Volume 5, Issue 6, June 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Multiple Pheromone Based ACO for Efficient Tumor Detection

Manjeet Kaur Bhullar, Kiranbir Kaur
Department of CSE, GNDU,
Amritsar, Punjab, India

Abstract: ***This research work deals with improving the accuracy of brain tumor detection further using multiple pheromone based ACO. A brain tumor is an abnormal growth of tissue in the brain or central spine that can disrupt proper brain function. The overall objective of this research work is to design and implement ACO based data mining algorithm for brain tumor detection. The proposed technique is designed and implemented in the MATLAB tool with the help of WEKA tool. The comparison among some well known technique has also been drawn by considering various performance metrics. The comparisons has clearly shown that the proposed technique outperforms over the available techniques.***

Keywords –Data mining, Aco, Brain tumor detection, Aco based mining ,mining algorithm.

I. INTRODUCTION

Data mining is the process of extracting the useful information from large amount of data. Data mining software is one of a number of analytical tools for analyzing data. . Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.The overall goal of the data mining process is to extract information from a data set and transform it into an understandable structure for further use.

Data mining is the search for the relationships and global patterns that exist in large databases but are hidden among vast amounts of data, such as the relationship between patient data and their medical diagnosis. This relationship represents valuable knowledge about the database and the objects in the database, if the database is a faithful mirror of the real world registered by the database.

ACO based Mining

The Knowledge Discovery in Databases (KDD) field of data mining is concerned with the development of methods, techniques and algorithm which can make sense of the available data. Knowledge Discovery in Database is useful in finding trends, patterns and anomalies in the databases which is helpful to make accurate decisions for the future. Association rule mining finds collections of data attributes that are statistically related to the data available. Ant Colony Optimization (ACO) improved the association mining is to perform the association mining on medical data set. During the rule generation, the global pruning will be used to eliminate the rules as well as attributes that are not effective. The work is about to generate the optimized and accurate result set so that different decisions regarding the disease classification can be done.

Problem of Brain Tumour

A brain tumor is an abnormal growth of tissue in the brain or central spine that can disrupt proper brain function. Doctors refer to a tumor based on where the tumor cells originated, and whether they are cancerous (malignant) or not (benign).Some symptoms of Brain tumour are given as under :

- Issues with vision
- Seizures
- Changes in personality
- Short-term memory loss
- Poor coordination
- Difficulty speaking or comprehending

II. LITERATURE SURVEY

S. kashef et al.[1] have proposed a novel feature selection algorithm based on Ant Colony Optimization (ACO), called Advanced Binary ACO (ABACO), is presented. The performance of proposed algorithm is compared to the performance

of Binary Genetic Algorithm(BGA), Binary Particle Swarm Optimization(BPSO),Catfish BPSO ,Improved Binary Gravitational Search Algorithm(IBGSA),and some prominent ACO-based algorithms on the task of feature selection on 12 well-known UCI datasets. Simulation results verify that the algorithm provides a suitable feature subset with good classification accuracy using a smaller feature set than competing feature selection methods. they present a new feature selection technique based on Ant Colony Optimization(ACO)by combining two models of ACO. The proposed algorithm has a strong search capability in the problem space and can effectively find the minimal feature subset.

Yumin chen et al.[2] have proposed a new rough set approach to feature selection based on ACO, which adopts mutual information based feature significance as heuristic information. A novel feature selection algorithm is also given. Jensen and Shen proposed a ACO-based feature selection approach which starts from a random feature. Their approach starts from the feature core, which changes the complete graph to a smaller one. To verify the efficiency of their algorithm, experiments are carried out on some standard UCI datasets. The results demonstrate that their algorithm can provide efficient solution to find a minimal subset of the features.

Khalid M. Salama et al.[3] have explored the use of various classification quality measures for evaluating the BAN classifiers constructed by the ants. The aim of this investigation is to discover how the use of different evaluation measures affects the quality of the output classifier in terms of predictive accuracy. In their experiments, they use 6 different classification measures on 25 benchmark datasets. they found that the hypothesis that different measures produce different results is acceptable according to the Friedman's statistical test. They explored the effect of using 6 different classification quality measures for evaluating the candidate BN classifiers constructed by the ants and updating pheromone during the training phase of ABC-Miner.

