IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Issue-10, Oct 2019 E-ISSN: 2347-2693

Complex Pattern Detection with Entropy

Ritu Sindhu[1*], Neha Gehlot[2]

[1]School of Computing Science and Engineering, Galgotias University Greater Noida, UP, India
[2]Dept. of Computer Science & Engineering, SGT University, Gurugram, Haryana, India

*Corresponding Author: ritu.sindhu2628@gmail.com

DOI: https://doi.org/10.26438/ijcse/v7i10.201205 | Available online at: www.ijcseonline.org

Accepted: 08/Oct/2019, Published: 31/Oct/2019

Abstract- Pattern recognition techniques are important component of intelligent systems. It used for both data pre-processing and decision making. Broadly speaking, pattern recognition is the science that concerns the description or classification of measurements. And its algorithms generally aim to provide a reasonable answer for all possible inputs and to perform "most likely" matching of the inputs, taking consideration of their statistical variation in every approach that we are taking in account. This is just opposite to pattern matching algorithms, which compare the input with pre-existing patterns for exact matches.A very common example of a pattern-matching algorithm is regular expression matching, which looks for patterns of a given sort in given text data and is included in the search capabilities.

***Keywords*:** Pattern Recognition, Artificial Intellegence, Fuzzy Logic, Neural Network

I. INTRODUCTION

Pattern recognition techniques are often an important component of intelligent systems and are used for both data pre-processing and decision making. Broadly speaking, pattern recognition is the science that concerns the description or classification (recognition) of Measurements. The following enumerates a few of the areas where pattern recognition finds image pre processing, segmentation, and analysis like Computer vision,Artificial intelligence,Seismic analysis,Speech recognition/understanding,Fingerprint identification etc.There are three inter-related pattern recognition approaches like Statistical Pattern Recognition,Syntactic Pattern Recognition,Neural Pattern Recognition.Pattern Recognition Could Be Broadly Classify On The Basis Of Neural And Fuzzy Logic.Pattern recognition stems from the need for automated machine recognition of objects, signals or images, or the need for automated decision-making based on a given parameters. Despite over half a century of productive research, pattern recognition continues to be an active area of research because of many unsolved fundamental theoretical problems as well as a rapidly increasing number of applications that can benefit from pattern recognition.

II. BASIC PATTERN RECOGNITION APPROACH

Pattern recognition is nearly synonymous with machine learning. This branch of artificial intelligence focuses on the recognition of patterns and regularities in data. In many cases, these patterns are learned from labeled "training" data (supervised learning), but when no labeled data is available other algorithms can be used to discover previously unknown patterns (unsupervised learning).The terms pattern recognition, machine learning, data mining and knowledge discovery in databases (KDD) are hard to separate, as they largely overlap in their scope. Machine learning is the common term for supervised learning methods and originates from artificial intelligence, whereas KDD and data mining have a larger focus on unsupervised methods and stronger connection to business use. Pattern recognition has its origins in engineering, and the term is popular in the context of computer vision: a leading computer vision conference is named Conference on Computer Vision and Pattern Recognition. In pattern recognition, there may be a higher interest to formalize, explain and visualize the pattern; whereas machine learning traditionally focuses on maximizing the recognition rates. Yet, all of these domains have evolved substantially from their roots in artificial intelligence, engineering and statistics; and have become increasingly similar by integrating developments and ideas from each other.

In machine learning, pattern recognition is the assignment of a label to a given input value. In statistics, discriminate analysis was introduced for this same purpose in 1936. An example of pattern recognition is classification, which attempts to assign each input value to one of a given set of classes (for example, determine whether a given email is "spam" or "non-spam"). However, pattern recognition is a more general problem that encompasses other types of output as well. Other examples are regression, which assigns a real-valued output to each input; sequence labeling, which assigns a class to each member of a sequence of values (for

© 2019, IJCSE All Rights Reserved

example, part of speech tagging, which assigns apart of speech to each word in an input sentence); and parsing, which assigns a parse tree to an input sentence, describing the syntactic structure of the sentence.Pattern recognition algorithms generally aim to provide a reasonable answer for all possible inputs and to perform "most likely" matching of the inputs, taking into account their statistical variation. This is opposed to pattern matching algorithms, which look for exact matches in the input with pre-existing patterns. A common example of a pattern-matching algorithm is regular expression matching, which looks for patterns of a given sort in textual data and is included in the search capabilities of many text editors and word processors. In contrast to pattern recognition, pattern matching is generally not considered a type of machine learning, although pattern-matching algorithms (especially with fairly general, carefully tailored patterns) can sometimes succeed in providing similar-quality output to the sort provided by pattern-recognition algorithms.Pattern recognition studied in man fields,including psychology, psychiatry, ethnology, cognitive science, traffic flow and computer science. The basic Type of Approaches are Statistical pattern recognition approach,Syntactic pattern recognition approach,Neural pattern recognition approach.

