# A New Approach in Analyzing the Emotions of Learners and Implementation with Clustering Technique

I.Samuel Peter James[1], Dr.P.Ramasubramanian[2] , D.Magdalene Delighta Angeline[3]

Research Scholor, Dept. of . CS.,  Bharathiyar University,Coimbatore, Tamilnadu, India [1]

Principal, Annai Vailankani College of Engineering, Kanyakumari, Tamilnadu, India [2]

Assistant Professor, Dept. of CSE., Dr.G.U.Pope College of Engineering, Thoothukudi, Tamilnadu, India[3]

**ABSTRACT:** Emotions are accountable for motivation to pursue goal-directed actions and activities of every human. Emotions serve to support people, providing attentiveness and direction. The motivation expands while an aim is difficult or easy to achieve something. A rational dispute is motivation with positive thoughts. This paper scrutinizes how emotions affect the learners' learning and the achievement of performance enhancement of various learners under different environment that leads to the success of a learner. The implementation is done with different types of learners and the analysis is made using clustering algorithm. The primary purpose of the study was to examine trait emotional intelligence and how it relates to academic performance.

**KEYWORDS**: Clustering, Cognitive Ability, Emotions, Emotional Intelligence, Positive emotion

## I. INTRODUCTION

Emotions play a very important role in human interactions. Emotions not only impact our social interactions but much of decision making as well. [16] proposed an improved approach for classifying Emotions using customized decision tree algorithm. As emotions relates to learning and expansion, researchers argued the connection between emotions and way of thinking. Emotions can override thoughts, transform relationships and strongly convince actions. Emotional intelligence permits to connect the power to understand ourselves, succeed over challenges and construct tough relationships.

In the present midst of our country's education crisis, the results are essential in teaching and nurturing motivated and successful learners in the classroom.  Emotions such as anger, anxiety, and sadness have the potential to distract learners learning efforts by interfering with their ability to attend to the tasks at hand [1].

The strong predictor of academic achievement is motivation that has been defined as the process through which activities of student get keyed up, directed and continued in organizational settings [18]. The theory which examines diverse sources of motivation was proposed by deCharmes. He proposed the idea of intrinsic versus extrinsic motivation to distinguish the unusual loci of causality. An intrinsically motivated behavior represents internal causality, whereas behaviors that are induced by external forces are said to represent external causality. Deci [8] investigates the effects of extrinsic rewards on intrinsic motivation and in doing so, sheds some light on the meaning of intrinsic motivation.

## II. LITERATURE SURVEY

A wide range of researches has been conducted on to predict the performance of students in learning. Researchers who have sought to discover factors associated with high academic performance have examined an array of variables such as social behavior [19] academic self-concept [17] [21] learning strategies [5] motivation [6] [7] [20] Parenting Styles [1] and socio-economic status [14].

The higher education institutions are responsible to develop knowledge and skills in students but organizations frequently condemn that the students are not equipped to handle their In fields like banking, telecom, retailing, emotional intelligence is used as an performance indicator. [10] [12] exposed that emotional intelligence affects the

success in academic and professional studies and contributes to performance over and above the contribution by general intelligence. The emotionally intelligent students are observed by their peers and colleagues as friendly and non-antagonistic [3]. By doing so, the relationship between peers get improved and helps in the academic growth which leads to better academic performance [2] [9]. The prioritizing thinking, behavior and lifestyle supported by emotional intelligence assist in academic performance. The self-report measures of EI completed at the start of the academic year by students can predict their GPA in the final year [15]. The relation between academic performance and cognitive ability is moderated using trait emotional intelligence [11].

The faculty in teaching experience a large variety of positive and negative emotions while teaching and interacting with students. All students experience frustration and failure to achieve their goals. They depend on the strength of fortitude to control their negative thoughts and feelings. Learning disabilities have an effect on a learner's understanding, progression and act in response to new information leads to emotional problems. The best learning takes place when a positive feeling toward a mission facilitates to use what we know, while motivating to enlarge that knowledge and build on it. The learners' motivation to learn is a direct result of the feelings they relate with their preexisting knowledge and the lack thereof. These feelings are believed to be the stem from relations with new arriving information as well as confidence in the ability to process that information. This can be produced and shaped through diverse pedagogy.