Wen xiong et al.[4] have proposed a novel hybrid clustering approach, which uses adaptive ant colony optimization(ACO) to optimize the partition of data set, and utilizes enhanced particle swarm optimization (PSO) to refine the result of the adaptive ACO. Experiments displayed that the approach obtains smaller clustering evaluations on three data sets of University of California Irvine (UCI) and competitive results on two data sets of UCI, which verifying its availability.

Mr. K. Ravikumar et al.[5] have described a model that develops an ant colony algorithm for the discovery of spatial trend patterns found in a GIS traffic risk analysis database. The proposed ant colony based spatial data mining algorithm applies the emergent intelligent behavior of ant colonies to handle the huge search space encountered in the discovery of this knowledge. Genetic algorithm is deployed to evaluate the spatial risk pattern rule sets to its optimization on search phase in quick successions. The experimental results on a geographical traffic (trend layer) spatial database show that their method has higher efficiency in performance of the discovery process and in the quality of trend patterns discovered compared to other existing approaches using non-intelligent decision tree heuristics. The proposed results provide spatial decision trees for traffic risk patterns with optimized route structure with the ant agents.

Mohammad Saniee et al.[6] have presented an ACO to extract a set of rules for diagnosis of diabetes disease. The new presented algorithm uses ACO to extract fuzzy If-Then rules for diagnosis of diabetes disease, they call it FADD. They have evaluated their new classification system via Pima Indian Diabetes data set. Results show FADD can detect the diabetes disease with an acceptable accuracy and competitive or even better than the results achieved by previous works.

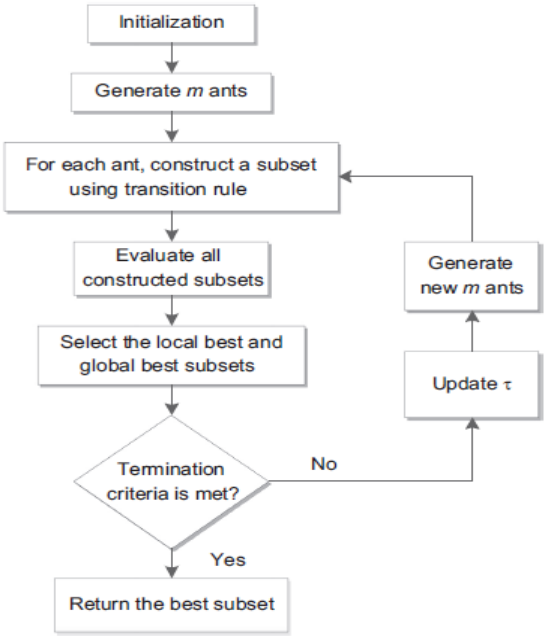
Yu-Min Chiang et al.[7]They utilizes some machine learning techniques and a meta-heuristic approach to classify cancers using microarray data. In the study, the ant colony optimization algorithm is introduced to select genes relevant to cancers, then the MLP and SVM classifiers are used for cancer classification. Experimental results show that selecting genes by using ACO can improve the accuracy of MLP and SVM classifiers. Besides, the optimal number of genes selected for cancer classification should be set according to the microarray dataset and gene selection methods. Although the proposed ACO gene selection algorithm improves the classification accuracy of MLP and SVM classifiers .

Shyi-Ching Lian et al.[8] Have proposed an extension of Ant-Miner is proposed to incorporate the concept of parallel processing and grouping. . Due to the algorithm design, Ant-Miner made a slight modification in this part which removes the parallel searching capability. Based on Ant-Miner, they propose an extension that modifies the algorithm design to incorporate parallel processing. For solving the classification rule problem, they design an algorithm with the concept of multi-level rule choosing mechanism in order to get more accuracy of rule induced. Furthermore, they provide a possible direction for researches toward the classification rule problem.

