Community Detection in Static Social Networks Using the Gray Wolf Optimizer Algorithm

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Abstract

Detecting communities in complex networks is one of the most important issues in social network analysis and scientific areas. It helps researchers identify network structures and understand their functions. Clustering or community detection will reveal community structures in social networks, and hidden relations among their components. A community is a collection of nodes whose density of communication is more than other network entities.

This paper presents a novel algorithm for community detection in static networks, called the gray wolf optimizer algorithm, which has scalability, according to the selected criteria. Moreover, as experience has shown, one of the most important characteristics of meta-heuristic algorithms is the lack of trapping at the local minimum. In the field of community detection, gray wolf algorithm is less likely to be trapped than other meta-heuristic algorithms such as the genetic algorithm and the particle swarm algorithm are. Experiments show that the mentioned algorithm has higher precision than other algorithms.

Keywords*: social networks, community detection, meta-heuristic algorithms, gray wolf optimizer algorithm.*

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Predicting Blood Donation Using Machine Learning Techniques Based on the Decision Tree, KNN, SVM, and MLP algorithms

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Abstract

Blood donation has an important and critical role in maintaining the health and survival of human life. Today, despite significant scientific developments and medical advancements, adequate supply of healthy blood is still one of the challenges and concerns of the medical community in the world. Predicting and planning blood donation in order to provide and preserve the amount of blood required in blood banks is very important and difficult over time, with regard to the variation of blood groups and interrelations between them. This study tries to perform data mining and machine learning techniques for predicting blood donation, in order to estimate and provide the amount of blood required by blood banks in different periods of time. In this regard, several classification algorithms in supervised learning, including the decision tree, KNN, SVM and MLP algorithms are implemented for prediction, and the accuracy results of each are presented. Totally, the performance of the algorithms KNN and MLP in predicting blood donation has higher accuracy.

Keywords: *data mining, the decision tree, artificial neural network, support vector machine (SVM), machine learning, k-nearest neighbors (KNN).*

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Presenting a Novel Hybrid Approach to Text Mining for Twitter Sentiment Analysis Using the CART Decision Tree

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Abstract

With the growth of social networks as virtual communities and an ever-increasing use of them, a huge amount of user feedback on various topics emerge. Therefore, it is necessary to apply modern and scientific approaches for analyzing networks. Text mining, as an effective approach, aims to discover knowledge from texts. In the present paper, a novel approach composed of machine learning and vocabulary-based methods is proposed to perform text mining for Twitter sentiment analysis. In order to improve data mining for sentiment analysis and data classification, the CART decision tree is applied as a machine learning approach. Additionally, for a more thorough analysis of the type of the sentiment present in tweets, a SentiStrength list is used as a lexicon-based method. The unique feature of CART is the analysis of the complex data structure, which can perform regression-related operations and also data classification, with regard to the input of the problem. The power of SentiStrength algorithm in the detection of sentiments has also led to a thorough analysis of tweet sentiments. The results of the implementation of the proposed approach for tweet sentiment analysis, for most indicators, show the improvement of data classification.

Keywords: sentiment analysis, the CART decision tree, social networks, SentiStrength algorithm, text mining.

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Optimization of Job Scheduling in the Cloud Computing Environment Using the Fuzzy Particle Swarm Optimization Algorithm

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Abstract

Today, with regard to the ever-increasing use of cloud environment by companies and organizations, job scheduling has become of great importance within these environments. Different algorithms have been suggested for assigning tasks to resources in cloud environments, most of which do not consider factors such as balanced load, resource optimal allocation, and reduced task completion time. In this research, using the meta-heuristic algorithm of particle swarm optimization (PSO) and fuzzy logic, the task completion time is reduced, and consequently, resource efficiency increases. Generally, in a distributed system, like a cloud environment, tasks are randomly allocated to virtual machines. Hence, the overall load on the cloud environment becomes imbalanced, which reduces resource efficiency. In the present study, PSO and fuzzy logic is used for job scheduling. In addition, it is suggested to use simulated annealing (SA) in order to improve the initial conditions for randomly-generated data. Results show that the optimization method suggested in this study can effectively improve the scheduling algorithm performance factors, such as the makespan, once compared with non-optimized algorithms like Round-Robin, and even in comparison with other optimization algorithms like the genetic algorithm.

Keywords: *cloud computing; job scheduling; particle swarm optimization; fuzzy logic; simulated annealing.*

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Vehicle Detection in Different Environments

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Abstract

This article designs and implements a vehicle detection system based on the analysis of the RGB color space components, and then investigates the existing challenges such as different weather conditions (rain, snow, fog, etc), different times of the day (day, night, noon, afternoon), heavy traffic, the existence of shadows and the problems with the road surface. This article aims to propose an approach to vehicle detection, without any need to generate and update the background model, with the ability to operate appropriately with high precision in challenging situations. In this approach, histogram normalization is used to overcome problems caused by changes in brightness and different weather conditions. In addition, in order to extract the moving objects the differentiation of grey value and optical flow were performed. Finally, HOG descriptor and SVM classifier were used to explore the identified areas and separate traffic signs and lane markings from vehicles. The results of the experiments conducted on VDTD dataset approve the performance of this method, and indicate that in heavy traffic and various weather conditions, the suggested approach works better than similar approaches.

Keywords: vehicle detection, car detection, traffic monitoring, histogram normalization, optical flow.

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Query-Based Extractive Multi-Document Summarization Using Paraphrasing and Textual Entailment

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Abstract

One of the most common problems with computer networks is the large amount of data in them. Meanwhile, searching and gathering information on the content of text documents, as the most widespread types of data in such networks, is very difficult and sometimes impossible. Multi-document summarization systems aim to generate a fixed-length summary of input text documents, while maximizing the coverage of their contents. The present article presents a new method for summarizing text documents, based on the utilization of paraphrasing and textual entailment, and the formulation of the problem, in the form of an optimization problem. In this method, the sentences within input documents are clustered firstly based on the paraphrasing relations. Then the textual entailment score is calculated for a fraction of headers with the highest score based on the user query, according to which the final score of each sentence is obtained. Finally, the optimization problem is solved, using the two approaches greedy and dynamic programming, and the final summary is generated by choosing the best sentences. The results of the implementation of the proposed system on standard datasets and performing ROUGE-based evaluations indicate that the system has increased the performance of the best query-based extractive summarization systems by an average of at least 2.5%.

Keywords: *text summarization, natural language processing, textual paraphrasing, textual entailment, 0-1 knapsack problem.*

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