with a high budgetary expense. Natural life creature ethereal recordings which is gathered with the assistance of UAV (unmanned aerial vehicles) furnish an extraordinary trade whenever joined with appropriate programmed acknowledgment strategies. In picture preparing recognition of article and following has been created for a considerable length of time inside the field of PC vision. Be that as it may, all calculations proposed have confinements built up on the particular conditions. Article acknowledgment with impediment which is moving in stationary cameras with a steady foundation can be effectively taken care of today. There are extraordinary measure of trackers calculation have been framed using diverse strategies, for example, foundation displaying techniques and State Estimation strategies. There is an issue of moving item recognition from a camera which is moving, this is only a run of the mill strategy is the augmentation of foundation subtraction. A display of record groupings was created using geographic data framework (GDF), foundation was demonstrated with the help of enlistment strategies. Be that as it may, creature recognition from automaton recordings is past the scope of this kind of calculations. The setting we decided is entirely unexpected compare to traditional approaches, for example, elevated traffic the executives, common reconnaissance [4] [5], and military activities [6]. Seen above, creatures don't have a steady form, and reliable development introduction, that are generally accepted in motor discovery. Plus, energetic foundation and normal cover of creatures can lead additional difficulties .This research a creature recognition technique is proposed by featuring the distinctive movement designs between the foundation and the creatures. The upside of movement include is that it considers on the surface, shading, and impact of light which structure the significant challenges in our unique circumstance. Tests are done on ethereal recordings caught from a certifiable wild scene, and the outcomes are talked about in detail.

2. RELATED WORK

Videos taken by drones to find the interaction between pedestrian and vehicle and risk level for that with the help of drones videos find the behavior of pedestrian and tracking and detecting the each vehicle and pedestrian ,using some tracking method analyzing the interaction between vehicle and pedestrian with the help of (PSM)[1].Automatically tracking selected object using drone video for this tracking using some computer vision methodology called (TLD)[2].Moving Animal tracking and detection approach based on motion using Optical flow estimated the motion vector of each pixel[3].This is a very Challenge to create a good approach to find and count the wild animal using aerial video.

3. DATASET DESCRIPTION

I made our own datasets. In our datasets both images and video were being collected and I show the data rate , bit rate and frame rate for each video in Table.1 . No one uses this videos before because those videos I downloaded from YouTube and extract the frames from those videos. We downloaded aerial video of animals such as elephant and tiger from the internet and prepare the videos into small part and make our own video datasets. In our datasets there are two

different folder one is for tiger and one is for elephant. From the videos we extracted the frames to prepare the training image datasets and kept it into two different folders. In our dataset frame width and frame height is same for all videos

Table 1: Video Dataset Description

Input	Data rate	Bit rate	Frame rate
Video1	1871	131	29.97
Video2	1560	128	25.27
Video3	1670	127	26.76
Video4	1476	126	29.23
Video5	1463	127	27.67
Video6	1543	128	24.78
Video7	1647	125	27.89
Video8	1876	121	29.97
Video9	1254	129	27.76
Video10	1986	131	28.76

3. METHODOLOGY

In this section, proposed algorithm has been discussed.

3.1 Watershed

Watershed is a sort of division technique which by and large utilized for doing the discovery for intersecting pictures. In basic system it's extremely hard to take out every single item from the pictures which are essentially intersected with one another .In this untamed life discovery and following there ought to be plausibility that the creature will be in gathering sitting or standing or pursuing so watershed will be the great methodology for that to take out every one of the tally from them.

Watershed calculations fundamentally takes a shot at marks this names user may characterized physically or typical characterized by some system (threshold).

Picture pixels and names is client characterized where the flooding part is done on the pictures which are named in an unexpected way.