The positive emotional state people will be open to a learning experience, make more positive judgments and give more favorable feedback than someone in a negative state. The challenge for faculty is to create consequential learning experiences extracting positive reactions from learners.

## III. PROPOSED METHODOLOGY

This study explores the prediction of academic performance from emotional intelligence of learners. Every learner has diverse emotion reacting to each situation differently. It is very essential to balance the emotional state of a learner to make the learner to learn new concepts. The proposed research work used SAM (Sustain, Ask and Monitor) method that helps the learner to overcome the difficulties such as uneven emotional thoughts and making them to be attentive in classrooms, more responsible and creating eagerness in learning new concepts, producing new things and attaining greater heights. The steps of this method are:

    i.     Sustain good relationship and continued observation
   ii.     Ask questions and provide necessary solutions with good explanation.
  iii.     Monitor the progress at each and every step taken by the learner.

### A.  *K-MEANS CLUSTERING:*

The *k*-means clustering algorithm is a simple and efficient algorithm for finding clusters in data. The algorithm proceeds as follows:

Step 1: Select the number of clusters k the data set should be partitioned into.
Step 2: Randomly assign k records to be the initial cluster center locations.
Step 3: For each record, find the nearest cluster center. Thus, in a sense, each cluster center "owns" a subset of the records, thereby representing a partition of the data set. Therefore k clusters is formed as, C1, C2, …, Ck.
Step 4: For each of the k clusters, find the cluster centroid, and update the location of each cluster center to the new value of the centroid.3
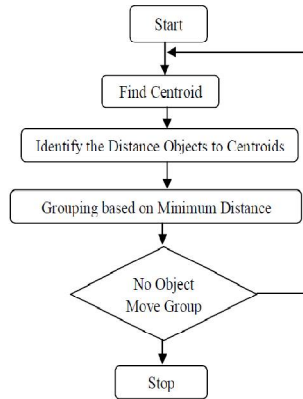Step 5: Repeat steps 3–5 until convergence or termination.

Fig. 3.1. Flowchart for K-means clustering

## B. *MEASURING THE PERFORMANCE:*

The emotional intelligence activity list (EIAL) was used to measure the degree of the learners' emotional intelligence. The EIAL consists of 20 inquiries which were answered on a scale ranging from 1 to 4. (1=Very much incapable 2= incapable 3=Less Capable 4=Capable). Higher scores point to superior levels of emotional intelligence and produces poor performance in academic. The analysis chart of learners' emotional influence is given in fig.3.2

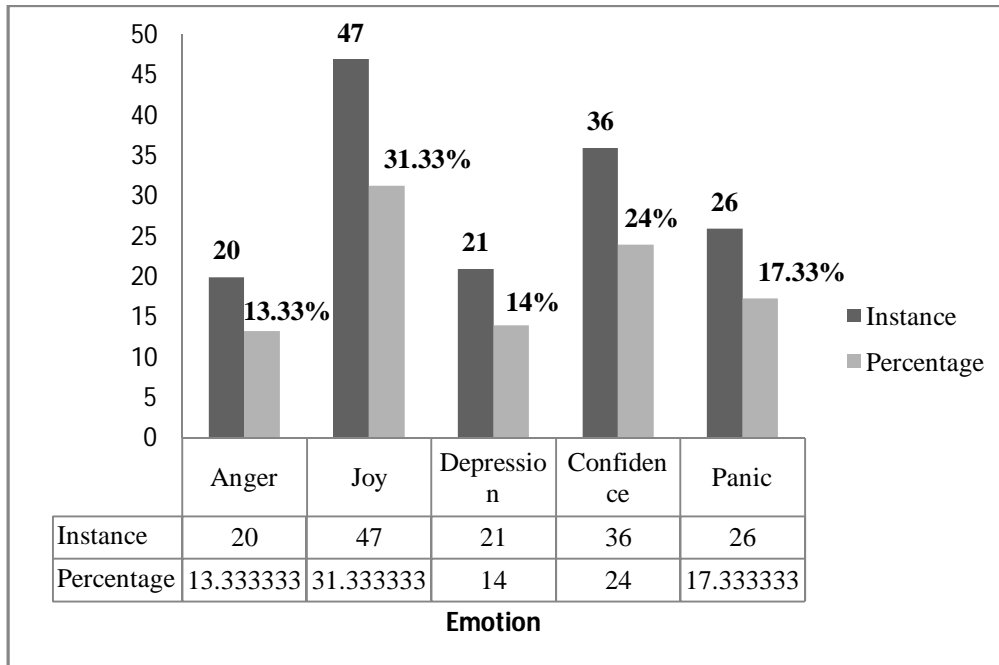Step 1:  Calculating Transmission Energy:



| | Anger | Joy | Depression | Confidence | Panic |
|---|---|---|---|---|---|
| Instance | 20 | 47 | 21 | 36 | 26 |
| Percentage | 13.333333 | 31.333333 | 14 | 24 | 17.333333 |

