



International Journal of Emerging Technologies in Computational and Applied Sciences (IJETCAS)

www.iasir.net

A Study of Consciousness in Traditional Learning Explore With Classification Strategy

D. Magdalene Delight Angeline¹, Dr. P. Ramasubramanian², I. Samuel Peter James³

^{1,2,3}Department of Computer Science

¹Research Scholar, Bharathiyar University, Coimbatore, ²Principal, As-Salam College of Engineering and Technology, Thirumangalakudi, Thiruvudaimaruthur Taluk, Dist. Thanjavur, ³Assistant Professor, Chandy College of Engineering, Thoothukudi
^{1,2,3} Tamilnadu, INDIA

Abstract: Data Mining is a tool that helps in understanding the patterns extracted with the set of rules. Mining the knowledge from the database and provides a better solution for a specific problem yields good outcome to the developers. The discovery of knowledge is essential in all sorts of application that uses data mining techniques. Data mining technique is used in various domains in order to give meaning for the available data. People are often prone to make mistakes during analyses or, possibly, when trying to establish relationships between multiple features which make it difficult for them to find solutions to certain problems. Machine learning can often be successfully applied to these problems, improving the efficiency of systems and the designs of machines. In the context of machine learning, classification is supervised learning and is capable of processing a wider variety of data and is growing in popularity. Classification techniques are being used in different industry to easily identify the type and group to which a particular tuple belongs. In this paper, different classification techniques are summarized in order to improve the learner's objective.

Keywords: Classification, Data mining, Neural Networks, Predictive model, Rough sets

I. Introduction

One of the most useful data mining techniques in learning is classification. Classification is a predictive data mining technique which makes prediction about values of data using known results found from different data [1]. Predictive models have the specific aim of allowing us to predict the unknown values of variables of interest given known values of other variables. Predictive modeling can be thought of as learning a mapping from an input set of vector measurements to a scalar output [2]. There are two types of predictive modeling based on the types of variables, namely classification, for categorical dependent variables, and value prediction, for continuous dependent variables. Classification is appropriate if the goal is to predict group membership of new records based on their characteristics. Classification maps data into predefined groups of classes which is often referred to as supervised learning because the classes are determined before examining the data. Prediction models that include all personal, social, psychological and other environmental variables are necessitated for the effective prediction. There are several algorithms for data classification such as decision tree and Naive Bayes classifiers. With classification, the generated model will be able to predict a class for given data depending on previously learned information from historical data.

The rest of the paper is organized as follows. The related researches are presented in section III. Section III deals with various classification approaches used in data mining. Section IV discusses about the issues in classification. Section V explains the learner centered application and the challenges with the learner followed by conclusions in section VI.

II. Related Research

Data mining has been applied into many application domains such as biomedical and DNA analysis [28, 29, 30], retail industry and marketing [28, 31], telecommunications [28, 32], web Mining [33], computer auditing [35], banking [28], fraud detection [32], financial industry [28], medicine [35], and education.

Data mining techniques can be used in e-learning for making decision whereby the effectiveness of courses is evaluated, as well as determining how students access electronic materials. The research that relates to the pathways that the participants follow within electronic courses is conducted. In addition, the time students spend within certain types of teaching materials was analyzed using data mining techniques. As in [36], data mining techniques are used, among other things, to gain a better understanding of how the students could access and use electronic courses.

Han and Kamber [3] describes data mining software that allow the users to analyze data from different dimensions, categorize it and summarize the relationships which are identified during the mining process. Galit [4] gave a case study which is to analyze the learners learning behavior to predict the results and to warn students at risk before their final exams.

Al-Radaideh et al. [1], applied the data mining techniques, particularly classification to help in improving the quality of the educational system by evaluating learners data. Al-Radaideh, et al [1] applied a decision tree

model to predict the final grade of students who studied the C++ course in Yarmouk University, Jordan in the year 2005. Three different classification methods namely ID3, C4.5, and the Naive Bayes were used. The outcome of their results indicated that decision tree model had better prediction than other models.

A kind of decision tree induction algorithm which is more efficient in a wide area system employs metalearning [24], [25], [26], [27]. In metalearning, each computer induces a decision tree based on its local data; then, the different models are combined to form the final tree. This final tree is an approximation of the one which would be induced from the entire database. Studies have shown that the quality of the approximation decreases significantly when the number of computers increases, and when the data become sparse. A different metalearning induction algorithm was suggested in [25]. The algorithm turns each decision tree classifier into a set of rules and then merges the rules into a single superset of rules while resolving conflicts as suggested in [24].

