ISEAIA 2014

2nd International Symposium on Engineering, Artificial Intelligence and Applications

ABSTRACT PROCEEDINGS

ISEAIA 2014

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GAU - Girne / North Cyprus

Girne American University

Dear ISAIA2014 Participant;

We would like to welcome you to Girne American University.

GAU's goal is to become a University with and without walls, a University located in time and place but unhampered by constraints in the fulfillment of its mission. To do this, GAU maintains constant awareness of the impact of technology and how it changes knowledge and learning. GAU evaluates its courses, and programs to be sure that the curriculum and learning strategies reflect these changes.

Faculty of Engineering and Architecture, which was established in 1992, was separated into two faculties in 2009. Faculty of Engineering started to function from 2009-2010 academic year on. Faculty of Engineering aims to educate fully qualified engineers in all aspects. In today's competitive environment, the engineers who are the graduates of GAU Faculty of Engineering, are aimed to be fully equipped with contemporary engineering skills. The vision of Faculty of Engineering is to become comprehensive, distinct faculty that is recognized both nationally and internationally in engineering teaching, research and development. The mission is to create and disseminate knowledge through creative inquiry, to provide the high standards in engineering education and to serve our students by teaching them how to become contemporary engineers who are culturally informed and well equipped with technological skills. In carrying out its mission, Faculty of Engineering commits to continually evaluating, improving and evolving its programs and stimulates meaningful research and service to community by which they belong to. As a result of the continous quality improvement studies, Faculty of Engineering was awarded ASIIN Accreditation in December 2012 for Computer, Electrical and Electronics and Industrial Engineering Departments. These three programmes are also awarded by EUR-ACE Labels since June 2014.

Within this context The Second International Symposium on Engineering, Artificial Intelligence and Applications (ISEAIA 2014)is devoted to play a unique role in providing a platform for researchers, practitioners, developers and educators to share their experiences in the fields of engineering, artificial intelligence and their applications in a friendly environment. We will find the opportunity to provide communication among researchers and to encourage multi-disciplinary and inter-disciplinary researches by ISEAIA 2014.

We are proud to inform you that this year our symposium gained more interest by researchers around the world. As part of the symposium, you will be able to attend 50 presentation sessions, 3 keynote addresses and a special session .

We sincerely hope you have an outstanding stay in Kyrenia.

With warm regards,

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Keynote Speakers

Prof. Dr. Mübeccel Demirekler

Mübeccel Demirekler received her Ph.D. degree in Electrical Engineering from Middle East Technical University, Turkey in 1979. She was the department chair of the Electrical and Electronics Engineering Department of METU in between the years 1999-2002. She is currently a professor at the same department. Her research interests are tracking systems, information fusion and stochastic optimization. She conducted several industry sponsored projects and also worked as a consultant to the industry on radar tracking, video tracking and multi sensor tracking. She has several papers on this subject.

Tracking Problem

Tracking problem is one of the hot topics of the literature starting from late 1970's. The need for automatically tracking objects started after the development of radars, and accelerated exponentially. Video tracking is another hot topic. Although the two sensors are quite different from each other they share some common algorithms. Target tracking is estimating the dynamics of a target or multiple targets as a function of time on the basis of sensor measurements like radar or camera. Sensor measurements usually give a noisy position for the object that is tracked. A filter is used to obtain more accurate estimates of the position as well as some other features like velocity or acceleration. Filtering is based on modelling the targets dynamics. The model makes it possible to use statistical methods to estimate the states, i.e., dynamics of the target. Kalman filter, introduced at 1969 by Kalman, and its' variations are the main tools that are used in tracking applications. Starting from 2000, Monte Carlo techniques became popular as a filtering technique. Multi target and multi sensor tracking are important application areas of target tracking. Therefore fusion is another area that should be involved in multi sensor applications. This talk is about the history of tracking, basic methods and the state of the art of tracking problem.

Prof. Dr. Faruk Polat

Faruk Polat is Professor of Computer Science at the Department of Computer Engineering at the Middle East Technical University, Ankara. Dr. Polat received a B.S. degree in Computer Engineering from the Middle East Technical University in 1987. He received M.S. and Ph.D. degrees from Computer Engineering from Bilkent University in 1989 and 1994, respectively. He was a visiting scholar at the Department of Computer Science at the University of Minnesota, Minneapolis betweeen 1992-1993. His research focuses primarily on artificial intelligence, and autonomous agents and multiagent systems. He is interested in Reinforcement Learning, Markov Decision Processes and Partially Observable Markov Decision Processes, and their applications including induction and control of Gene Regulatory Networks in computational biology, and behaviour modeling in virtual simulations and computer games.

