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A Study on Classification and Optimization Techniques: Survey & Discussions

[1]Dr. Rizwana Parveen, [2]Rajesh Chaurasia
[1,2]Assistant Professor
[1]Department of Computer Science,
[1] NRI Group of Institutions, Bhopal, (M.P.), India.
[2]Rajeev Gandhi College Trilanga Bhopal, (M.P.), India.

Abstract. *Data mining technique gives well know classifier for different applications. In cluster oriented ensemble classifier is suffered from a selection of optimal number of cluster for ensemble. Machine learning play big role in pattern recognition, the recognition of pattern faced the series of training process. The training process of classification technique generates the accuracy performance of classifier and method of pattern recognition, machine learning classification techniques are based on binary classification and multi class classification. Optimization techniques were also used by different application's nowadays, the techniques are like particle swarm optimization, and ant colony optimization. In this research work discuss on different classification and optimization techniques as used for different applications.*

Keywords: Machine Learning, classification, Support vector machine, Optimization techniques.

Introduction

The process of combining different clustering output (cluster ensemble or clustering Aggregation) emerged as an alternative approach for improving the quality of the Results of clustering algorithms [13]. It is based on the success of the combination of supervised classifiers. Given a set of objects, a cluster ensemble method consists of two principal steps: Generation, which is about the creation of a set of partitions of these objects, and Consensus Function, where a new partition, which is the integration of all partitions obtained in the generation step, is computed [12]. Over the past years, many clustering techniques have been proposed, resulting in new ways to face the problem together with new fields of application for these techniques. Besides the presentation of the main methods, the introduction of taxonomy of the different tendencies and critical comparisons among the methods is really important in order to give a practical application to a survey [9]. Thus, due to the importance that clustering has gained facing cluster analysis, we have made a critical study of the different approaches and the existing methods. Feature selection technique is used for selecting subset of relevant features from the data set to build robust classification models [16].

Classification accuracy is improved by removing most irrelevant and redundant features from the dataset. Ensemble model is proposed for improving classification accuracy by combining the prediction of multiple classifiers [14]. In this dissertation used cluster based ensemble classifier. The performance of each classifier and ensemble model is evaluated by using statistical measures like accuracy, specificity and sensitivity. Classification of medical data is an important task in the prediction of any disease [3]. It even helps doctors in their diagnosis decisions. Cluster oriented Ensemble classifier is to generate a set of classifiers instead of one classifier for the classification of a new object, hoping that the combination of answers of multiple classification results in better performance [8].

Neural Network

Neural networks (NN) have been increasingly used to solve artificial intelligence problems. The diagnosis of breast cancer is an example where NN have been widely used. Neural networks are machine learning techniques that simulate the learning mechanism in biological organisms and are networks of interconnected artificial neurons [1]. The main advantage of neural networks is that they are data-driven and do not require restrictive assumptions about the shape of the basic model [5]. In addition to this advantage, NN allow detecting complex nonlinear relationships between independent and dependent variables and to identify all possible interactions between predictor variables, having the ability to store information on the network (memory capacity). In addition, NN can work with incomplete knowledge and in parallel processing [16]. However, NN also have disadvantages, such as hardware dependency, the lack of determination of the appropriate network structure, more computational resources requirements and limited ability to identify possible casual relationships [14].

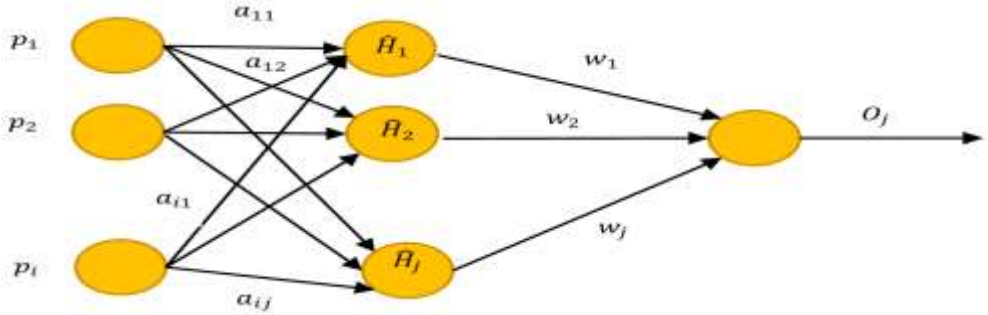

Figure 1: Feed forward neural network.

SVM Classification

Despite the increasing popularity and high effectiveness of CNN classification techniques, the direct deployment of CNN techniques requires large training datasets [14] that are potentially difficult to obtain when the underlying data is privacy sensitive. In addition, black-box transformation of CNN-based methods to their privacy-preserving equivalents will result in classifiers that are computationally prohibitive to use. Thus using a light-weight classification method such as SVMs can be beneficial in privacy sensitive environments, and their evaluation can be done (as we show) in a secure manner. With

the CNN features, an SVM can learn quickly from very few positive examples, which shows that they are useful to perform one-shot learning [15].