Kargupta et al. [26] describe a metalearning algorithm where the local decision tree classifiers are approximated by a set of Fourier coefficients, which are then collected to a central site where they are combined into a single model. Although the metalearning approach is very scalable in terms of performance, the accuracy and the comprehensibility of the metaclassifier drops sharply as the number of remote sites increases. Thus, these methods are not well-suited for large distributed networks.

Kotsiantis, et al. [37] applied five classification algorithms namely Decision Trees, Perceptron-based Learning, Bayesian Nets, Instance-Based Learning and Rule-learning to predict the performance of computer science students from distance learning stream of Hellenic Open University, Greece. The performance attribute namely mark in a given assignment was used as input to a binary (pass/fail) classifier. Filter based variable selection technique was used to select highly influencing variables and all the above five classification models were constructed. It was noticed that the Naïve-Bayes yielded high predictive accuracy (74%) for two-class (pass/fail) dataset.

III. Approaches of Classification

There are several types of classification approaches used in data mining techniques. Some of them are:

A. Statistical classification

Statistical classification is a procedure in which individual items are placed into groups based on the quantitative information of characteristics inherent in the items which is based on a training set of previously labeled items [5]. Two main parts of work on classification can be identified within the statistical community. The first, “classical” phase concentrated on derivatives of Fisher’s early work on linear discrimination. The second, “modern” phase exploits more flexible classes of models, many of which attempt to provide an estimate of the joint distribution of the features within each class, which can in turn provide a classification rule. Statistical approaches are generally characterized by having an explicit underlying probability model, which provides a probability of being in each class rather than simply a classification. In addition, it is usually assumed that the techniques will be used by statisticians, and hence some human intervention is assumed with regard to variable selection and transformation, and overall structuring of the problem. Some examples of statistical algorithms are linear discriminant analysis [6], least mean square quadratic [7], kernel [6] and k-nearest neighbors [6].

B. Decision Tree

A decision tree is a set of conditions organized in a hierarchical structure [8]. It is a predictive model in which an instance is classified by following the path of satisfied conditions from the root of the tree until reaching a leaf, which will correspond to a class label. A decision tree can easily be converted to a set of classification rules. Some of the most well-known decision tree algorithms are C4.5 [8] and CART [9].

C. Rule Induction

Rule Induction is an area of machine learning in which IF-THEN production rules are extracted from a set of observations [10]. The algorithms included in this paradigm can be considered as a heuristic state-space search. In rule induction, a state corresponds to a candidate rule and operators correspond to generalization and specialization operations that transform one candidate rule into another. Examples of rule induction algorithms are CN2 [11], Apriori [12], XCS [14], Supervised Inductive Algorithm (SIA) [13], a genetic algorithm using real-valued genes (Corcoran) [9] and a Grammar-based genetic programming algorithm (GGP) [15]. Clark & Niblett’s (1989) CN2 algorithm has the following main features: 1) the dependence on specific training examples during search (a feature of the AQ algorithm) is removed; 2) it combines the efficiency and ability to cope with noisy data of decision-tree learning with the if-then rule form and flexible search strategy of the AQ family; 3) it contrasts with other approaches to modify AQ to handle noise in that the basic AQ algorithm itself is generalized rather than “patched” with additional pre- and post-processing techniques; and 4) it produces both ordered and unordered rules.

D. Fuzzy rule induction

Fuzzy rule induction applies fuzzy logic in order to interpret the underlying data linguistically. To describe a fuzzy system completely, a rule base (structure) and fuzzy partitions have to be determined (parameters) for all

variables. Some fuzzy rule learning methods are Logit Boost [8], MaxLogitBoost [16], AdaBoost [18], Grammar based genetic Programming (GP), a hybrid Grammar-based genetic Programming/genetic Algorithm method (GAP), a hybrid Simulated Annealing/genetic Programming algorithm (SAP) [17] and an adaptation of the Wang- Mendel algorithm (Chi) [6].

