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ELEPHANT ZAPPER

AN ELEPHANT THREATNING SYSTEM TO SAVE LIVES AND CROPS

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Abstract— This project is an outcome of a real-time life threatening problem faced in and around Thandikudi region of Palani hills and in several other places due to wild elephants. Here, conflict arises often between wild elephants and man which results in occasional death of humans and frequent economic loss by crop destruction particularly plantain, millets etc. According to WWF Global the loss estimate is around $105 million worldwide annually. In the Thandikudi region alone two lives were lost in the past 6 months. Still, there is no amicable solution to this problem. Our present work is an attempt to save loss of lives and economy by threatening wild elephants and send them back to the forest region, when elephants try to trespass the farm land. This work also attempts detect the presence of elephants even during the night time. Using thermal and night vision cameras presence of wild elephants will be detected and an electric drum will be activated to threaten and send the elephants back to the forest. This is the working solution followed by farmers and villagers for centuries. But, elephants are intelligent species and electric drums alone cannot threaten them on every occasion. So, in addition to electric drum wild animal sounds like angry tigers etc., will be added to the list of threatening sounds. These sounds are generated and sent to a mega phone (loud speaker) which will scare the elephants. Using a random number generator the sounds appear random on every occasion so that the elephants will think as if the sounds were real.

Keywords—Elephant detection, Raspberry pi, NOIR-camera.

I. INTRODUCTION

A study made in the region of interest shows that elephants move into human habitation due to many reasons.

(i)Fences and trenches compromised by people who need access to forests.
(ii)Farm lands may funnel them to unprotected adjacent villages.
(iii)Badly planned barriers that do not take elephant behavior into consideration.
(iv)Denying elephant access to a critical water source or foraging area.
(v)Human activities create abundant secondary vegetation that brings elephants closer to human settlements.
(vi)Artificially maintained water sources attract elephants during drought.
(vii)Traditional migration routes severed by human intervention (e.g., canals, power installations, and cattle fences).

The obvious conclusion to be drawn is that there is no single cause or explanation to account for human-elephant conflict; situations are circumstantial and complex. Rather, elephants and agriculture mix in numerous ways with varying consequences. Human population growth and land occupation for settlement may heighten conflict with elephants. However, it is generally the borders of forests that are the focal points of conflicts. Minimizing human-elephant conflict to reduce the risk of life of both human beings and elephants is of utmost importance.
Elephant conservation issues can be divided into two distinct categories:

1. Activities that affect elephants directly such as hunting/poaching and capture;
2. Developmental activities and human activities leading either to the loss of elephant habitat or its qualitative degradation.

It is easier to chase elephants before they enter farm fields and therefore most damage can be averted. Guarding from watch towers, patrolling, and trip wire alarms provide farmers with advance warning of approaching elephants. Once the animals are detected, active crop guarding devices using light and noise are deployed to chase them away. An early warning system to minimize the human-elephant conflict in the forest border areas is proposed in this paper.
The system helps mitigate such conflicts in two ways:

1) providing warning to people about the anticipated entry of elephants into human habitation;
2) Providing advance information to the authorities to take action to chase the pachyderms back to the forest.

An early warning system to minimize the human-elephant conflict in the forest border areas using image processing is proposed in this paper. The system helps to detect the elephants even in the presence of other wild animals like Bison, Tiger, and Deer, and so forth. The system also identifies the elephants coming in groups. The reliability of elephant detection is tested and the time to detect the elephant images is optimized with the proposed optimized distance metric.

II. RELATED WORK

The analysis of elephant behavior that is a complex task for computer vision. Recently, methods related to the analysis of elephants have been introduced for different tasks such as gait recognition, individual elephant recognition. The basis for most tasks is the detection of elephants in an image or video stream. Other approaches restrict the recording setting or the video material to reduce the complexity of elephant detection. It classifies elephants using a highly constrained setup with a NOIR camera mounted at each side of a farm field. This setup makes the detection of elephants passing the farm field trivial. Alternatively, some methods require that elephants take a