III. METHODOLOGY USED IN PROPOSED FRAMEWORK:

In this paper we are providing an approach to perform the pattern detection using improved neural network approach. Here the improvement is being done using wavelet. In this chapter the detail methodology of proposed work is shown.Problem-Solving How do humans solve problems? To begin with we have to replace our intuitive requirements by reasonably well-defined technical questions. This may require the largest part of the intellectual effort, but we cannot dwell on the subject. A minimal requirement is that one have a method of discerning a satisfactory solution should one appear. If we cannot do this then the problem must be replaced by one which is well-defined in that sense, and we must hope that solution of the substitute problem will turn out to be useful. In the best case we come equipped with an efficient algorithm: a systematic procedure which, given the problem as input, is guaranteed to produce a solution as output; efficient in that the solution will arrive within reasonable bounds on time and effort. But for new and interesting problems we don't usually have algorithms, or at least not efficient ones. At the other extreme we may know nothing about how to get a solution (except for the ability to recognize one). In such a case we have no alternative save to launch into an exhaustive search through the ensemble of potential solutions, e.g., the set of all proper expressions in our language. Random search is no better in general than systematic exhaustion,and may introduce the possibility of failure. It Is tempting but irrational to look for a panacea in chaos. But In any case it is well known that for interesting problems exhaustive search is usually out of the question, even with the aid of the most powerful conceivable machines. Normally, we are not motivated to attempt such problems. "Interesting" problems always have roots in areas which are at least partially understood. We usually have a good deal of partial information about how to get a solution. But this information may occur in fragmentary form: we may have some information about the "form" of a solution, recollections of similar problems solved in the past, general suggestions, hints, and the like. We need to find ways of writing programs which will be able to use these fragments, or general advice, to reduce the amount of search to reasonable proportions.

IV. PROPOSED WORK

The problem of sorting events and situations into useful categories arises in so many ways that it is tempting to regard it as the central problem of artificial intelligence. The enormity of the usual underlying search process requires that each trial result be used to remove (on the average) a relatively large class of trial possibilities. Each method will be fruitful only when applied to some particular class of problems, and efficient operation requires that these be recognized. The sorting operation involved may be called "pattern—recognition" or "characterization". Each category can be assigned a conventional or a computed name. It is only through such names that we can hope to introduce "general" or "informal" advice. In a machine designed to recognize, or learn to recognize, visual objects or the like, the characterization problem is itself the centre of attention. The simplest techniques are those in which objects are "matched" more or less directly against standards or "templates". One usually has to Introduce some notion of similarity; this will generally involve (1) an appropriate measure of goodness of fit with the template and (2) searchingfor such a match over a set of transformations of either the object or the template. This type of recognition seems limited, in practice, to patterns defined by equivalence with respect to modest collections of easily per— formed transformations — otherwise extensive search and too many templates would be involved. A more flexible scheme of categorization Is that of listing "proper— ties" or "characteristics". A characteristic of an object is the value of some function from the space of objects into some smaller, more convenient, rarige. (The values mien be, e.g., numerical, verbal, or even neural firing patterns)Objects having a common characteristic should tend, of course, to be heuristically related, e.g., through equivalence under transformations frequently encountered in the problem area involved.

V. ALGORITHM STEP FOR RECOGNITION OF PATTERN:

- ✓ Step for Recognition of pattern

© 2019, IJCSE All Rights Reserved

- ✓ Capture image from camera
- ✓ Input camera image for segmentation
- ✓ Segmented image break by HAAR wavelets
- ✓ Through HAAR analysis all segmentaed pattern
- ✓ Monte carlo integration for reconstructing small segmented parts
- ✓ Now compare segmented part into training set provide by simple geometrical locus
- ✓ After comparing all the small locus recombine transform the segmented part into grid based plane
- ✓ Find inclination of high density area by maximum entrophy method
- ✓ Now again compare all high density part to fixed pattern locus
- ✓ Matching all probable parts to locus of geometrical part which is in our sets
- ✓ Nearby pattern by fuzzy logic decide which is closet locus to maximum entrophy area.
- ✓ Result will be noted for different pattern alone and together.