E. Neural Network

Neural Networks can also be used for rule induction. The field of Neural Networks has arisen from diverse sources, ranging from the attraction of mankind with understanding and emulating the human brain, to broader issues of copying human abilities such as speech and the use of language, to the practical commercial, scientific, and engineering disciplines of pattern recognition, modeling, and prediction. The pursuit of technology is a strong driving force for researchers, both in academia and industry, in many fields of science and engineering. In neural networks, as in machine learning, the excitement of technological progress is supplemented by the challenge of reproducing intelligence itself. A broad class of techniques can come under this heading, but, generally, neural networks consist of layers of interconnected nodes, each node producing a non-linear function of its input. The input to a node may come from other nodes or directly from the input data. Also, some nodes are identified with the output of the network. The complete network therefore represents a very complex set of interdependencies which may incorporate any degree of nonlinearity, allowing very general functions to be modeled. In the simplest networks, the output from one node is fed into another node in such a way as to propagate “messages” through layers of interconnecting nodes. More complex behavior may be modeled by networks in which the final output nodes are connected with earlier nodes, and then the system has the characteristics of a highly nonlinear system with feedback. It has been argued that neural networks mirror to a certain extent the behavior of networks of neurons in the brain.

Neural network approaches combine the complexity of some of the statistical techniques with the machine learning objective of imitating human intelligence: however, this is done at a more “unconscious” level and hence there is no accompanying ability to make learned concepts transparent to the user. A neural network, which is a parallel distributed processing network, is a computing paradigm that is loosely modeled after cortical structures in the brain. Examples of neural network algorithms are multilayer perceptron [19], a Radial Basis Function Neural network (RBFN) [23], incremental RBFN [21], decremental RBFN [23], a hybrid Genetic Algorithm Neural Network (GANN) [22] and Neural Network Evolutionary Programming (NNEP) [20].

IV. Issues in Classification

There are also many issues of concern to the classifier. Some of them are:

A. Accuracy

There is the reliability of the rule, usually represented by the proportion of correct classifications, although it may be that some errors are more serious than others, and it may be important to control the error rate for some key class.

B. Speed

In some circumstances, the speed of the classifier is a major issue. A classifier that is 90% accurate may be preferred over one that is 95% accurate if it is 100 times faster in testing (and such differences in time-scales are not uncommon in neural networks for example). Such considerations would be important for the automatic reading of postal codes or automatic fault detection of items on a production line for example.

C. Comprehensibility

If it is a human operator that must apply the classification procedure, the procedure must be easily understood else mistakes will be made in applying the rule. It is also important that human operators believe the system. An often quoted example is the Three-Mile Island case, where the automatic devices correctly recommended a shutdown, but this recommendation was not acted upon by the human operators who did not believe that the recommendation was well founded.

D. Time to Learn

Especially in a rapidly changing environment, it may be necessary to learn a classification rule quickly, or make adjustments to an existing rule in real time. “Quickly” might imply that we need only a small number of observations to establish our rule.

E. Overlearning

Overlearning results in decisions too close to the learning (training) dataset. Overlearning results in decisions too close to the learning (training) dataset. Training error no longer provides a good estimate of how well the intelligent system will perform on previously unseen records. Insufficient number of training records causes the intelligent system to predict the test outcomes more inaccurately. The concept of over learning is important in machine learning. Usually a learning algorithm is trained using some set of training examples. The learner

reaches a state where it will also be able to predict the correct output for other examples, thus generalizing to situations not presented during training. Especially in cases where learning was performed too long, or where training examples are rare, or there is some noise in training data, the learner may adjust to very specific features of the training data. Thus, the performance on the training data still increases while the performance on testing data becomes worse.

V. Learner Objectives

A. Significance of data mining in energetic education

The data mining is helpful for predicting, analyzing and classifying the given samples which may produce diverse effect in each application. There are lots of application may come across in data mining fields. This study focuses mainly on the learners who wish to achieve their goal with effective learning. The learners as well as the learning providers, whether private training companies, local authorities and governmental organizations providing training for their employees or universities intend to bring out their courses and make them accessible online via the internet. Here arise a few questions to consider while reflecting on the purpose of an education system:

What should a learner expect to learn? What are the roles of a learner and teachers in the learning process? Are certain kinds of learning and thinking more valuable than others? How do grades reflect a learners thinking and learning? What role does learning institution play in modern society?

B. Is learners face problem?

The strength of semantic technologies for learning and teaching and their benefits for digital libraries, virtual communities and e-learning have been a major topic of discussion during recent years. Making learning system more engaging, more enjoyable and more effective has been the goal of many researchers during the past few years. A clear understanding is a necessary prerequisite for successful use of standards in practical developments. Exercises and or laboratory practice are essential for the learning effect, since they provide opportunities for learners to solidify the knowledge acquired in lectures and to apply their theoretical knowledge to practical problems. In its traditional format, exercise groups work on paper and present their solutions at the blackboard. However, this traditional way of teaching, practicing and assessing were dissatisfied.