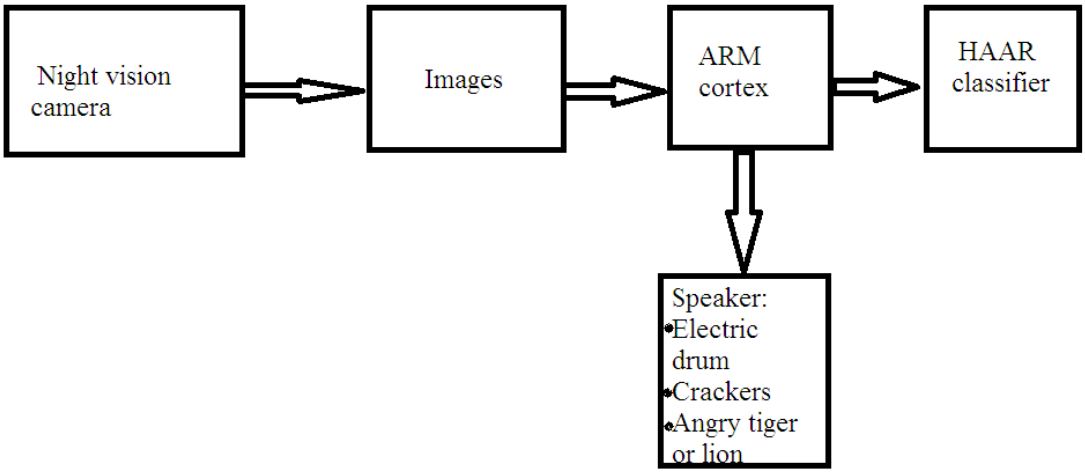
specific pose towards the camera and then apply, for example, face detection or the detection of other characteristic body parts. An advantage of using a well-trained elephant detector is that the confidence of the resulting detections is relatively high since elephants represent particularly distinctive patterns. However, elephant detection requires the elephants to look into the direction of the camera which is, in general, not given in wildlife video.

An interesting approach for the detection and tracking of animals is proposed. The authors build models of animals in an unsupervised manner from candidate segments detected consistently over successive frames. The candidate segments are obtained from a rectangle detector which uses Haar like templates at different scales and orientations. For each segment a feature vector is constructed which consists of a color histogram and the rectangle's width and height. There is rarely worked on the visual analysis of species with poorly textured skin such as elephants. The species of elephants is addressed only marginally. To our knowledge no work on the automated visual detection of elephants in wildlife video has been performed so far. In this article we present a approach for the detection of elephants in their natural habitat.

III. METHODOLOGY

Knowledge about the environment and the recording setup is an important factor for designing automated visual detectors because it enables the derivation of constraints and visual clues that facilitate detection. In an uncontrolled environment like wildlife video, as investigated in this work, the identification of robust constraints and clues is difficult. The video material we investigate has been captured by different people with a hand camera. Recordings were partly made in an ad hoc fashion. This means that we cannot make assumptions about the environment and the camera operation. As a consequence, we have to rely on the very basic visual cues such as shape, texture, motion, and color for the detection of elephants. Prior to the design of our method, we have investigated the suitability of the different visual cues.

A straight forward clue for the detection of elephants is their shape. Elephants have a characteristic shape, especially due to their trunk. In practice however shape is not applicable for the detection of elephants in the field because elephants in different poses and viewed from different directions may have diverse shapes. Additionally in most cases, parts of the animals are occluded and only certain body parts are visible which results in arbitrary shapes. Motion is another important visual clue for automated detectors. Even if we compensate for camera motion, the remaining object motions of elephants provides only weak clues since elephants move slowly and often remain stationary for a long time. This is especially a problem when the animals are far away from the camera. In such cases motion can hardly be exploited. However, additional clues are necessary to make the detection more robust.



IV. MODEL GENERATION

We learn a discriminative color model of elephant skin from a small set of labeled training images. The model represents foreground colors representing elephants as well as background colors from the surrounding environment. The training images represent different environments and differently shaded elephants in varying lighting situations. We first manually label all elephants in the training images. Our project is the proposal method to save the loss of lives and economy by threatening the wild elephants and back them to the forest region, when the elephants try to trespass the farmland. Field observations show that the proposed method can be used as an effective scheme to detect elephants in the forest border areas even in the presence of different species. This system has been rigorously tested through the various phases of the project and found to be efficient compared to the existing systems.

V. CONCLUSION

The work provides solutions to human-elephant conflict. The study provides insights to protect elephants from human activities and reduces the work effort of forest officials. The real time

elephant identification system provides solutions to the problem of human elephant conflict and provides solution for unsupervised process of individual species identification specifically for elephants. The system is completely automated; the strength of this approach stems from the ability to narrow down the collection of potential matches in the database with the query image. Optimal results for automated identification of individual elephants are obtained with the algorithm developed and is used to rank the most likely matches, followed by final supervised visual identifications and also with an early warning sent to the farmers or peoples about the arrival of elephants from the forest borders into the human habitat. We therefore recommend the use of the real time image processing technique to identify an approaching individual elephant as well as a group of elephants. The system can also be deployed along forest border migration routes or at water holes and food plantation areas for elephant tracking and monitoring.

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