Learning Control of Partially Observable Gene Regulatory Networks

The external control of Gene Regulatory Networks (GRNs) has received much attention in recent years. The control problem has been solved in several ways for both fully and partially observable GRNs. In this paper, we propose a novel algorithm for controlling partially observable GRNs making use of utility-based state learning methods for partially observable environments. We assume the actual states of the gene regulation are not known, i.e., they are hidden, and the available gene expression samples are successive observations that the gene reg- ulation system produced. We benefit from Batch Mode Reinforcement Learning (Batch RL) methods to obtain approximated utility values for each possible observation. Based on the approximated utility values associated with each observation, we identify the hidden states of the gene regulation and construct an infinite horizon Partially Observable Markov Decision Process (POMDP) model. Results show that our novel POMDP model produces better control policies than the available solutions and requires less time.

Prof. Dr. Victor Mark Grout

Vic Grout was awarded the BSc(Hons) degree in Mathematics and Computing from the University of Exeter (UK) in 1984 and the PhD degree in Communication Engineering (Thesis title: "Optimisation Techniques for Telecommunication Networks") from Plymouth Polytechnic, now the University of Plymouth, (UK) in 1988. He is currently Professor of Computing Futures and Head of Computing at Glyndwr University, Wrexham, Wales, where he is also Associate Dean for Research within the Institute of Art, Science and Technology. He serves on the UK National Committee of the Council of Professors and Heads of Computing (CPHC) as the Chair of the Council of Heads of Computing in Wales. He is an approved British Computer Society (BCS) accreditation assessor and an Institute of Engineering and Technology (IET) recommended speaker.

AI and the Internet

There are intuitive links between Artificial Intelligence and networks so it is hardly surprising that many Internet problems - optimisation, classification, modelling, management, etc. - lend themselves to effective solution through AI techniques. Apart from a few traditional design issues - and even these are harder to define than their theoretical counterparts, most Internet problems are dynamic, not static, and this adds increased relevance to the type of adaptive solutions that AI can offer. This is particularly true when network performance requires 'line speed' above and beyond simply 'real time' implementation. This talk will consider - and attempt to classify - a number of problems to be found in Internet design, operation and management with illustrations and examples drawn from the speaker's own research over the years. These range from questions of initial network topology and dimensioning, through dynamic issues such as packet filtering, routing, switching and bridging to the difficulties involved with effective data classification and shaping in multi-layer/multi-protocol environments, with performance and security implications, for example. AI is not a miracle cure in all these cases but it generally offers some degree of improvement or, failing that, at least better insight into the underlying problem structure. There will be an emphasis throughout the talk on the need to make the transition from the textbook to the real world. Conventional graph-theoretic formulations of many network problems prove inadequate in practice and we find we have to extend or adapt them to make them realistic and appropriate. The modern Internet places complex constraints on optimised solutions, which do not conform easily to conventional solutions or approaches, and usually becoming more difficult as a result. Furthermore, as will be seen from one or two examples, even the problem itself - or its objective function - can be difficult to determine when analysed in depth. Rather satisfyingly, AI can often assist in such cases too.

Special Presentation

Prof. Dr. Kemal Leblebicioğlu

Prof. Dr. Kemal Leblebicioğlu is a full professor of Electrical and Electronics Engineering Department of METU since 1999. He has a background in optimization, optimal control theory, computer vision, intelligent systems, flight control, walking robotsand unmanned vehicles. He got a Ph.D. from the Mathematics Department of Middle East Technical University, on 1988, His Ph.D. thesis is "An Optimal Control Problem with Nonlinear Elliptic State Equations". He has authored many journal papers, book chapters and numerous conference papers. He is in several IFAC technical committees. He was the editor of the Journal "ELEKTRIK" published by TUBITAK (Turkish Scientific and Technical Research Council) from 1996 to 2009. He is in the editorial board of several Turkish technical journals. He conducted several R&D projects as project leader and researcher. Nowadays he is studying on unmanned vehicles, inparticular, unmanned air and underwater vehicles. He has completed a project (supported by TUBITAK) on the construction of a special unmanned undersea vehicle, called ULISAR, which is a mixture of a ROV and a fully automated system. His current projects, also supported by TUBITAK, is on the coordinated guidance of multiple unmanned air vehicles and on the design of a small intelligent ROV. Presently, he is also working as an advisor for YEGAM, a Bahcesehir University Foundation, about matters related to education, developing educational systems to help students and teachers, intelligent testing and student evaluation systems.

A Perspective Unmanned Sea and Air Vehicles

It has been almost 60 years from the first occurance of unmanned vehicles. There has been a boom both in the types of unmanned vehicles and the companies producing them since 2000. Now, it is possible to find very different kinds of unmanned aircrafts, submarines, quadrotors at relatively very low prices. They can even be delivered to your door within a week. This rises a big question of whether there is something left to do both academically and engineeringly, in the field of unmanned vehicles.