**Emotion**

Fig. 3.2 Analysis chart of learners' with basic emotions

The positive motivation was provided to the learners'. The attributes considered for evaluation are self-regulating, courageous, interest, fulfilling faculty, confidence and painless effort that lead to the positive emotions.The faculty is allowed to maintain the relationship of a learner in a positive way. The positive approach helps the learner to actively engage in learning. The observation and care should be given to individual learner to identify the emotional behavior of a learner. For observation, the metrics like work based on team activities, individual activity, and leadership role are taken. The metrics aids to bring out the positive emotions of a learner and enhance the learning with positive thoughts. This approach allows the learners to learn the topics with positive emotions overcoming the negative emotions. From

the above said metrics the learners' emotion such as anger, joy, depression, confidence and panic conditions were identified. The participants in the study were 150. The fig.3.3 shows the analysis chart with positive emotions.
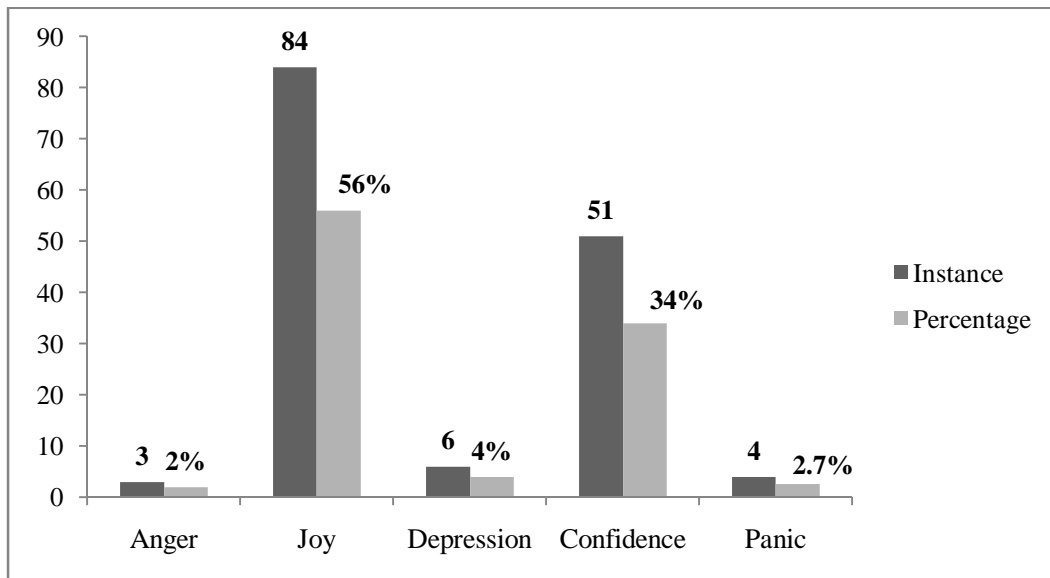