III. PROPOSED APPROACH

This research work has focused on improving the accuracy of brain tumor detection further using multiple pheromone based ACO.A brain tumor is an abnormal growth of tissue in the brain or central spine that can disrupt proper brain function. Doctors refer to a tumor based on where the tumor cells originated, and whether they are cancerous (malignant) or not (benign). Ant colony optimization (ACO) is another promising approach to solve the combinational optimization problems and has been widely employed in feature selection. Features are treated as graph nodes to construct a graph model and are fully connected to each other. Ant colony algorithm is used to select nodes while ants should visit all features. The ant colony algorithm provides a suitable feature subset with good classification accuracy using smaller features .The overall objective of this research work is to design and implement ACO based data mining algorithm for brain tumour detection.

RESEARCH METHODOLOGY:



IV. EXPERIMENTAL RESULTS

In proposed work, initially we have worked on 15 different data mining algorithms .Six different parameters are taken for evaluating the performance of brain tumor detection using these data mining algorithms.These parameters include

1.CCI : Correctly Classified Instances
2.ICI : Incorrectly Classified Instances
3.RAE:Relative Absolute Error
4.KS: Kappa Statistics
5.MAE: Mean Absolute Error
6.RSE: Root Mean Squared Error

The table 1 shows the analysis of three parameters that is CCI, ICI. RAE.The CCI parameter is a main parameter , which shows the accuracy when it is applied for the brain tumour detection. It is clear from the above table that the proposed algorithm is efficient and gives high accuracy than the existing algorithms. The accuracy of different algorithms have been shown in table and comparison analysis is shown in fig 1.

The table 2 shows the analysis of three parameters that is KS,MAE, RSE. These parameters shows the values of these algorithms. It can be observed from the above table that KS value for the proposed algorithm is highest among all algorithms. The values of different algorithms have been shown in table and comparison analysis is shown in fig 2.

Table 1 : CCI vs ICI vs RAE Analysis

Algorithm	CCI	ICI	RAE
Bayesnet	46%	53%	70%
Naivebayes	50%	49%	69%
Naivebayes updateable	50%	49%	69%
Logistic	43%	56%	70%
Multilayerperceptron	38%	61%	71%
Simplelogistic	48%	51%	74%
Smo	46%	53%	102%
Ibk	39%	60%	74%
Kstar	37%	62%	75%
Lwl	38%	61%	89%
Decisionstump	28%	71%	91%
J48	61%	60%	76%
Lmt	48%	51%	74%
Aco algorithm	84.36%	15.63%	101.87%
Proposed algorithm	86.43%	13.56%	35.98%

Table 2 : KS vs MAE Vs RSE Analysis

Algorithms	KS	MAE	RSE
Bayesnet	0.39	0.05	0.17
Naivebayes	0.43	0.05	0.17
Naivebayes updateable	0.42	0.05	0.17
Logistic	0.37	0.05	0.20
Multilayerperceptron	0.30	0.05	0.20
Simplelogistic	0.41	0.06	0.17
Smo	0.38	0.20	100
Ibk	0.31	0.06	0.20
Kstar	0.30	0.06	0.19
Lwl	0.28	0.07	0.18
Decisionstump	0.15	0.07	0.19
J48	0.30	0.06	0.19
Lmt	0.41	0.06	0.17
Aco algorithm	0.8224	0.0827	0.2002
Proposed algorithm	0.8477	0.0292	0.1038

