# Detection of Wild Animals

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***Abstract*—The conflict between wild animals and farmers is one such big issue which leads to death in both sides. In this paper, a animal detection system is used to monitor the wild animals which are intruding a village. Here thermal camera is used. It has the advantage of capturing image of wild animals even in dark. Temperature of the animal is given input of wild animal detected by the thermo graphic camera. We solve the proposed model with globally optimal guarantee. Extensive experiments on challenging well-known data sets demonstrate that our method significantly outperforms the state-of-the-art approaches and works effectively on a wide range of complex scenarios**

***Keywords—Thermographic camera; motion saliency Preprocessing; recognisation***

## I. INTRODUCTION

The problem of identifying salient regions in images has received much attention over the past few years. There has been significant progress showing encouraging results that could be quantified, thanks to datasets with ground truth containing salient objects. The approaches mainly involve the identification of "rare" features in an image that potentially contribute to visual saliency. However, when detecting saliency in videos, it is important to consider the inherent temporal information in addition to the spatial features in a single frame.

This leads us to the notion of "motion saliency," which could be the primary factor that contributes to the overall saliency in videos. The detection of salient motion in videos finds applications in object tracking and surveillance, video retargeting, and activity recognition. For example, surveillance and tracking applications are aided by the information on "what to follow," while video retargeting applications can use the knowledge of salient motion to resize video frames with minimum distortion.

One of the early approaches for salient motion detection involved background modelling. In a Kalman filter-based approach is used for background estimation and foreground detection, with the assumption of a static camera. The difference between the estimated pixel value and the actual pixel value is higher for foreground objects compared to the illumination changes in the background.

## II.EXISTING TECHNOLOGIES

In the existing system, the wild animals intruding the village is identified only when it is seen by people. Adding GPS tag to the animals can help tracking them in the forest. A base station is placed in each village which monitors the animal near that village. If any wild animals enter into the base stations range, then it alert the village people and forest department about that animal.

A GPS –enabled device will normally record and store location data at a pre-determined interval or on interrupt by an environmental sensor. These data may be stored pending recovery of the device or relayed to central data store or internet connected computer using cellular(GPRS) or satellite modem. The animal location can be plotted against a map or chart in real time location.

The benefits of the method is consuming low power and implementation can be made easy.

## III.PROPOSED SYSTEM

In this first category, GPS tag can be used to track the animal location.GPS tracking depends on battery power to function. If the unfavorable condition occurs, GPS takes longer to establish the location and leading to shorter battery life. Longer-lasting batteries would necessarily weight more and adding extra cost. Hence weight increases animal suffered and required data cannot be get, which are becoming more and more commonplace as a design tool for new hardware development .

The second category of usage, is not related to new or existing hardware design or testing, but is focused on product or process control applications. In these cases, thermographic camera can be used to detect wild animal which is more efficient and integrated into a complete feedback on automated system.

IR radiation is still a type of light, but is is usually completely invisible to the human eye and it is only through specialized equipment such as a thermal camera that we are able to detect the presence of IR light around us. IR light - expressed via IR radiation - is generally given out by practically every object on earth at some level. Ridiculously hot things such as a blast furnace will output massive amounts of IR radiation but even something extremely cold - like an ice cube - still generates some form of IR radiation that can be picked up on by an infrared detector.

The image you see on these systems will vary depending on the application the camera is pointed at, with the hottest parts of the image expressed as either a white coloring (other palettes may be used, but this is the general default view) or a series of oranges and reds. Colder objects will appear as a series of blues, purples or other dark colorings. By looking at the thermal image it is easy to tell at a glance where the hottest objects are, making this an extremely effective tool for countless applications.