The learners have a clear opinion about their learning goals and therefore, advocate that teaching should follow a learner-centered approach that is the learners take responsibility for their own learning. In this way, the learner can gain a deep learning. Traditional lectures encourage passive learning, often creating a mismatch between the way the learning providers teach and the way the learners learn. Some of the solutions to the learner problems are:

- The learners may engage in collaborative and active learning, to observe real life simulations and interact with the learning materials.
- Actively involving learner leads to deeper questioning, improved attendance and more enduring interest in the subject compared to lecturing alone.
- Hands-on activities and demonstrations can be developed.
- Multimedia based learning can be provided to increase effective teaching and learning approach.
- Laboratory teaching activities helps learners to develop their experimental skills and ability to work in teams, learn to communicate effectively and learn from failure.

VI. Conclusion

In this paper, the various classification techniques have been reviewed. This review would be helpful to researchers to focus on the various issues of data mining. Most previous studies suffer from the major disadvantage that their choice of algorithms is too tapered. The chosen algorithms may not represent the state of the art. The datasets are usually small and so not representative of real-life applications. There may be problems due to differences in the way the data were preprocessed, for example by removing or replacing missing values, or transforming categorical to numerical attributes. Particular methods may do well in some specific domains and for some performance measures, but not in all applications. Further research will be carried out with the classification techniques in which the above problems will be solve to improve the learning model.

References

- [1] Q.A.AI-Radaideh, E.M. Al-Shawakfa, and M.I. Al-Najjar, "Mining Student Data using Decision Trees", International Arab Conference on Information Technology(ACIT'2006), Yarmouk University, Jordan, 2006.
- [2] David Hand, Heikki, Mannil Padraic smyth, "Principles of Data Mining" PHI
- [3] J.Han, and M.Kamber, "Data Mining: Concepts and Techniques", 2nd edition. The Morgan Kaufmann Series in Data Management Systems, Jim Gray, Series Editor, 2006.
- [4] Galit.et.al, "Examining online learning processes based on log files analysis: a case study". Research, Reflection and Innovations in Integrating ICT in Education 2007.