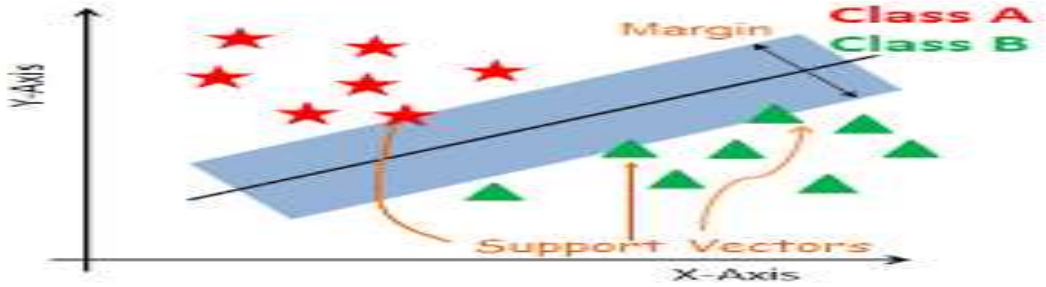

Figure 2: An example of image classification with SVM.

Multiple Classifier Systems

One may utilize an approach known as numerous or multiple classifier frameworks (MCSs). MCSs depend on joining various learners into one compound framework, which takes focal points of the capability zones of every one of its individuals. Each classifier may show singular learning properties, thus have diverse skill zones [6]. At the point when painstakingly joined, the nature of the consolidated choice can beat any of the individual indicators. In any case, a few imperative issues, for example, selecting the individual classifiers, and also picking a combination strategy to build up a cooperative choice, must be considered when outlining a MCS. Classifiers used to make the outfit in a perfect circumstance ought to be very precise and supplement each other. Including classifiers that are not various as for those as of now in the pool won't enhance the exactness of the compound classifier, yet will just build the general computational cost. Then again, building a MCS with profoundly different yet low quality classifiers will bring about a feeble advisory group [12].

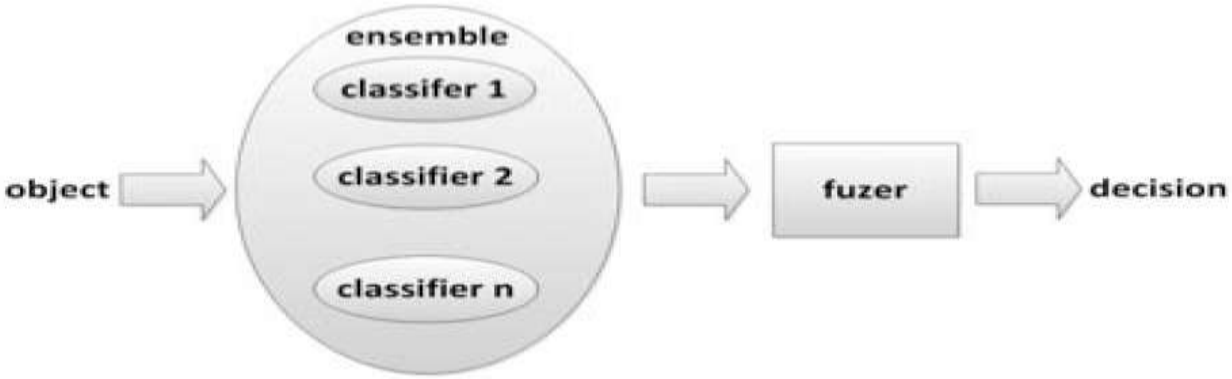

Figure 3: Overview of a multiple classifier system.

Optimization Techniques

The particle swarm optimization (PSO) algorithm [11] is a population-based search algorithm based on the simulation of the social behavior of birds within a flock. The initial intent of the particle swarm concept was to graphically simulate the graceful and unpredictable choreography of a bird flock, with the aim of discovering patterns that govern the ability of birds to fly synchronously, and to suddenly change direction with a regrouping in an optimal formation. Feature optimization is an important area of health care domain. The extraction process gives the better amount of feature for the feature for the processing of feature. But the signal image generate huge amount of feature for the processing of optimization. The feature optimization technique adopted the particle of swarm optimization. A PSO algorithm maintains a swarm of particles, where each particle represents a potential solution. In analogy with evolutionary computation paradigms, a swarm is similar to a population, while a particle is similar to an individual. In simple terms, the particles are "flown" through a multidimensional search space, where the position of each particle is adjusted according to its own experience and that of its neighbors.