Interestingly, requirements expected from unmanned systems have increased in propostion and they have quite complicated. For example, now a user may require both an optic camera and an infrared camera to be present simultaneously on the vehicle, plus the path to be followed by the vehicle to be designed optimally, etc. On the other hand, the developments in the sensors of components used in those devices always poses problems in custom design. New and redesigns are frequently required. More importantly, limitations on these vehicles still exist, such as the time of flight, speed, amount of payload for air vehicles are among the basic problems designers should face in developing new vehicles during custom design phase. It shouls also be noted that complicated needs and existing limitations resulted in the development of new and somewhat strange unmanned vehicles.

It is the aim of this presentation to describe some of the common and interesting unmanned sea and vehicles, by mentioning about how to properly utilize them, through the expertize of the author, acquired in years of academic and engineering studies. In particular, small aircrafts, quadrotors and small unmanned underwater vehicles developed during various Tübitak projects in the Electrical and Electronics Engineering Department of METU will be the main topic [1], [2]. There will also be a mention of some "not widely known" unmanned systems such as "wigs", "underwater gliders", and "intelligent life saving boat".

[1] Electrical and Electronics Engineering Department of METU, Unmanned Aerial Vehicles Group, http://cokiha.metu.edu.tr/,

[2] DESİSTEK; İnsansız Sualtı Araçları, http://www.desistek.com.tr/

List of Abstracts

Artificial Neural Network-Based Models for Predicting Maksimum Oxygen Uptake from Submaximal Data

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Maximum oxygen uptake (VO2max) is defined as the highest rate at which oxygen can be taken up and utilized by the body during severe exercise. It is one of the main variables in the field of exercise physiology, and is frequently used to indicate the cardiorespiratory fitness of an individual. In scientific literature, an increase in VO2max is the most common method of demonstrating a training effect. In addition, VO2max is frequently used in the development of an exercise prescription. The most accurate method to assess VO2max is directly measuring the oxygen uptake during graded, maximal exertion exercise on a treadmill or cycle ergometer in the laboratory. When there is no further increase in oxygen uptake despite a further increase in work rate, the measured peak oxygen uptake during steady-state can be considered as the VO2max.

Measuring VO2max directly is time-consuming, requires expensive equipment and occasionally also needs continuous medical supervision, thus making it unsuitable for studying large cohorts and performing routine measurements. There are three common ways to predict VO2max for an individual. VO2max can be estimated with maximal tests, submaximal exercise tests or with non-exercise tests. Maximal tests are expensive to administer and can be risky because the subject reaches their maximal heart rate near complete exhaustion. Non-exercise tests depend upon the truthful self-report of activity and cannot be used when the individuals have an interest in the results, giving them a reason to falsify the self-reported activity levels. Submaximal tests are most often performed on a cycle ergometer, although they can be performed on a treadmill or a track. Submaximal tests are faster, safer, and cheaper to administer than maximal tests. However, submaximal tests have been found to be less accurate than maximal tests yet more accurate than the non-exercise tests.

The purpose of this study is to develop new multilayer feed-forward artificial neural network (ANN)-based models to predict VO2max of fit adults from a single stage submaximal exercise test involving walking, jogging or running. The dataset includes data of 185 subjects and the input variables of the dataset are gender, age, height, weight, exercise time (MIN1, MIN2 and MIN3) and heart rate (HR1, HR2 ve HR3) at varying distances (0.5 mile, 1 mile and 1.5 mile). Participants, aged between 18 and 65 years, were recruited to participate in this study. Each participant completed a 1.5-mile endurance test (each completed on different

days). During the 1.5-mile test participants were instructed to sustain moderate exercise intensity throughout the entire test. At least 24 hours after the 1.5-mile test, participants successfully completed submaximal 1.5-mile endurance test. Relevant data are collected at the 0.5-mile mark, the 1.0-mile mark, and 1.5-mile mark.

21 different ANN-based VO2max prediction models have been developed by using combinations of the input variables. Using 10-fold cross validation on the dataset, standard error of estimates (SEE's) and multiple correlation coefficients (R's) for each fold have been calculated and these values have been averaged for each model. The results of ANN-based models are also compared with the ones obtained by Multiple Linear Regression (MLR) and it is shown that ANN-based models have better performance than MLR-based models average (6.59% on the average). The ANN model including the variables gender, age, height, weight, MIN3 and HR3 yields the lowest SEE (3.13 ml•kg-1•ml-1), whereas the model including the variables gender, age, height, weight, HR1, HR2 and HR3 yields the highest SEE (4.71 ml•kg-1•ml-1) for prediction of VO2max. It is concluded that ANN based submaximal models can accurately predict VO2max in participants using common predictor variable and any one of three distances.