VI. TOOL USED

MATLAB - The Language of Technical Computing MATLAB is a high-level language and interactive environment that enables you to perform computationally intensive tasks faster than with traditional programming languages such as C, C++, and FORTRAN.MATLAB (Matrix Laboratory), a product of Math works, is a scientific software package designed to provide integrated numeric computation and graphics visualization in high-level programming language. MATLAB program consists of standard and specialized toolboxes allowing users to take advantage of the matrix algorithm based on LINPACK1 and EISPACK2 projects. MATLAB offers interactive features allowing the users great flexibility in the manipulation of data and in the form of matrix arrays for computation and visualization. MATLAB inputs can be entered at the "command line" or from "mfiles", which contains a programming-like set of instructions to be executed by MATLAB. In the aspect of programming, MATLAB works differently from FORTRAN, C, or Basic, e.g. no dimensioning required for matrix arrays and no object code file generated. MATLAB offers some standard toolboxes and many optional toolboxes (at extra cost), such as financial toolbox and statistics toolbox. Users may create their own toolboxes consisted of "mfiles" written for specific applications. The original version of MATLAB was written in FORTRAN but later was rewritten in C. MATLAB consists of a collection of toolboxes. These toolboxes contain library files called M-Files, which are also functions or command names, executable from the Command window.

Tools Used In Simulator: Toolbox used in MATLAB for our proposed work is Image Processing Tool box. Image Processing Toolbox™ provides a comprehensive set of reference-standard algorithms and graphical tools for image processing, analysis, visualization, and algorithm development. You can perform image enhancement, image deblurring, feature detection, noise reduction, image segmentation, spatial transformations, and image registration. Many functions in the toolbox are multithreaded to take advantage of multicore and multiprocessor computers.

Image Processing Toolbox supports a diverse set of image types, including high dynamic range, giga pixel resolution, ICC-compliant color, and tomography images. Graphical tools let you explore an image, examine a region of pixels, adjust the contrast, create contours or histograms, and manipulate regions of interest (ROIs). With the toolbox algorithms you can restore degraded images, detect and measure features, analyze shapes and textures, and adjust the color balance of images.

VII. RESULT

All of the above approach towards pattern recognition of indexed data which is mathematically statistical in nature and implanted and realization on FGPA through HAAR wavelet gives the better and more real pattern when the all of the approach is being combined. When the program run gives the above figure and results in is very exciting for us. Ultimately we can detect the basic structure of pattern on the basic of said algorithm. on this basic we gives more accurate picture of the real world. We can also find more exact expectation of things that is performing in real world.

Table 1. TRIAL of our pattern detection model

	Circle	Triangle	Squrare	Diamond
Pic1	Detected	Detected	Detected	Not Detected
Pic2	Not Detected	Detected	Detected	Detected
Pic 3	Detected	Detected	Detected	Detected
Pic 4	Detected	Detected	Not Detected	Not Detected
Pic 5	Detected	Detected	Detected	Detected
Pic 6	Detected	Not Detected	Detected	Detected
Pic 7	Detected	Detected	Detected	Detected

© 2019, IJCSE All Rights Reserved

Pic 8	Detected	Not Detected	Detected	Not Detected
Pic 9	Detected	Detected	Detected	Detected
Pic 10	Not detected	Detected	Detected	Detected
Success Result	80%	80 %	90 %	70 %