Fig. 3.3 Analysis chart of learners' with positive emotions

Fig.3.4 shows the comparative analysis of learner with basic emotions and positive emotions. The learners' are trained with positive emotions and the results of the learner are increased with positive emotions. The learner enjoys the SAM approach that sustains that observes, provide positive approach on learners and monitor the progress of the learners. The emotions are captured and it is analyzed using the K means clustering approach.
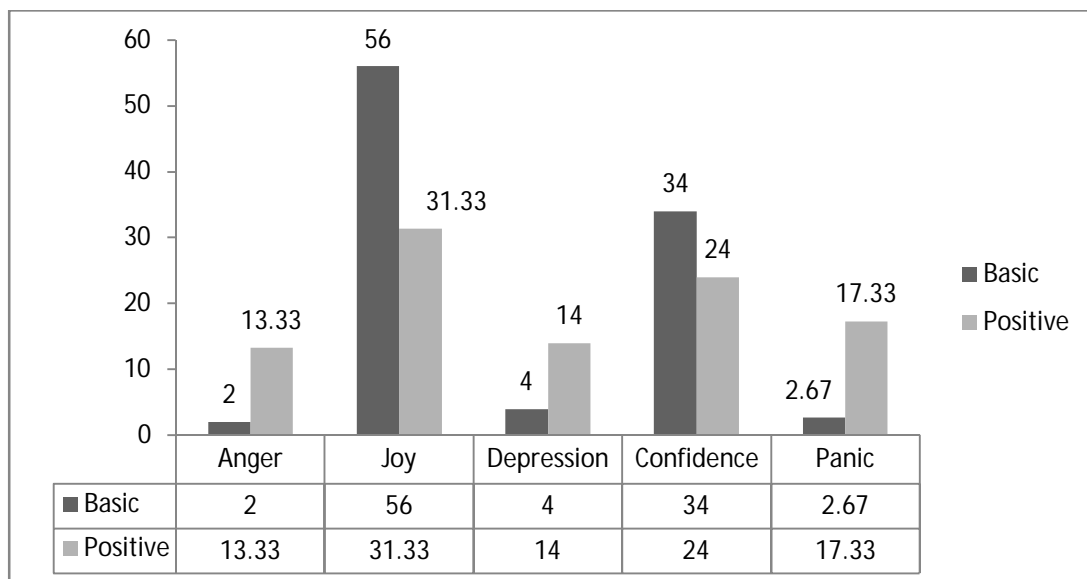


| | Anger | Joy | Depression | Confidence | Panic |
|---|---|---|---|---|---|
| ■ Basic | 2 | 56 | 4 | 34 | 2.67 |
| Positive | 13.33 | 31.33 | 14 | 24 | 17.33 |

Fig. 3.4 Comparative analysis of learner with basic emotion and positive emotions

### IV. IMPLEMENTATION

For this implementation 500 samples are taken. The emotions of learners such as anger, joy, depression, confidence and panic conditions are observed. The situation of learners creates more impact on learning and the learners with more socio emotions are lacking in studies. The different emotions of learners are captured and the learners were grouped under two categories: Low and High using k-means clustering. The learner with high emotional impact achieves lower results and with less emotion achieves higher results.  The k-Means Clustering method starts with k initial clusters. At each iteration, the records are assigned to the cluster with the closest centroid. After each iteration, the distance from each record to the center of the cluster is calculated. These two steps are repeated until the redistribution of record results in an increased distance value. When a random start is specified, the algorithm generates the k cluster centers randomly, and fits the data points in those clusters. This process is repeated for all specified random starts. The output is based on the clusters that exhibit the best fit. The process was carried out in 14 iterations and two clusters were formed. Fig.4.1 shows the clustering output of learners with low and high group.

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Clusterer output

kMeans
======

Number of iterations: 14
Within cluster sum of squared errors: 210.8714546650723
Missing values globally replaced with mean/mode