Support Vector Machines Combined with Feature Selection for Prediction of Maximal Oxygen Uptake

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Cardiorespiratory fitness (CRF) is the ability to perform dynamic, moderate-to-high intensity exercise using the large muscle groups for long periods of time. CRF depends on the respiratory, cardiovascular, and skeletal muscle systems and, therefore, is an important component of health and physical fitness. The standard test for determining CRF is the direct measurement of maximal oxygen uptake (VO2max) during a maximal graded exercise test. VO2max is the most accurate way to assess CRF, however maximal exercise tests that directly measure VO2max is impractical in most physical therapy clinics because maximal tests require expensive gas analysis and ventilation equipment. As a result, researchers have sought to develop alternative methods that would allow clinicians to predict VO2max without having to perform direct measurement of oxygen uptake.

There are many limitations of the studies in literature that focus on predicting VO2max by using maximal variables. First of all, most of them were developed using multiple linear regression analysis (MLR). In other words, machine learning methods that provide important tools for intelligent data analysis have not been used in most of the studies on prediction of VO2max. Secondly, most of the studies did not present cross-validation results. Thirdly, none of the studies applied feature selection algorithms to find out the most discriminative features for prediction of VO2max.

Feature selection has been an active research area in pattern recognition, statistics, and data mining communities. The main idea of feature selection is to choose a subset of input variables by eliminating features with little or no predictive information. Feature selection can significantly improve the comprehensibility of the resulting classifier models and often build a model that generalizes better to unseen points.

In this study, support vector machines (SVM) combined with a feature selection algorithm (Relief-F attribute evaluator combined with ranker search method) have been used to develop seven maximal VO2max prediction models. The dataset includes data of 440 subjects (229 females, 211 males), that are healthy volunteers ranging in age from 20 to 79 years. The models include the predictor variables age, gender, body mass index (BMI), heart rate (HR), rating of perceived exertion (RPE), respiratory exchange ratio (RER), and time. By using the Relief-F attribute evaluator combined with ranker search method, the score of each attribute

has been calculated and the attributes have been sorted in descending order according to their scores. According to the feature selection algorithm, the ranking (from the highest to the lowest score) of the attributes is: time, gender, age, BMI, HR, RER, and RPE. Dimensionality of the data set is reduced by one feature at a time (the attribute with the lowest score is removed) before being passed on to the SVM. By using 10-fold cross-validation on the data set, the performance of the prediction models has been evaluated by calculating their standard error of estimate (SEE) and multiple correlation coefficient (R). MLR-based VO2max prediction models have also been developed for comparison purposes. The results show that SVM-based VO2max prediction models perform better than MLR-based prediction models. The model including 5 predictor variables, which are time, gender, age, BMI, and HR, yields the lowest SEE (4.58 ml kg_1 min_1 and 4.77 ml kg_1 min_1) and the highest R's (0.90 and 0.89) both for SVM-based and MLR-based models whereas the model including a single predictor variable yields the highest SEE (6.55 ml kg_1 min_1 and 6.75 ml kg_1 min_1) and the lowest R (0.78 and 0.76) both for SVM-based and MLR-based models, respectively. The inclusion of HR, RER, and RPE scores in VO2max models yields 3.48% and 2.44% reduction in SEE's for SVM-based and MLR-based models, respectively.

Using Support Vector Machines to Predict Maximal Oxygen Uptake with the Help of Questionnaire Variables

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Keywords: support vector machines, regression, maximal oxygen consumption

Maximal oxygen uptake (VO2max) is defined as the highest rate of oxygen consumption attainable during maximal or exhaustive exercise. VO2max is useful as an indicator of endurance capacity of a person and represents the upper limit for endurance performance. The purpose of this study is to investigate the effect of questionnaire variables on the prediction of VO2max by using support vector machines (SVM) and compare the results with those obtained by multiple linear regression (MLR). Two types of questionnaire variables are considered. Perceived functional ability (PFA) questions are designed to determine how fast participants believe they could walk, jog, or run one mile distance (PFA-1) and a three mile distance (PFA-2) without becoming overly breathless or tired. The responses to the PFA-1 and PFA-2 questions are the PFA-1 and PFA-2 scores (range = 1–13), respectively. The physical activity rating (PA-R) question allows participants to judge their level of physical activity during the past six months. The response to the PA-R question is the PA-R score (range = 0–10).

24 different VO2max prediction models have been developed. Common predictor variables in each model are gender, age, weight and height. Rest of the predictor variables are ending speed, heart rate and the three questionnaire variables PFA-1, PFA-2 and PA-R. By using the combination of these questionnaire variables together with ending speed and heart rate, three categories have been formed. By using 10-fold cross-validation, the performance of the prediction models in each category has been thoroughly evaluated by calculating their standard error of estimates (SEE's) and multiple correlation coefficients (R's).

The results have shown that among the categories, the combination of questionnaire variables with the ending speed comparatively yields the lowest SEE's, while their combination with heart rate gives the highest SEE's. In particular, the model including the predictor variables gender, age, weight, height, ending speed, PFA-1 and PA-R yields the lowest SEE (SEE = 3.256 mL kg-1 min-1) whereas the model including the variables gender, age, weight, height, heart rate and PFA-2 yields the highest SEE (SEE = 7.2256 mL kg-1 min-1) for prediction of VO2max, independent of whether they are assessed with SVM or MLR.