The thermal camera can be used to see through all of these things because it doesn't need visible light in order to operate; instead it works to spot the IR radiation that the lens can detect and - since an animal will generally put out a lot of heat via IR emissivity - detecting the animal in question is easy because their thermal signature will clearly be displayed on the device. This makes all the difference between detecting an animal and them remaining hidden. As previously mentioned, thermal cameras are great tools for seeing through complete darkness to detect body heat. They are also equally effective in bright sunlight; since they don't rely on the use of visible light to make an image, darkness or daytime don't have any effect whatsoever on the camera's abilities. Many animals can easily remain hidden during the daytime, so this technology proves extremely effective when out in the field.

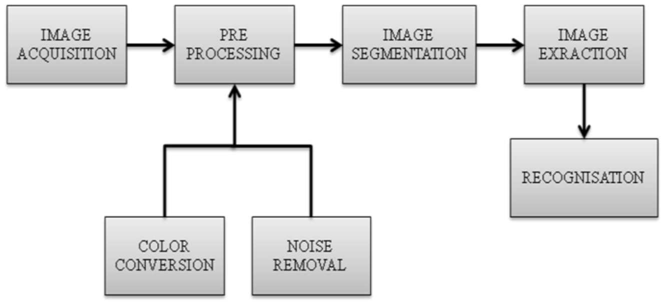
The thermal camera is also a much more effective method of seeing through darkness than using night vision equipment. While NV systems do offer some level of illumination they still rely on visible light to make an image, which means things can be easily missed. A thermal camera shows the world as heat and heat can't hide from the gaze of the devices' IR lens.

The same principle applies to the weather. If an area was completely choked with thick fog, the thermal camera would be able to be used in order to see through the area. It can also be used in rain, snow and various other weather conditions to see where you are going and also detect the presence of heat signatures nearby.

FLIR systems are currently leading the way in the development of wildlife thermal cameras with their FLIR Scout series. These portable, lightweight systems are built for use in the great outdoors and come in several different models for use in detecting the presence of wildlife. The smallest and most portable model available in the Scout series of thermal imaging cameras, these are also the cheapest items available. There are two models in this range - the PS24 and PS32 - each of which are quite similar. The major difference between the two is that the PS32 has wider field of view and produces images at a larger resolution than a PS24.

These devices are best suited for those looking for a thermal imaging system that isn't going to break the bank. Their portable, silent-running and quick response nature makes these thermal cameras an absolutely brilliant tool for detecting animal presence and they are also ideal for use outdoors thanks to protective, rugged design.

## IV.BLOCK DIAGRAM




### *A. IMAGE ACQUISITION*

Digital imaging or digital image acquisition is the creation of photographic images, such as of a physical scene or of the interior structure of an object. Digital imaging can be classified by the type of electromagnetic radiation or other waves whose variable attenuation, as they pass through or reflect off objects, conveys the information that constitutes the image. In all classes of digital imaging, the information is converted by image sensors into digital signals that are processed by a computer and made output as a visible-light image. For example, the medium of visible light allows digital photography (including digital videography) with various kinds of digital cameras.

### *B. PRE PROCESSING*

Pre-processing helped enhancing the quality of an image by filtering and removing unnecessary noises. The minutiae based algorithm only worked effectively in 8-bit gray scale fingerprint image. A reason was that an 8-bit gray fingerprint image was a fundamental base to convert the image to 1-bit image with value 0 for ridges and value 1 for furrows. As a result, the ridges were highlighted with black color while the furrows were highlighted with white color. This process partly removed some noises in an image and helped enhance the edge detection.

### *C. IMAGE SEGMENTATION*

Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s). When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes. The simplest method of image segmentation is called the thresholding method. This method is based on a clip-level (or a threshold value) to turn a gray-scale image into a binary image. There is also a balanced histogram thresholding.

### *D. IMAGE EXTREACTION*

Feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction. When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a feature vector).