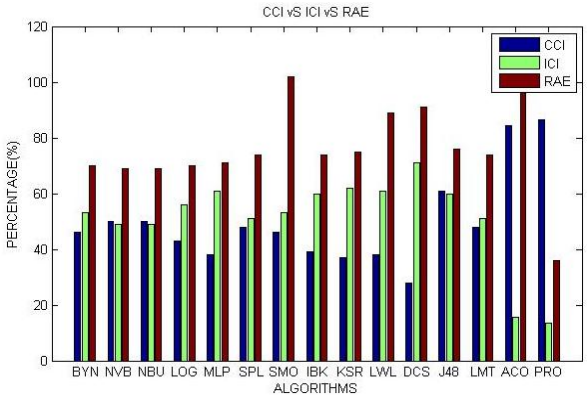


Figure 1 : CCI vs ICI Vs RAE Analysis

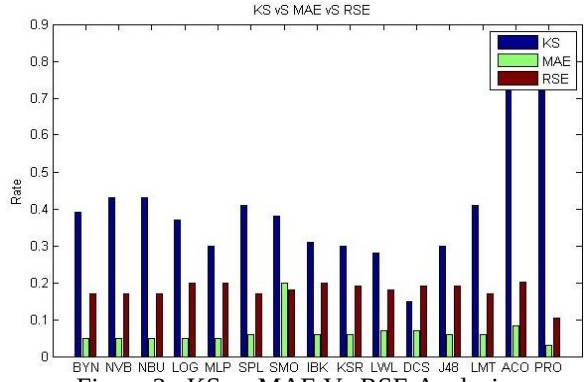


Figure 2 : KS vs MAE Vs RSE Analysis

V. CONCLUSION AND FUTURE WORK

This research work has focused on improving the accuracy of brain tumor detection further using multiple pheromone based ACO. A brain tumor is an abnormal growth of tissue in the brain or central spine that can disrupt proper brain function. ACO is a promising approach to solve the combinational optimization problems and has been widely employed in feature selection. ACO can be applied to the data mining field to extract rule-based classifiers. The ant colony algorithm provides a suitable feature subset with good classification accuracy using smaller features.. The overall objective of this research work is to design and implement ACO based data mining algorithm for brain tumor detection. The proposed technique is designed and implemented in the MATLAB tool with the help of WEKA tool. The comparison among some well known technique has also been drawn by considering various performance metrics. The comparisons has clearly shown that the proposed technique outperforms over the available techniques. Although ACO has shown quite significant results over the available techniques, but it has very slow speed comparative to other techniques. So in order to remove this issue we will integrate ACO with branch and bound algorithms to enhance the results further.

REFERENCES

[1] Kashef, Shima, and Hossein Nezamabadi-pour. "An advanced ACO algorithm for feature subset selection." *Neurocomputing* 147 (2015): 271-279.

[2] Chen, Yumin, Duoqian Miao, and Ruizhi Wang. "A rough set approach to feature selection based on ant colony optimization." *Pattern Recognition Letters* 31, no. 3 (2010): 226-233.

[3] Salama, Khalid M., and Alex Alves Freitas. "Investigating the impact of various classification quality measures in the predictive accuracy of ABC-Miner." In *Evolutionary Computation (CEC), 2013 IEEE Congress on*, pp. 2321-2328. IEEE, 2013.

[4] Xiong, Wen, and Cong Wang. "A novel hybrid clustering based on adaptive ACO and PSO." In *Computer Science and Service System (CSSS), 2011 International Conference on*, pp. 1960-1963. IEEE, 2011.

[5] Ravikumar, K., and A. Gnanabaskaran. "ACO based spatial data mining for traffic risk analysis." In *Innovative Computing Technologies (ICICT), 2010 International Conference on*, pp. 1-6. IEEE, 2010.

[6] Fathi Ganji, M., and Mohammad Saniee Abadeh. "Using fuzzy ant colony optimization for diagnosis of diabetes disease." In *Electrical Engineering (ICEE), 2010 18th Iranian Conference on*, pp. 501-505. IEEE, 2010.

[7] Chiang, Yu-Min, Huei-Min Chiang, and Shang-Yi Lin. "The application of ant colony optimization for gene selection in microarray-based cancer classification." In *Machine Learning and Cybernetics, 2008 International Conference on*, vol. 7, pp. 4001-4006. IEEE, 2008.

[8] Li, Pei-Chiang. "The Application of Ant Colony Optimization to the Classification Rule Problem." (2007).