In addition, the following observations could be gained from the results:

- The inclusion of PFA and PA-R scores in VO2max models yields on the average 8.9% and 10.51% reductions in SEE's for SVM-based and MLR-based models, respectively.

- Prediction models not including the PFA and PA-R scores yield the highest SEE's.

- Prediction models including both the PFA-1 and PA-R scores achieve the lowest SEE's, regardless of whether they are evaluated with SVM or MLR, or whether they are combined with heart rate, ending speed or both.

- The results of SVM models have also been compared with the ones obtained by MLR models. The results show that SVM models markedly outperform MLR models, and can be used safely for prediction of VO2max.

Prediction of Upper Body Power of Cross-Country Skiers Using Support Vector Machines Combined with Feature Selection

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Several researchers have concluded that upper body power (UBP) plays an important role in cross-country ski racing. In this study, support vector machines (SVM) combined with feature selection is used to develop several different models to predict UBP10 (10-second UBP) and UBP60 (60-second UBP) of cross-country skiers. Trained cross-country ski racers with a minimum of 3 years of ski racing experience were recruited for this study. The models include the predictive variables age, gender, height, weight, time, maximum heart rate (HRmax), and relative maxium oxygen uptake (RVO2max). By using the Relief-F attirubute evaluator combined with a ranker search method, the score of each attribute has been calculated and the attributes have been sorted in descending order according to their scores.

According to the feature selection algorithm, the ranking (from highest to the lowest score) of the attirubutes for UBP60 are weight, height, age, RVO2max, gender, HRmax and time, and the ranking of the attirubutes for UBP10 are weight, height, age, gender, time, RVO2max and HRmax. Dimensionality of the data set is reduced by one feature at a time (the attirubute with the lowest score is removed) before being passed on to the SVM. Performance metrics such as standard error of estimate (SEE) and multiple correlation coefficients (R) have been used to assess the performance of the prediction models. The results of SVM models are compared with the ones obtained by multiple linear regression analysis (MLR). The results show that the performance of all SVM models is better than that of MLR models both for prediction of UBP10 and UBP60. For prediction of UBP60, the model including 5 predictor variables, which are weight, height, age, RVO2max, and gender, yields the lowest SEE's (18.32 Watts and 21.98 Watts) and the highest R's (0.95 and 0.92) both for SVM and MLR models whereas the model including a single predictor variable yields the highest SEE's (39.10 Watts and 43.32 Watts) and the lowest R's (0.71 and 0.63) both for SVM and MLR models, respectively. For prediction of UBP10, the model including 6 predictor variables, which are weight, height, age, gender, time, and RVO2max, yields the lowest SEE's (29.94 Watts and 32.29 Watts) and the highest R's (0.91 and 0.90) both for SVM and MLR models whereas the model including a single predictor variable yields the highest SEE's (50.93 Watts and 57.52 Watts) and the lowest R's (0.72 and 0.61) both for SVM and MLR models, respectively. SVM prediction models for UBP60 show better performance than SVM prediction models for UBP10 because of the high standard deviation of UBP10 . It is concluded that UBP10 and UBP60 of cross-country skiers can be predicted with less error by using certain predictive features.

Investigating the Effects of Maximum Oxygen Uptake and Maximum Heart Rate Variables on the Prediction of Upper Body Power of Cross-Country Skiers Using Support Vector Machines

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Upper body power (UBP) is an important determinant of cross-country ski race performance. Although first general studies have been recently made to predict UBP, no in-depth investigations in that research area have been performed so far. The purpose of this study is to investigate the effects of maximum oxygen uptake (VO2max) and maximum heart rate (HRmax) variables on the prediction of 10-second UBP (UBP10) and 60-second UBP (UBP60) of cross-country skiers using support vector machines (SVM) and compare the results with those obtained by multiple linear regression (MLR).

To predict UBP10 and UBP60, two categories of prediction models have been formed. In the first category, the common predictor variables in each model are protocol, gender, age, height, weight and exercise time, whereas the models in the second category have common predictor variables gender, age, BMI and exercise time. Rest of the predictor variables for both categories are VO2max and HRmax. By using the combination of VO2max and HRmax with the common predictor variables from both categories, eight models have been formed in total. By using 10-fold cross-validation, the performance of the prediction models in each category has been thoroughly evaluated by calculating their standard error of estimates (SEE's) and multiple correlation coefficients (R's).