### *E. IMAGE RECOGNISATION*

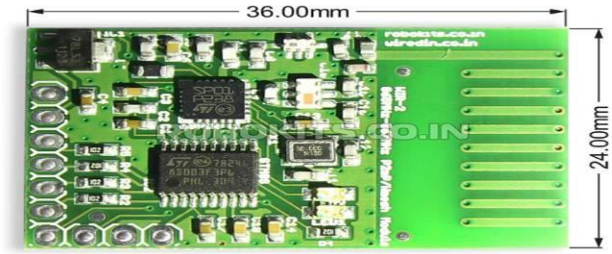
The computer vision technology is able to recognise products that are similar or identical such as branded drinks or shampoo bottles whilst also being able to differentiate between them based on variety and size. It piloted its machine learning algorithms with initial customers, allowing its algorithm to learn about different products. As the company processes more images, the better it gets at recognising the same products in different shapes and sizes.

Technology in the field of computer vision for finding and identifying objects in an image or video sequence. Humans recognize a multitude of objects in images with little effort, despite the fact that the image of the objects may vary somewhat in different view points, in many different sizes and scales or even when they are translated or rotated. Objects can even be recognized when they are partially obstructed from view. This task is still a challenge for computer vision systems. Many approaches to the task have been implemented over

## V.COMPONENTS USED

### *A. RF TRANSMITTER*

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication. For many applications the medium of choic is RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required achieving operation on a specific frequency. In addition, reliable RF communication circuit requires carefulmonitoring of the manufacturing process to ensure that the RF performance is not adversely affected.




### *B. RF RECEIVER*

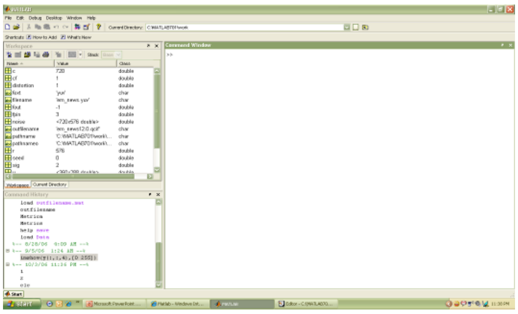
An RF receiver module receives the modulated RF signal, and demodulates it. There are two types of RF receiver modules: super heterodyne receivers and super-regenerative receivers. Super-regenerative modules are usually low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage. Super heterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in the past tended to mean a comparatively more expensive product. However, advances in receiver chip design now mean that currently there is little price difference between super heterodyne and super-regenerative receiver modules.

### *C. THERMOGRAPHIC CAMERA*

A thermographic camera (also called an infrared camera or thermal imaging camera) is a device that forms an image using infrared radiation, similar to a common camera that forms an image using visible light. Instead of the 400–700 nanometre range of the visible light camera, infrared cameras operate in wavelengths as long as 14,000 nm (14 µm). Their use is called thermography.

### *D. MATLAB SOFTWARE*

MATLAB, which stands for Matrix Laboratory, is a software package developed by Math Works, Inc. to facilitate numerical computations as well as some symbolic manipulation. The collection of programs (primarily in FORTRAN) that eventually became MATLAB were Developed in the late 1970s by Cleve Molar, who used them in a numerical analysis course, he was teaching at the University of New Mexico. Jack Little and Steve Banger later reprogrammed these routines in C, and added M-files, toolboxes, and more powerful graphics (original versions created plots by printing asterisks on the screen). MATLAB (“Matrix Laboratory”) is a tool for numerical computation and visualization. The basic data element is a matrix, so if you need a program that manipulates array-based data generally .



## II. ALGORTHM USED

### A. GLC

The gray-level co-occurrence (GLC) method, a texture analysis algorithm in which GLC matrices are computed on subregions of an image, is considered. The large number of calculations required to find the matrices for an image of any practical size precludes use of the GLC method in real-time systems. The GLC matrix and shows that the computation of all GLC matrices for an image has time complexity O(N/sup 4/) for an image of size N /spl times/ N when conventional methods are used.