Every pixel those are near one another and named territory are putted into a need line with a need level relating to the gradient magnitude of the pixel. picture pixels those have least need are disposed of from the line and killed pixel's nearest pixels on the off chance that they already named, at that point those pixels are named with label .Then every one of the pixels which are not named putted in the line and rehashed this progression till line is winds up void. Refer the architecture diagram Figure 1 of the workflow for doing segmentation.

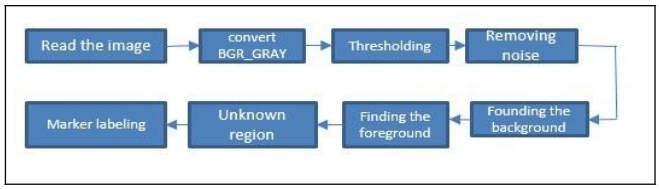

Figure 1: Architecture diagram for doing the segmentation.

3.2 Ssim

The structural similarity index matrix evaluate picture corruption which is brought about by, for example, information pressure or misfortunes any information transmission. It's requires two pictures which is produced from an equivalent picture as referenced and prepared picture. Prepared picture is compacted. It's really measure the distinction between two comparative pictures. Structural similarity index matrix record is determined on different casement of a picture. The estimate between two casements and of regular dimension NN is:

A. Equations

ax: mean of x, ay: mean of y, vx2: variance of x, vy2: variance of y. The SSIM list fulfills the condition of symmetry:

SSIM(x, y) =SSIM(y, x)

$$((2axay+c1)\ (2axay+c2))\ /\ ((ax2+ay2+c1)\ (vx2+vy2+c2)) \quad (1)$$

3.3 Gaussian Mixture model

In this we utilized GMG for subtraction of the foundation and expel the clamor of the video by utilizing morphological method. This will recognizes forepart objects with the assistance of Bayesian algorithms. And it likewise takes into consideration light change for foundation that emerge after some time. A few recordings we got great outcome when we utilized this division strategy.

3.3 Hungerian Algorithm

In this investigation, the Hungarian calculation is utilized to coordinate the recognition's in each edge to followed objects (the anticipated locations from Kalman channel), and figure out distinguished articles which have disappeared and to another track which ones ought to be coordinated. The calculation depends on separation (cost) network which holds Euclidean separations between every blend of a trace (expectations) within lines of a framework, and recognition's within sections; separations are determined captivated with centroids of anticipated and distinguished articles a littler separation suggests a better likelihood of right related of discoveries to forecasts.

Steps

A: Lessen the lines by subtracting the base estimation of each lines from that line. B: In the event that there are segments

without a zero, diminish the segments by subtracting the base estimation of every section from that segment. C: Wrap the zero components with the base number of lines it is feasible to cover them with. D: Add the base revealed component to each secured component. E: Subtract the base component from each component in the lattice. F: Wrap the zero components once more. G: Select a matching by picking a lot of zeros with the goal that each line or segment has just a single chosen. H: Apply the matching to the first matrix, slighting matrix lines.

3.4 Kalman Filter Based Tracking Using Hungerian Algorithm

The Kalman filter calculation has been generally utilized and effectively executed in a wide range of kinds of item tracking and recognition applications. The primary preferred standpoint of the Kalman filter is that it can give totally taught supposition around the upcoming location of some sort of thing in an energetic situation. To comprehend the Kalman channel calculation for following an item accept that we have an information and its state vector (u) of an obscure framework, we want to anticipate its conduct (like position, speed) in an energetic situation at separate occasions k, in behavior of its past conduct that put away in vector (u).