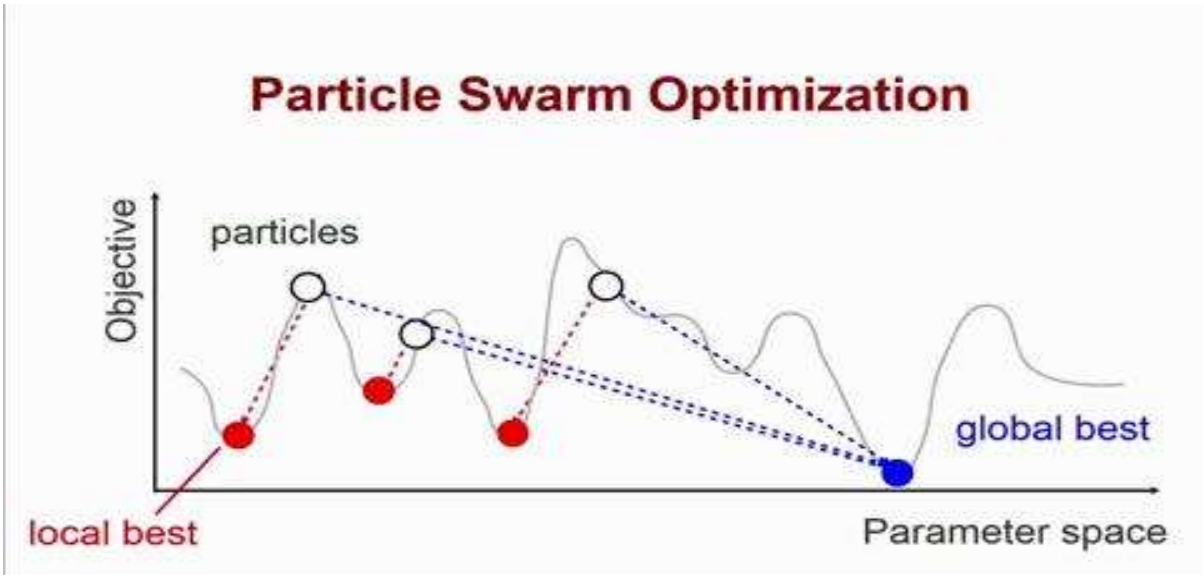

Figure 4: Particle swarm optimization description.

ANT Colony Optimization

The ACO [12] is a meta-heuristic inspired by the behavior of some species of ants that are able to find the shortest path from nest to food sources in a short time. The ACO mimics the way real ants find the shortest route between a food source and their nest. The ants communicate with one another by means of pheromone trails. Pheromone is the chemical material deposited by the ants, which serves as critical communication medium among ants, thereby guiding the determination of the next movement. The more

the number of ants traces the given path, the more attractive this path (trail) becomes and is followed by other ants by depositing their own pheromone. This auto catalytic and collective behavior results in the establishment of the shortest route. Ants find the shortest path based on intensity of pheromone deposited on different paths.

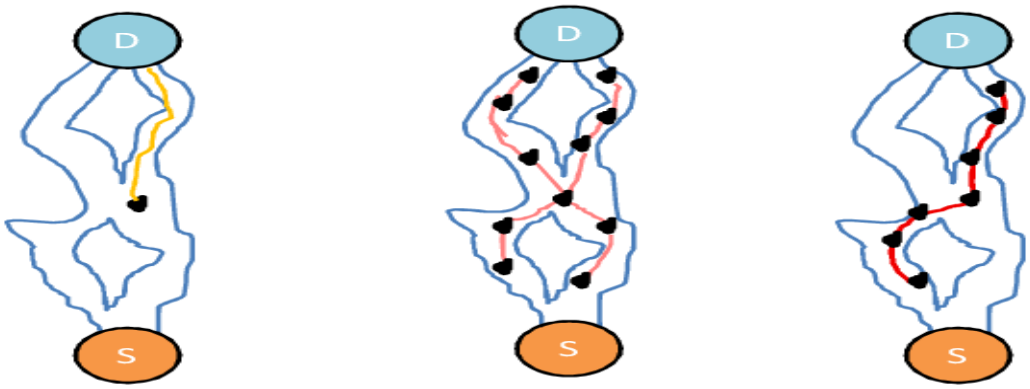

Figure 5: An example of ant colony optimization.

Conclusion

Since the computer was invented, it has begun to affect our daily life. It improves the quality of our lives, it makes our life more convenient and more efficient. A fascinating idea is to let a computer think and learn as a human. Basically, machine learning is to let a computer develop learning skills by itself with given knowledge. Therefore, machine learning, and other optimization techniques have close connection with different number of application area nowadays, this work emphasize on classification, and optimization techniques, in near future may use the same techniques for different application like healthcare, education, and other businesses.

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