Cluster centroids:
                            Cluster#
Attribute      Full Data         0            1
                  (499)        (195)        (304)
========================================================
1.7518         -0.2488      -8.8688       5.2804
2.2742          0.0048      -2.2236       1.4342
2.9658          0.1375      11.3053      -7.026
8.5658          0.344       13.611       -8.1661
-0.32036       -0.0176      -0.7425       0.4474
-8.6464         -0.25       -15.0674      9.2546
-4.0976         -0.0637     -12.7495      8.0736
-11.804         -0.6368     -34.3196      20.9689
-1.9435         -0.2021     -12.6644      7.7919
-7.5333         -0.3677     -22.3965      13.7626
17.376           0.5998      34.5581     -21.1827
-4.3713         -0.5276     -32.3145      19.8621
4.7587          -0.1364     -13.1292      8.1978
6.0616          -0.1383     -11.1056      6.8966
-6.0123         -0.43       -25.1427      15.4219
0.79198          0.027      -11.7589      7.5871
12.922           1.1612      68.8379     -42.2499
18.279           1.1381      72.1224     -44.3946
7.6734           0.2758      18.3316     -11.3061
5.1922           0.2291      18.1764     -11.2831
1.1582           0.3079      23.481      -14.5564
-6.3302          0.0192      -6.1616      3.9839
-1.6957          0.2662      15.1638     -9.2898
-12.634         -0.3137     -18.6243      11.4315
-6.0556          0.0138      0.9845      -0.6089
1.2068          -0.0477      7.5419      -4.9161
-6.1052         -0.1796     -7.0173      4.2064
-16.007         -0.5739     -47.4723      29.509
4.7656           0.0141      5.7934      -3.6931
-4.1542         -0.2988     -11.0918      6.6243
0.4181          -0.1492     -5.4096      3.2251
1.5502           0.0434      8.3526      -5.2865
```

Fig.4.1  Clustering output of learners with low and high group

In fig.4.2, the outputs of the clusters are given. The cluster 0 achieves 51% with 86 instances and cluster 1 achieves 49% with 84 instances.

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Cluster centroids:
                         Cluster#
Attribute     Full Data       0            1
              (329)          (183)        (146)
============================================
1.7518        -0.1767        4.7827       -6.393
2.2742         0.1209        2.3357       -2.6552
2.9658        -0.2558       -8.3176        9.8491
8.5658         0.1482       -7.5374        9.7816
-0.32036      -0.7641       -1.1081       -0.333
-8.6464        0.3084        9.9488      -11.7752
-4.0976        0.2184        9.9947      -12.0354
-11.804        0.6624       23.8803      -28.4395
-1.9435       -0.379         7.8204      -10.6562
-7.5333        0.3217       14.8636      -17.9055
17.376        -0.535       -23.4042       28.13
-4.3713       -0.1033       22.0261      -27.8407
4.7587         0.1578        9.6517      -11.7421
6.0616         0.054         8.6464      -10.7158
-6.0123        0.2861       17.2777      -21.0115
0.79198        0.7571       10.3482      -11.2648
12.922        -0.8644      -46.4621       56.2888
18.279        -0.682       -49.2259       60.1641
7.6734        -0.1229      -12.6747       15.6099
5.1922        -0.4854      -12.8876       15.0598
1.1582        -0.4867      -16.919        20.1098
-6.3302        0.63          5.8074       -5.8595
-1.6957       -0.0393      -10.1038       12.5757
-12.634        0.332        12.377       -14.7656
-6.0556        0.0245       -0.7286        0.9686
1.2068         0.07         -6.6134        8.4471
-6.1052       -0.0455        3.7863       -4.8483
-16.007        1.084        34.6358      -40.9708
4.7656        -0.2115       -5.1352        5.9601
-4.1542        0.0389        6.4181       -7.957
0.4181        -0.001         2.8421       -3.5647
1.5502        -0.0614       -6.3247        7.7892


Clustered Instances

0        86 ( 51%)
1        84 ( 49%)
```

Fig.4.2 Cluster centroid and instances

SSE is the sum of the squared differences between each observation and its group's mean. It can be used as a measure of variation within a cluster. It is given by

$$SSE = \sum_{i=1}^{n} (X_i - \bar{X})^2$$

When more data are added to the collection the sum of squares will increase, except in unlikely cases such as the new data being equal to the mean. So usually, the sum of squares will grow with the size of the data collection. The sum of squared errors is 143.66.