- [5] J.Otero, L.Sanchez, "Induction of Descriptive Fuzzy Classifiers with the Logitboost Algorithm". *Soft Computing* 2005, 10(9), pp.825-835.
- [6] B.Minaei-Bidgoli, W.Punch, "Using Genetic Algorithms for Data Mining Optimization in an Educational Web-based System. Genetic and Evolutionary Computation", Part II. 2003. pp.2252–2263.
- [7] J.S.Rustagi, "Optimization Techniques in Statistics". Academic Press, 1994.
- [8] J.R. Quinlan, "Programs for Machine Learning". Morgan Kaufman. 1993.
- [9] L.Breiman, J.H.Friedman, R.A.Olshen, C.J.Stone, "Classification and Regression Trees", Chapman & Hall, New York, 1984.
- [10] M.Delgado, E.Gibaja, M.C. Pegalajar, O. Pérez, "Predicting Students' Marks from Moodle Logs using Neural Network Models. Current Developments in Technology-Assisted Education", Badajoz, 2006. pp.586-590.
- [11] P.Clark, T.Niblett, "The CN2 Induction Algorithm", *Machine Learning* 1989, 3(4), pp.261-283
- [12] V.Jovanoski, N. Lavrac, "Classification Rule Learning with APRIORI-C. In: Progress in Artificial Intelligence, Knowledge Extraction, Multi-agent Systems, Logic Programming and Constraint Solving, 2001. pp.44-51.
- [13] G.Venturini, "A Supervised Inductive Algorithm with Genetic Search for Learning Attributes based Concepts", Conference on Machine Learning, 1993. pp.280-296.
- [14] S.W.Wilson, "Classifier Fitness Based on Accuracy. Evolutionary Computation," 1995, 3(2), pp.149-175.
- [15] P.G.Espejo, C.Romero, S.Ventura, C. Hervás, "Induction of Classification Rules with Grammar-Based Genetic Programming", Conference on Machine Intelligence, 2005. pp.596-601.
- [16] L.Sanchez, J.Otero, "Boosting Fuzzy Rules in Classification Problems under Single-winner Inference," (in press). *International Journal of Intelligent Systems*. 2007.
- [17] L.Sánchez, I.Couso, J.ACorrales, "Combining GP Operators with SA Search to Evolve Fuzzy Rule Based Classifiers. *Information Sciences*, 2001, 136(1-4), pp.175-191.
- [18] M.J.Del Jesus, F.Hoffmann, F. Junco, L. Sánchez, "Induction of Fuzzy-Rule-Based Classifiers With Evolutionary Boosting Algorithms", *IEEE Transactions on Fuzzy Systems* 2004, 12(3), pp.296-308.
- [19] M.F.Moller, "A Scaled Conjugate Gradient Algorithm for Fast Supervised Learning", *Neural Networks*, 1993, 6(4), pp.525-533.
- [20] F.J.Martínez, C. Hervás, P.A. Gutiérrez, A.C.Martínez, S.Ventura, "Evolutionary Product-Unit Neural Networks for Classification", Conference on Intelligent Data Engineering and Automated Learning. 2006. pp.1320-1328.
- [21] J.A.Platt, "Resource Allocating Network for Function Interpolation", *Neural Computation*, 1991, 3(2), pp.213-225.
- [22] X.Yao, "Evolving Artificial Neural Networks", *Proceedings of the IEEE*, 1999, 87(9), pp.1423-1447.
- [23] D.A.Broomhead, D.Lowe, "Multivariable Functional Interpolation and Adaptive Networks", *Complex Systems* 11, 1988, pp.321-355.
- [24] P.K. Chan and S.J. Stolfo, "Toward Parallel and Distributed Learning by Meta-Learning," *Working Notes AAAI Work. Knowledge Discovery in Databases*, pp. 227-240, 1993.
- [25] F.J. Provost and D.N. Hennessy, "Scaling Up: Distributed Machine Learning with Cooperation," *Proceeding 13th Nat'l Conf. Artificial Intelligence*, 1996.
- [26] L.O. Hall, N. Chawla, and K.W. Bowyer, "Combining Decision Trees Learned in Parallel," *Proceeding Distributed Data Mining Workshop at the Int'l Conf. Knowledge Discovery and Data Mining*, 1998.
- [27] H. Kargupta, B. Park, D.Hershberger, and E.Johnson, "Collective Data Mining: A New Perspective Toward Distributed Data Mining," *Advances in Distributed and Parallel Knowledge Discovery*, 1999.
- [28] J. Han, "How can Data Mining Help Bio-Data Analysis". *BIOKDD02: Workshop on data mining in Bioinformatics*, 2002.
- [29] R. Feldman, "Mining the Biomedical Literature using Semantic Analysis and Neural Language Processing Techniques, a link analysis approaches". ClearForest Corporation, New York, 2003.
- [30] H. Edelstein, "Building Profitable Customer Relationships with Data Mining", Two Crows Corporation, SPSS white paper-executive briefing, 2000.
- [31] W. H. T. Chang and Y. H. Lee, "Telecommunications Data Mining for Target Marketing," *Journal of Computers*, Vol. 12, No. 4, December 2000, pp.60-74.
- [32] Bamshad Mobasher Namit Jain Eui-Hong(Sam) Han Jaideep Srivastava, "Web Mining: Pattern Discovery from World Wide Web Transactions", March, 1997
- [33] Y. W. Teh, A. B. Zaitun, S. P Lee, "Data Mining In Computer Auditing". In *Proceedings of the 2002 Informing Science*. Cork, Ireland June, Pp.19-21, 2002.
- [34] P. Baylis, "Better Health Care with Data Mining", SPSS White Paper, UK, 1999, pp.1-8.
- [35] S. E. Brossette, A. P. Sprague, J. M.Hardin, K. B. Waites, W. T. Jones, S.A. Moser. "Association Rules and Data Mining in Hospital Infection Control and Public Health Surveillance", *Journal of the American Medical Informatics Association (JAMIA)*, vol. 5: 1998, pp.373-381.
- [36] D.Monk. "Using data mining for e-learning decision making", Retrieved 27 March 2012, from website: <http://sci2s.ugr.es/keel/pdf/specific/articulo/v3-i1-art5-monk.pdf>.
- [37] S. Kotsiantis, C. Pierrakeas, and P. Pintelas, "Prediction of Student's Performance in Distance Learning Using Machine Learning Techniques", *Applied Artificial Intelligence*, Vol. 18, No. 5, 2004, pp. 411- 426.