International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 02 | Feb -2017 www.irjet.net p-ISSN: 2395-0072

A Hybrid Auto Surveillance Model Using Scale Invariant Feature Transformation for Tiger Classification

G.Raghavendra Prasad[1]

[1]*Assistant Professor, Amity School of Engineering & Technology, Amity University Chhattisgarh*

Abstract - *In this paper a Schematic Model is proposed to classify Tiger with a new hybrid algorithm. For effective biodiversity monitoring over recent years Image Sensors are increasingly deployed wild life species such as tiger is on the brink of being extinct species throughout the world. It is a tedious work to perform classification of animals due to various natural constraints and occlusions. In order to perform that systematic approach like segmentation, feature extraction and classification they are to be followed by better pattern recognition systems. Mathematical interpretations are given and the local features are extracted using scale invariant feature transformation (SIFT) and linear SVM to classify image of species. The images stored in the database are compared with the incoming data set with the feature vectors and the decision is made whether the identified image belongs to that specific Tiger or not.*

***Key Words*: SIFT, SVM , KNN, Hybrid System, K Clusters**

1. INTRODUCTION

The classification and recognition of Tiger will be helpful in automated surveillance systems. The tagging / labeling will be useful for tracking migrating Tiger across the woods. A model to recognize and classify the same will be enrooting to a very good expert system. In order to design a real time based recognition system with better object recognition capability the objects should be projected and characterized in best possible manner. For Real time based situations in wild life scenarios classifiers such as SVM is used for its acclaimed fast testing ability and a very good precision rate. Object characterization can be achieved by visual descriptors, shape descriptors or texture representation. Animal classification or fine-grained animal recognition [1]. Profiling sensors are electro-optical sensing devices which will help capture moving Tigers accurately in woods. The data acquired from a detector in the profiling sensor are extracted and used to create a profile or two-dimensional outline of the Tiger. Classifications of objects in a deeper sense [4].

1.1 Pattern Recognition Automation

To identify and to collect and analyze information from the jungle where there exists a necessity to separate the foreground details from the background the pattern recognition system should be precise and in order to achieve the same on mechanizing these abilities with the goal of automating the identification process is essential. Automated pattern recognition systems use algorithms to process data collected through image sensors resulting in an identification of the group of which the data are most representative [7].

Three activities are considered to be most important for the converting the data collected to get identified as feature. They are preprocessing, feature extraction and feature selection. The output of the above description process will be containing a set of features called as feature vector. A Hybrid pattern recognition approach is mooted for the objective

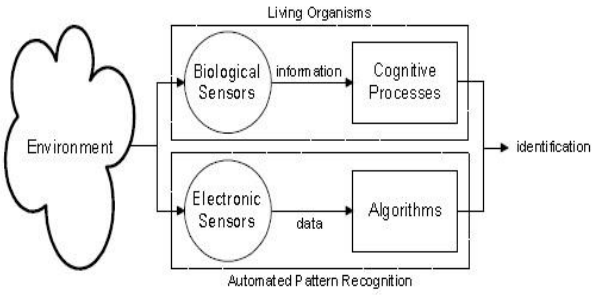

Fig 1: Automated PR System

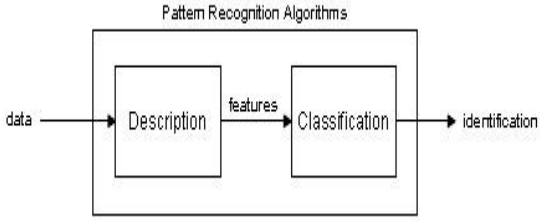

Fig 2: PR Algorithm Design Schema

2. Statistical Vs Structural Vs Hybrid Pattern Recognitions

Statistical pattern recognition techniques are quantative in nature and the techniques are used as classifiers within the classification task such as similarity match, probability analysis, drawing boundary classification and clustering. A statistical approach extracts quantitative features such as the number of horizontal, vertical, and diagonal segments which are then passed to a decision theoretic classifier. Structural pattern recognition techniques are sometimes referred to as syntactic pattern recognition due to its origins in formal language theory which is based upon the morphological interrelationships (or interconnections) present within the data [7].

The limitation of statistical pattern recognition makes it difficult to differentiate, shape based or structural based sub patterns and their interrelationships within the data. This limitation provided the impetus for the development of a structural approach to pattern recognition that is supported by the functioning of human perception and cognition. To overcome the shortcomings observed amongst the two traditional techniques and keeping it in mind that for a custom application like Tiger classification we need a custom hybrid methodology which combines both features and delivers for our need.

3. Proposed System

In the proposed system the image of tiger acquired from the sensor is segmented into n*n blocks preferably accordingly [11]. By means of SIFT, SVM, and K-Nearest Neighbors are used to get the classification tagged for that specific Tiger.

Scale-invariant feature transform (SIFT) is an algorithm in computer vision to detect and describe local features in images. In Tiger identification we are going to spot the objects in the image and those points on the object will be given as a major entity to describe the feature of the object. The recognition system is designed to withstand and deliver precise work even if it encounters a variation in scaling property of image or noise and illumination content .SIFT is one of the best methods for Tiger classification in woods because it can identify objects under partial occlusions. The descriptor majorly remains unchanged to uniform scaling, orientation.The key points of Tiger are extracted from a set of the acquired images from the sensors and they are stored in the database. The stored image of Tiger is compared with the new incoming image and features are matched based on Euclidean distance of their feature vectors. The tagged distinct Tiger is stored in the database and when there comes a similar class or identical class of the same species, the algorithm with the help of K- means cluster analysis. SVM is a recently developed pattern recognition algorithm with non –linear formulation. It is based on the idea that the classification that affords dot products can be computed efficiently in higher dimensional feature space.