B. Equations

Prediction equation where u previous state vector, P previous covariance matrix, F state transition matrix (captures state transition from one time step to another) Q process noise matrix.

$$u_{k|k-1} = Fu_{k-1|k-1} \quad (2)$$

$$P_{k|k-1} = FP_{k-1|k-1}F^T + Q \quad (3)$$

Now we corrected or updated the u and covariance P where u predicted state vector (covariance matrix) A is the matrix for observation equation b is the vector of observations Q process noise matrix K KalmanGain matrix C covariance weighting matrix R: observation noise matrix.

$$C = AP_{k|k-1}A^T + R \quad (4)$$

$$K_k = P_{k|k-1}A^TC^{-1} \quad (5)$$

$$u_{k|k} = u_{k|k-1} + K_k(b_kAu_{k|k-1}) \quad (6)$$

$$P_{k|k} = P_{k|k-1}K_kCK_T \quad (7)$$

4. EXPERIMENTAL RESULTS

Using the watershed segmentation algorithm we are taking the input video and after that we are applying thresholding to that and that we are removing the white noise for that we are using morphological opening closing, you can see in the Figure 2. Thus, presently we know without a doubt that locale close to the focal point of articles is a closer view and area much far from the item are the foundation. Just locale we don't know is the limit area.

Figure 2: First one is original second one is using threshold

Presently we know without a doubt which is the area of articles, which are foundation what not. Now we make marker (it is a variety of the same size as that of a unique picture yet with int32 datatype) and name the areas inside it. The areas we know without a doubt (regardless of whether frontal area or foundation) are marked with any positive whole numbers, yet various whole numbers and the region we don't know without a doubt are simply left as zero. Using watershed methodology we can see in Figure 3 that we are getting segmented object but overlapped object not separated properly

Figure 3: Using watershed methodology.

4.1 Ssim Operation

In our cases we are calculating the region of the fragmented picture and the exact image and discover the differences and we are also performing the morphological operations such as erosion dilation openings and calculating the distance between this two images which distance is close we are identifying this as a detected object or animal, for clear understanding refer the down Figure.4

Figure 4: SSIM outputs.

4.2 Blob analysis with Kalman filter and Hungerian tracking output

In our study we finding the blob we ready to see in Figure.5 and the bounding box using some vision technique. Our

object tiger is different color and background is white so we convert the original image into HSV and then we saturated the images and applying thresholding technique to find the useful object and which will also reduce the noise but still after applying thresholding technique some noises or patches we can see so remove all this patches we applied ***Median filter*** with the help of this filter which removes all the patches and its evaluated the median point from the surroundings area and allocate that point to the pixels and we find the contour and the area of the contour and drew the bounding box.

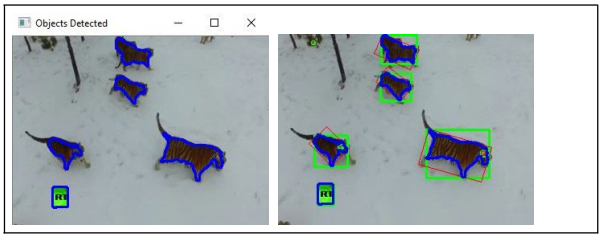

Figure 5: Blob analysis using Median Filter and bounding Box

Kalman Filter *and* ***Hungarian Tracking*** *output* the test video was downloaded Here, we are primarily interested to detect multiple object from a video using Kalman tracking algorithm the detection algorithm demonstrates a case of the trial results from the discovery calculation. This incorporates two casings from a similar video (the tried video grouping).

Figure 6: Kalman Filter using Hungerian Tracking Output

In the above Figure 6.image we ready to see that there are two unique sorts of mistake (miss-recognition): the primary kind of misconception where the Tigers are not recognized completely by the calculation. Another sort of misconception where a tiger is recognized, in any case, the intersection between the identification and explanations bounding box could not surpass half and in this way, recognition isn't pronounced and it's additionally distinguished some wrong positives esteems.

5. CONCLUSION

In this proposition paper, we connected watershed marker based division to fragment the article from the video and a multi-target following calculation dependent on Kalman channel using Hungarian calculation to better the location execution of a formerly suggested calculation. The inspiration was to better this execution for live identifying untamed life creature. The Kalman channel was utilized to foresee the following places of the identified creatures in video groupings, along with this Hungarian calculation was utilized to dole out expectations to the tracks.

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