### B.SLIC

Simple Linear Iterative Clustering (SLIC) as the segmentation algorithm. SLIC is efficient and produces regions which adhere well to edges in the image. Moreover, it is not overly difficult to implement.In the full image stylization process, areas with high-frequency texture will be approximated by stipples, whereas areas with lower-frequency texture will be approximated by closed shapes. To create the closed shapes and decide how the image is to be divided into regions, each containing pixels with similar properties, I need an image segmentation algorithm.

### C.SSIM

The structural similarity (SSIM) index is a method for predicting the perceived quality of digital television and cinematic pictures, as well as other kinds of digital images and videos. SSIM is used for measuring the similarity between two images. The SSIM index is a full reference metric in other words, the measurement or prediction of image quality is based on an initial uncompressed or distortion-free image as reference. SSIM is designed to improve on traditional methods such as peak signal-to-noise ratio (PSNR) and mean squared error (MSE), which have proven to be inconsistent with human visual perception. A more advanced form of SSIM, called Multiscale SSIM is conducted over multiple scales through a process of multiple stages of sub-sampling, reminiscent of multiscale processing in the early visionsystem. The performance of both SSIM and Multiscale SSIM is very high in regards to correlations to human judgments, as measured on widely used public image quality databases.

$$SSIM(x,y) = \frac{(2\mu_x\mu_y + C_1)(2\sigma_{xy} + C_2)}{(\mu_x + \mu_y + C_1)(\sigma_x + \sigma_y + C_2)}$$

where

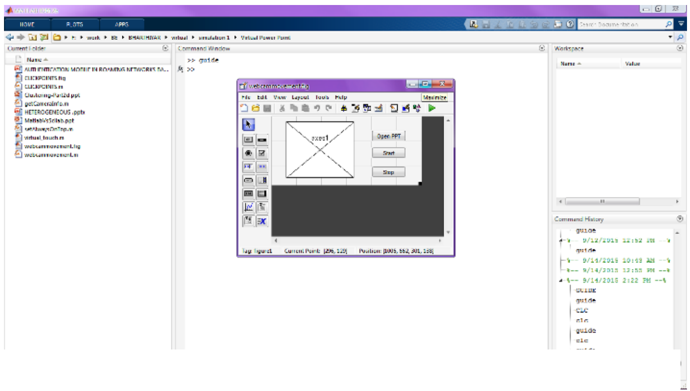
$$\mu_x = \sum_{i=1}^{N} \omega_i x_i$$

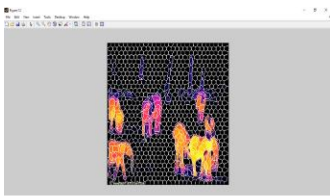
$$\sigma_x = \left( \sum_{i=1}^{N} \omega_i (x_i - \mu_x) \right)^{\frac{1}{2}}$$

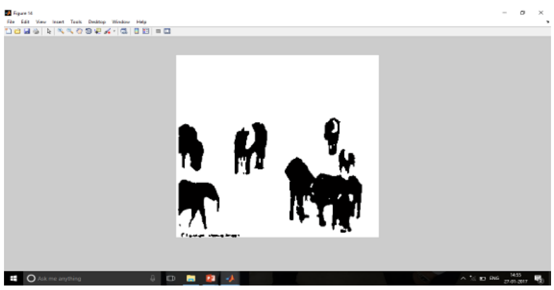
$$\sigma_{xy} = \sum_{i=1}^{N} \omega_i (x_i - \mu_x)(y_i - \mu_y)$$

The constants $C_1$ and $C_2$ are defined according to the following expressions:

$$C_1 = (K_1 L)^2$$
$$C_2 = (K_2 L)^2$$







## CONCLUSION

A thermo graphic camera based low-rank and saliently fused sparse decomposition model (TLSFSD) is proposed to detect the moving objects. The TLSFSD regularizes the background and foreground respectively by TNN and SFS, and its globally optimal solution can be obtained with theoretical guarantee. The method has potential for future use for data from different stations, but its performance can only be assessed by providing a set of labeled data from these new stations.

ACKNOWLEDGMENT

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