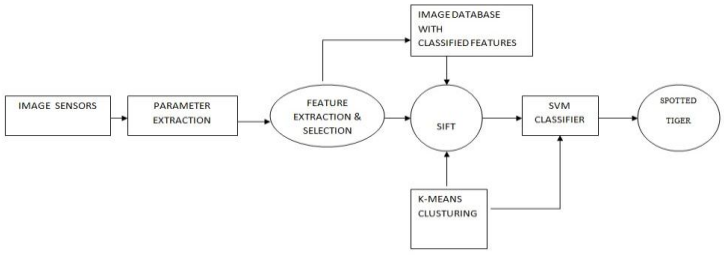

Fig 3: Proposed Hybrid PR Model

4. Algorithm

STEP: 1 Extract SIFT from the available set of Tiger images available in the database.

STEP: 2 Compute K-Means over the entire set of SIFTs extracted form the training set.

STEP: 3 K cluster centers are obtained by the "K" parameter (the number of clusters) which is proportional to SIFTs trained.

STEP: 4 500 to 8000 SIFT's taken.

STEP:5 Descriptor of the Tiger image is computed by assigning each SIFT of the image to one of the K clusters.

STEP: 6 obtain a histogram of length K and normalized.

STEP:7 Implement K-dimensional descriptors, SVMs are used to learn a classifier.

5. Conclusion and Future Work

This approach is a pilot study to perform classification of Tiger and label them with a combinational hybrid approach of pattern recognition. The Migration pattern of Tigers inside the woods can be eventually recorded by effective identification of the same class. This helps us in tracking one particular Tiger no matter wherever it moves. This system helps in saving the endanger species such as Tiger to prevent becoming extinct.

A better system can be made to match by using more than one eigenspaces having different scales and rotations. The feature matching property should be redesigned in order to achieve that. For labeling and tempalting Tiger images convolutional neural network based algorithm is to be tested. Such systems are capable and good enough to handle

Large Scale Visual Recognition Challenges. It is believed and proven with some cases that Convolution Neural Network based algorithms classification ability and recognition capability are close to that of humans. By doing so Tiger classification system will be fully automated and it will be excellent supporting tool for surveillance.

REFERENCES

[1] Robert Hudec, Patrik Kamencay, Miroslav Benco, Martina Zachariasova, Slavomir Matuska "A Wireless Sensors Based Feedback System for Human Body Movement Practices Classification of Wild Animals Based on SVM and Local Descriptors",.AASRI Conference on Circuits and Signal Processing (CSP 2014)AASRI Procedia -9, 2014, pp 25 – 30 .

[2] Y H Sharath Kumar, Manohar N, Chethan H K, "Animal Classification System: A Block Based Approach" International Conference on Advanced Computing Technologies and Applications (ICACTA-2015) Procedia Computer Science 45 (2015) pp 336 – 343.

[3] Peng-zhan Chen, Jie Li, Man Luo, and Nian-hua Zhu, "Real-Time Human Motion Capture Driven by a Wireless Sensor Network," International Journal of Computer Games Technology, vol. 2015.

[4] Jakir Hossen, Eddie L. Jacobs,a and Srikant Charib, "Real-time classification of humans versus animals using profiling sensors and hidden Markov tree model Optical Engineering 54(7), 073102 July 2015.

[5] Mac Schwager a, Dean M. Anderson b, Zack Butler c, Daniela Rusa ,"Robust classification of animal tracking data Computers and Electronics in Agriculture", Elsevier 56 (2007) pp 46–59.

[6] Xiaoyuan Yu, Jiangping Wang, Roland Kays, Patrick A Jansen, Tianjiang Wang and Thomas Huang. Yu *et al* ,"Automated identification of animal species in camera trap images". *EURASIP Journal on Image and Video Processing* (2013), 2013:52.

[7] Robert T. Olszewski ,"Feature Extraction for Structural Pattern Recognition in TimeSeries Data **",** CMUCS01108 ,February (2001).

[8] Slavomir Matuska, Robert Hudec, Patrik Kamencay, Miroslav Benco, Martina Zachariasova, "Classification of Wild Animals Based on SVM and Local Descriptors AASRI Conference on Circuits and Signal Processing", AASRI Procedia 9 (2014), pp 25 – 30

[9] Chulhee Lee David Landgrebe ,"Feature Extraction And Classification Algorithms For High Dimensional Data", TR-EE 93-1 January, (1993).

[10] Xianjin Zhu, Rik Sarkar, Jie Gao, Joseph S. B. Mitchell*y,"*Light-weight Contour Tracking in Wireless Sensor Networks ",IEEE INFOCOM (2008)

[11] David A. Forsyth, Kobus Barnard , Deva Ramanan "Building models of animals from video", IEEE transaction on Pattern Analysis and Machine Intelligence, Vol 28 no. 8, (2006). pp. 1319--1334.