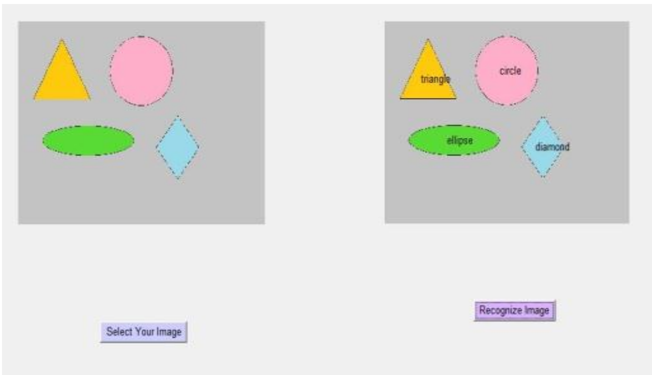

Figure 1 GUI OF DETECTION OF SIMPLE IMAGE

In this process the Haar transform was run once (or one level) over the input signal. The difference component of the first level tells us where dramatic local changes in the input signal occur. Large differences indicate large change between adjacent input signal values. Differences near zero tell us that adjacent input signal values are somehow similar. By running the Haar transform again on the first level average and difference components we can generate information about a larger part of the input signal since each new coefficient contains information about 4 adjacent input signal values. We repeat the process until we obtain single average and difference components (which are defined on the all input signal values). Stated succinctly, each successive transform level reveals courser frequency (change) information about a larger part of the input signal. If the signal has N coefficients, then the Haar transform can be run log2 (N) times producing N coefficients in each run.

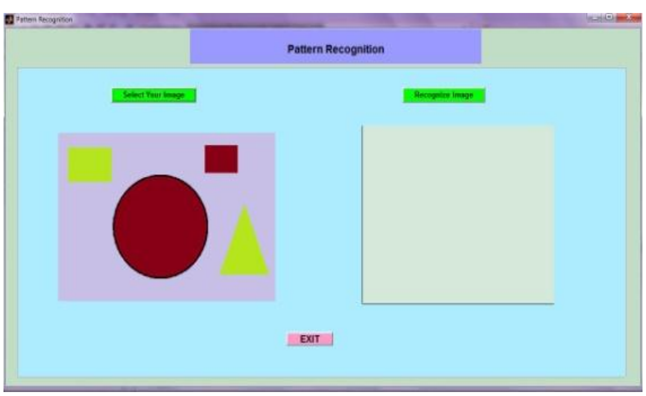

Figure.2 : Shows the image Taken by select image button

This picture contains the geometric structure which is painted in pained software. Adjucent windows Is now ready to recognize the high entropy area.

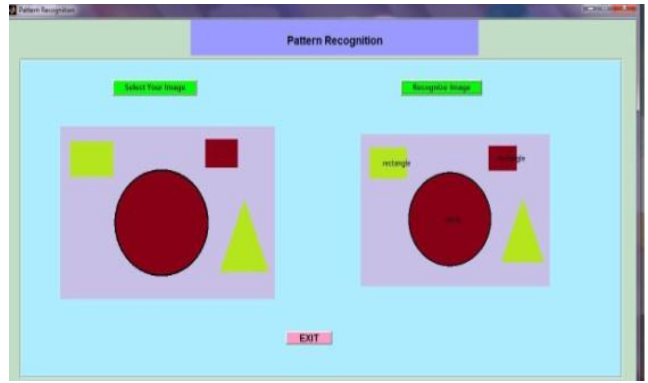

Figure 3- Detected image

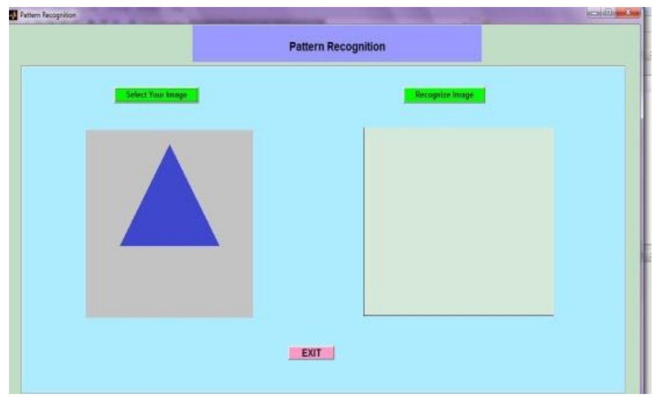

Figure 4: Image Selected

Here right windows detected the highly entropy area.Now we have the detected figure in right windows that is recognize correctly.

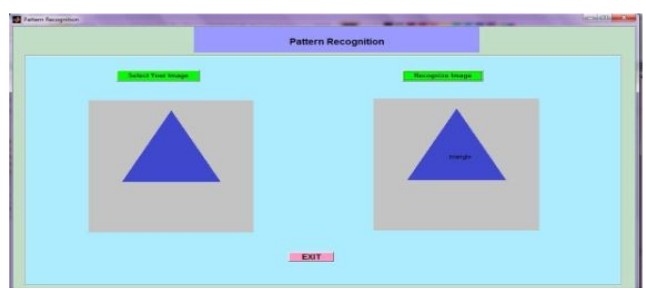

Figure 5: Detected Figure

Table 2 shows the value of Haar wavelet coefficients at each level and waveforms that represent the obtained coefficients after each loop of the Haar transform algorithm. Notice that in this waveform interpretation coefficients represent the inner product of the input signal and the corresponding waveform.