The results show that the combination of the common variables from both categories with VO2max comparatively yields the lowest SEE's, while their combination with HRmax gives the highest SEE's. In particular, the model in the first category including the predictor variables protocol, gender, age, height, weight, exercise time and VO2max yields the lowest SEE's (SEE for UBP10 = 30.404 mL kg-1 min-1 and SEE for UBP60 = 21.576 mL kg-1 min-1) and similarly, the model in the second category including the variables gender, age, BMI, exercise time and VO2max yields the lowest SEE's (SEE for UBP10 = 31.313 mL kg-1 min-1 and SEE for UBP60 = 25.367 mL kg-1 min-1) for prediction of UBP, independent of whether they are assessed with SVM or MLR. In contrast, the combination of the above mentioned models with HRmax instead of VO2max gives the highest SEE's (SEE for UBP10 = 44.688 mL kg-1 min-1 and SEE for UBP60 = 38.910 mL kg-1 min-1).

In addition, the following observations could be gained from the results:

- The performance of all SVM models is much better (higher R and lower SEE) than the performance of MLR models both for prediction of UBP10 and UBP60.

- For prediction of UBP10 and UBP60, SVM models yield up to 29% reductions in SEE's compared with the results of MLR models.

- The SEE's for prediction of UBP10 change from 30.404 to 44.688 whereas the SEE's for prediction of UBP60 change from 21.576 to 38.910.

- SVM prediction models for UBP60 show better performance than SVM prediction models for UBP10 because of the high standard deviation of UBP10.

Multilayer Perceptron Models for Predicting the Admission Decision of a Candidate to the School of Physical Education and Sports at Cukurova University

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The School of Physical Education and Sports at Cukurova University, Adana, Turkey conducts physical ability test to select students for admission to the School. The physical ability test consists of two stages, each of which includes two sub-tests. In the first stage, candidates perform a vertical jump test and coordination skill test. In the second stage, candidates are subjected to a 30m sprint and 20m shuttle run test. The scores in the physical ability test, National Selection and Placement Examination (NSPE) test score, high school grade point average (GPA) and the type of high school graduated (whether it is a sports field high school or not) are the main factors used to determine whether a candidate would be admitted to the program or not. Hence; the dataset consists of 4 score types taken from physical tests, NSPE score, GPA, type of high school graduated and gender as predictor variables.

In this paper, we use multilayer perceptron to predict in advance whether or not a candidate will be admitted to the School once he knows his scores from the physical ability test. Hence a study has been carried out on two types of datasets which are generated from the students tested in 2006 and 2007, respectively. Each dataset has been categorized as train and test sets. They are proportionally grouped in 90-10%, 80-20%, 70-30%, 60-40%, 50-50% portions and cross validation with 10 folds.

Criteria such as learning rate, number of hidden layer neurons and momentum have been changed by using trial-and-error to reach the best results. The results obtained from the data sets are compared according to the criteria such as classification accuracy, true / false positive rates and true / false negative rates. For the 2006 data set, the highest classification accuracy (i.e. 96.195%) has been obtained for the case of 80-20% split whereas for the 2007 data set, the highest classification accuracy (i.e. 86.341%) has been obtained for the case of 80-20% split. For the 2006 data set and 80-20% split case, the true positive rate is 0.952, the false positive rate is 0.013, the true negative rate is 0.988 and the false negative rate is 0.048. For the 2007 data set and 80-20% split case, the true positive rate is 0.87, the false positive rate is 0.175, the true negative rate is 0.825 and the false negative rate is 0.13.

In conclusion; to predict whether a candidate would be admitted to the school or not is possible with a high precision rate by using multilayer perceptron.

Development of New Non-Exercise Maximal Oxygen Uptake Models by Using Support Vector Machines

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Maximal oxygen uptake (VO2max) is defined as the maximum ability to transport and consume oxygen during strenuous endurance exercise and is considered the single best measure of cardio-respiratory fitness. VO2max is used for quantifying training intensity for aerobic exercise prescription, evaluating the effects of aerobic exercise programs, and classifying individuals for health risks. Standard tests for determining VO2max involve directly measuring the oxygen uptake during graded, maximal exertion exercise on a treadmill or cycle ergometer in the laboratory. When there is no further increase in oxygen uptake despite a further increase in work rate, the measured peak oxygen uptake during steady-state can be considered as the VO2max.

Maximal tests are expensive to administer and can be risky because the subject reaches his maximal heart rate near complete exhaustion. The requirement of expensive gas analysis and ventilation equipment and the need for medical attendance are the other major disadvantages of maximal tests. Because of these drawbacks of maximal tests, other methods that do not require maximal effort have been developed to determine VO2max. These methods use non-exercise tests to predict VO2max. Non-exercise prediction equations provide a convenient estimate of VO2max without needing to perform a maximal test. Researchers may favor non-exercise models over maximal exercise tests because of their ease of administration to large populations and their independence from expensive instrumentation and exercise testing.