Fig.4.3 shows the cluster 0 and cluster 1 implies that cluster 0 is formed with higher probability when compared to cluster1.
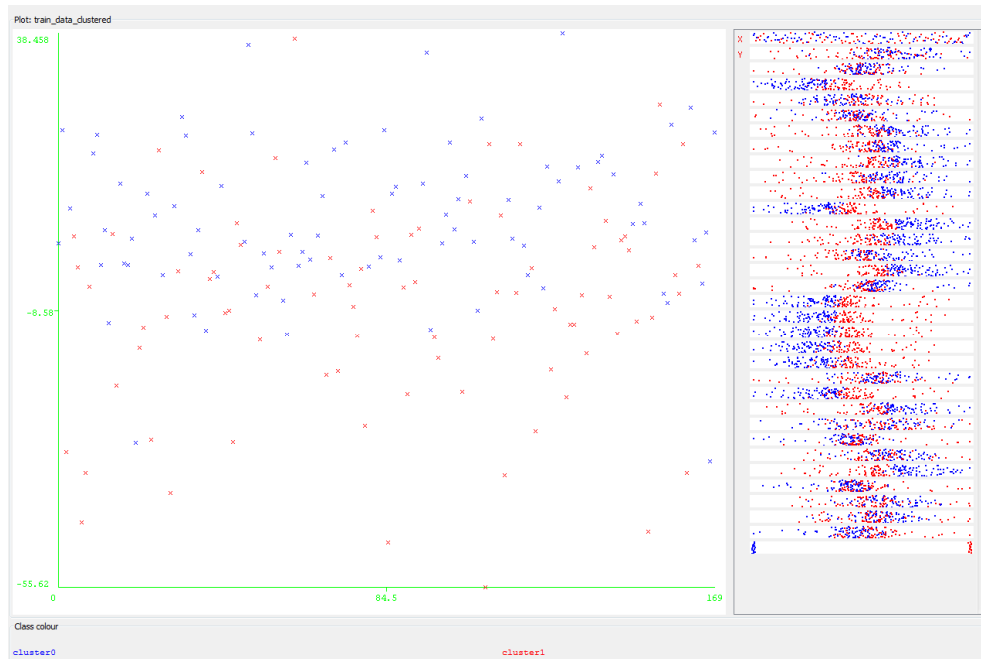
Fig.4.3. Two Clusters : Cluster 0 and Cluster 1

## V. CONCLUSION

For the fact that emotional intelligence is a strong predictor of academic achievement, it is necessary for the curriculum developers to integrate emotional intelligence into the curriculum of the learner. Based on the findings from this study, it is recommended that the faculty should encourage the development of a strong achievement motivation in the learners through the provision of appropriate counseling intervention programs and enabling environment. By so doing, the academic performance of the learners could be improved barring all other teaching-learning obstacles. For preparing learners to cope with the dynamic and competing business environment it is essential to integrate emotional intelligence training into the business curriculum.

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## BIOGRAPHY

**I. Samuel Peter James** is a research scholar of Bharathiar University, Coimbatore, Tamilnadu, India. He obtained his Bachelor degree in Computer Science and Engineering from Anna University, Chennai in the year 2009 and he obtained his Master degree in Computer Science and Engineering and also M.B.A. in Manonmaniam Sundaranar University, Tirunelveli in the year 2012. He has over 5 years of Teaching Experience and published one paper in national conference, five papers in International conferences and also published twelve papers in various international journals. He also published four books. He is a reviewer for various international journals. His current area of research includes Data Mining, Image Processing and Neural Networks.

**Prof. Dr. P. Ramasubramanian,** presently working as a Principal in Annai Vailankani College of Engineering, Kanyakumari Dist. Tamilnadu, India. He obtained his Bachelor, Master degree in Computer Science and Engineering from Madurai Kamaraj University, Madurai in the year 1989 and 1996 respectively. He also obtained his Ph.D degree from Madurai Kamaraj University in the year 2012. He has more than 24 years of Teaching Experience and authored 16 books and 39 research papers in International, National Journals and Conferences. His current area of research includes Data Mining, Data Ware housing, Neural Networks, Fuzzy and Rough Set logic. Prof. Dr. P.Ramasubramanian has been chosen for inclusion in MARQUIS Who's Who in Science and Engineering, 11th Edition, for the year 2011 – 2012. He is a member of various professional societies like Indian Society for Technical Education (ISTE), International Association of Engineers, Computer Science Teachers Association, International association of Computer Science and Information Technology, Multi-Criteria Decision Making and Fellow in Institution of Engineers (India). He is a reviewer and editor for various international conferences and journals.

**D. Magdalene Delighta Angeline** is working as a Assistant Professor in the Department of Computer Science and Engineering in Dr.G.U.Pope College of Engineering, Sawyerpuram, Tamilnadu, India. She obtained her Bachelor degree in Information Technology from Anna University, Chennai in the year 2007 and she obtained her Master degree in Computer and Information Technology in Manonmaniam Sundaranar University, Tirunelveli. She is also a research scholar of Bharathiar University, Coimbatore. She has over 9.3 years of Teaching Experience and published nine papers in national conference, five papers in International conferences and also published thirteen papers in various international journals. She also published four books. She is a reviewer for various international journals. Her current area of research includes Image Processing, Neural Networks, and Data Mining.