© 2019, IJCSE All Rights Reserved

Input signal	0	0.5	1	0.5	0	-0.5	-1	-0.5
Level 1	0.25	0.75	-0.25	-0.75	-0.5	0.5	0.5	-0.5
Level 2	0.5	-0.5	-0.5	0.5	0	0	-1	1
Level 3	0	1	0	-1	0	0	0	-2

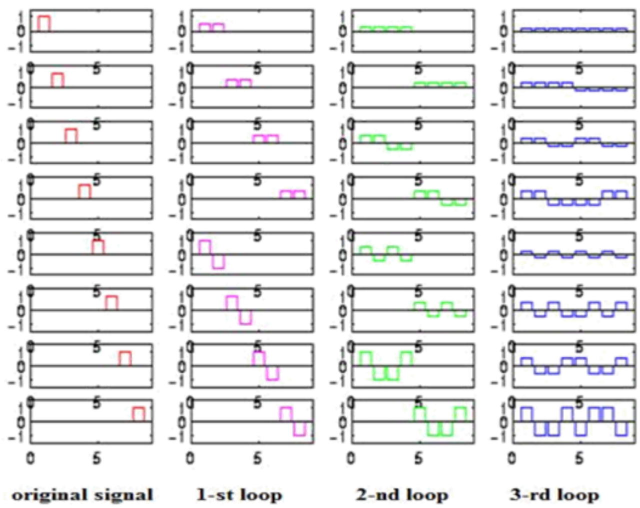

Figure 6- waveform interpretation of Haar Coefficients

The following section explains how the Haar transform was used to determine the input space transformation which maximized information in 1-dimension Analysis: We start with two classes of signals and perform Haar transform on them.

VIII. CONCLUSION

Pattern recognition techniques are often an important component of intelligent systems. With the increase in size and complexity of the feature selection undertaken in pattern `recognition and other areas, people pay more attention to the application of evolutionary and adaptive learning techniques in this field. It was demonstrated in this work that by selecting features based on evolutionary use of Haar wavelets, new features with better classification properties could be obtained. The convergence is very fast. The quality of the obtained transformation is measured using the entropy based information index. This thesis provides the new way for data sets with estimated probability density functions of different classes. Any mutual dependence of extracted features is automatically accounted for by performing Monte Carlo integration in 2 and 3 dimensional space. The confidence interval of the predicted performance is related to standard deviation of the information index and depends on the information level and the number of training points used.Future work will include extension of the proposed information measure to k-class problem, training and testing using some real data.

REFERENCES

[1]. Majida Ali Abed , Ahmad Nasser Ismail andZubadiMatizHazi, “Pattern recognition UsingGenetic Algorithm”,International Journal of Computer and Electrical Engineering, Vol. 2, No. 3, June, 2010. Ahmad, T.,Jameel,

[2]. A.Ahmad, “Pattern recognition using statistical and neural techniques”, International Conference onComputer Networks and Information Technology (ICCNIT), 2011.

[3] Mohammad S. Alam,Mohammad A. Karim,“Advances in Pattern Recognition Algorithms,Architectures and Devices,” Optical Engineering,Vol. 43 No. 8, August 2004.

[4] Sebastien ´ Gadat,Laurent Younes, “AStochastic Algorithm for Feature Selection in Pattern Recognition”, Journal of Machine Learning Research 8 (2007) 509-547.

Author Profile

Dr. Ritu Sindhu pursued her Master of Technology from Banasthali University, Rajasthan, India. She did her Ph.D from Banasthali University, Rajasthan, India.. She is currently working as a Professor, School of Computer Science and Engineering, Galgotias University, Greater Noida, India. She has published 40 research papers in various reputed National and International Journals. Her teaching experience is 14 Years.

Ms.Neha Gehlot pursued her Master of Technology from ITM University Gurugram , India. She is pursuing her Ph.D from SGT University, Gurugram , India.. She is currently working as an Assistant Professor, School of Computer Science and Engineering, SGT University, Gurugram , India. She has published 15 research papers in various reputed National and International Journals. Her teaching experience is 5 Years.

© 2019, IJCSE All Rights Reserved