In this paper, SVM have been used to develop new non-exercise VO2max prediction models for healthy subjects ranging in age from 18 to 65 years. In order to compare the performance of SVM-based VO2max prediction models, Multiple Linear Regression (MLR), and Multilayer Perceptron (MLP) prediction models have also been developed. The dataset contains measured VO2max values of 126 subjects as well as the variables; age, gender, body mass index (BMI), body fat percentage (BF%), lean body mass (LBM) and activity code (AC). 7 different VO2max prediction models have been developed by using combinations of the input variables. Grid search method has been used to find the optimal values of the SVM

parameters cost, gamma and epsilon. By using 10-fold cross-validation on the dataset, the performance of the prediction models has been evaluated by calculating their standard error of estimates (SEE's) and multiple correlation coefficients (R's).

The results indicate that SVM models yield lower SEE's than the other prediction methods.

The average percentage decrease in SEE's of SVM models compared to those of the MLR models is 7.03%. The SVM model including the variables age, gender, BMI, BF% and AC yields the lowest SEE (4,68 ml•kg-1•ml-1), whereas the model including the variables age, gender, BMI and LBM yields the highest SEE (5,75 ml•kg-1•ml-1) for prediction of VO2max.

Performance Comparison of Different Regression Methods for Maximal Oxygen Uptake Prediction

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Keywords: Group Method of Data Handling, Generalized Regression Neural Networks, Gene Expression Programming

Regular exercise, which improves cardiorespiratory fitness (CRF), is a powerful factor in enhancing health and wellbeing. The assessment of CRF, commonly assessed by the measurement of maximal oxygen uptake (VO2max) or aerobic capacity, can be a useful tool in promoting health. For example, it enables a baseline of fitness to be established, it enables an exercise program to be more individually prescribed, it provides a system for monitoring change and it may be used as a health risk indicator. In community and occupational health settings, the assessment of aerobic capacity is becoming more common place both in medical screening and as a measurement and monitor of functional status. The classical method of measurement of CRF (or aerobic capacity) is by direct measure of VO2max, where the subject undergoes a maximal exercise test on a cycle or treadmill and oxygen consumption is measured directly. While this is the gold standard, the equipment is expensive, requires a high level of technical expertise and supervision, is impractical in non-laboratory and field test situations and is unsuitable for those individuals for whom exhaustive exercise is not recommended.

Maximal tests and the direct measurement of VO2max have some drawbacks. Therefore nonexercise tests have been developed to predict VO2max. Non-exercise regression equations provide a convenient estimate of CRF. This approach is inexpensive, time-efficient, and realistic for large groups.

The purpose of this paper is to compare the performance of different regression methods for VO2max prediction. In this regard, VO2max prediction models for fit adults based on non-exercise variables have been developed by using Group Method of Data Handling (GMDH), Generalized Regression Neural Networks (GRNN) and Gene Expression Programming (GEP) methods. The dataset includes measured VO2max values of 439 individuals as well as the non-exercise test variables; age, gender, body mass index (BMI), body fat percentage (BF%), lean body mass (LBM) and activity code (AC). 7 different VO2max prediction models have

been developed by using combinations of the input variables. By using 10-fold cross-validation on the data set, the performance of the prediction models has been evaluated by calculating their standard error of estimates (SEE's) and multiple correlation coefficients (R's).

The results indicate that GRNN-based models yield the lowest SEE's and GEP-based models yield the highest SEE's for estimating VO2max. Furthermore, the model including the predictor variables age, gender, BMI, BF%, and AC yields the lowest SEE (3.32% ml•kg-1•ml-1), whereas the model including the variables age, gender, BMI and LBM yields the highest SEE (7.03% ml•kg-1•ml-1) for prediction of VO2max. The average SEE of GRNN models is 20.5% lower than the worst prediction model, which is GEP. It is concluded that GRNN based non-exercise models can accurately predict VO2max.

Predicting the Admission Decision of a Candidate to the School of Physical Education and Sports at Cukurova University by Using Multilayer Perceptron Combined with Feature Selection

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Keywords: multilayer perceptron, feature selection

The School of Physical Education and Sports at Cukurova University, Adana, Turkey conducts physical ability test to select students for admission to the School. A candidate's performance in the physical ability test as well as his scores in the National Selection and Placement Examination and graduation grade point average (GPA) at high school are the main factors (along with some other criteria) that determine whether he will be admitted or not. In this paper, multilayer perceptron (MLP) combined with a feature selection algorithm has been used to develop a prediction model to predict the admission decision of a candidate to the School of Physical Education and Sports. Predictor variables are gender, scores of the candidate in the National Selection and Placement Examination (NSPE-1 & NSPE-2), graduation GPA (GGPA), specialization area at high school and scores from vertical jump test, coordination and skill test score, 30m sprint test score and 20m shuttle run test score. Admission is the target variable which takes the values 0 and 1, where 0 means "reject" and 1 means "admit".

By using the Relief-F attribute evaluator combined with a ranker search method, the score of each predictor variable has been calculated and the variables have been sorted in descending order according to their scores. According to the feature selection algorithm, the ranking (from the highest to the lowest score) of the variables is: 30m sprint test score, specialization area at high school, NSPE-2, vertical jump test score, 20m shuttle run test score, NSPE-1, GGPA, coordination and skill test score, and gender. Dimensionality of the data set is reduced by one feature at a time (the variable with the lowest score is removed) before being passed on to the MLP. By this way, nine prediction models have been developed. 90% of the data is used as a training set and the rest of the data is used as a test set. The optimal values of the parameters that affect the performance of MLP models (i.e. number of neurons in the hidden layer, learning rate and momentum) have been found by trial and error. The performance of the models has been evaluated by calculating the classification accuracy, positive predictive percentage and negative predictive percentage. Linear and logistic activation functions have been used with MLP at the output layer (both with one and double layer).

The results show that the model including all the predictor variables yields the best classification accuracies, independent of which activation function has been used at the output layer. More specifically, among the results obtained by using different activation functions, the double layered MLP model using the linear activation function yields the best classification accuracy (i.e. 96.50%). True positive and true negative percentages for this model are 25.17% and 69.23%, respectively.

Among the results obtained by using the double layered MLP model including the predictor variables NSPE-1, specialization area, vertical jump test score and 30m sprint test score and using the linear activation function gives the second best classification accuracy with 79.02%. True positive and true negative percentages for this model are 11.19% and 67.81%, respectively.

Among the results obtained by using MLP models with logistic activation functions, the second highest classification accuracies have been achieved with two models. The MLP model including the predictor variables NSPE-1, NSPE-2, specialization area, vertical jump test score, 30m sprint test score and 20m shuttle run test score using one layered logistic activation function yields a classification accuracy of 88.81%. True positive and true negative percentages for this model are 18.18% and 70.63%, respectively. Similarly, the MLP model including the predictor variables NSPE-1, NSPE-2, GGPA, specialization area, vertical jump test score, coordination and skill test score, 30m sprint test score and 20m shuttle run test score using one layered logistic activation function also achieves a classification accuracy of 88.81%. True positive and true negative percentages for this model are 21.68% and 67.13%, respectively.

When the number of predictor variables falls below three, the classification accuracy of the prediction models decreases up to 70.63%.

Conclusively, the accuracies obtained show that the MLP classification is an effective tool for this application domain. By the help of our method, it will be feasible for a candidate to predict his admission decision in advance once he has (or knows) his scores from the physical ability test.

Prediction of Maximal Oxygen Uptake of Cross-Country Skiers Using Different Regression Methods

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Maximal oxygen uptake (VO2max) is the maximum capacity of an individual\\\'s body to transport and use oxygen during incremental exercise, which reflects the physical fitness of the individual. VO2max is expressed either as an absolute rate in liters of oxygen per minute (L/min) or as a relative rate in milliliters of oxygen per kilogram of body mass per minute (mL kg-1 min-1). The purpose of this study is to predict VO2max of cross-country skiers using different regression methods; namely Support Vector Machines using the Radial Basis Function (SVM-RBF), Linear SVM (SVM-Linear) and Multilayer Perceptron (MLP). The results are compared with those obtained by Multiple Linear Regression (MLR).

Several different models have been developed to predict VO2max of cross-country skiers using the mentioned regression methods. Common predictor variables in each model are protocol, gender, age and body mass index (BMI). Rest of the predictor variables are heart rate (HR), heart rate at lactate threshold (HRLT) and time. By using the combination of HR, HRLT and time with the common predictor variables, seven prediction models have been formed in total. Using 10-fold cross validation on the data sets, the performance of the prediction models has been thoroughly evaluated by calculating their standard error of estimates (SEE's) and multiple correlation coefficients (R's).

The results have shown that the model including the predictor variables protocol, gender, age, BMI and HR yields the lowest SEE's whereas the model including the variables protocol, gender, age, BMI, time, HR and HRLT yields the highest SEE's for prediction of VO2max, independent of whether they are assessed with SVM-RBF, SVM-Linear, MLP or MLR. In more detail, for this model the lowest SEE among the regression models is obtained by SVM-RBF with 4.39 mL kg-1 min-1 whereas the highest SEE is achieved by MLR with 5.23 mL kg-1 min-1.

In addition, the following observations could be gained from the results:

- SVM-RBF-based prediction models show better performance (i.e. lower SEE and higher R) than the models developed by other regression methods.

- As compared to the SEE's of MLR, the maximum percentage decrement rates in SEE's of SVM-RBF, MLP and SVM-Linear are 2.9%, 5.5% and 13.62%, respectively.

- Due to the non-linear characteristics of VO2max, linear regression methods yield higher SEE's for prediction. On the other hand, linear regression methods yield faster results for prediction.

- The order of the regression methods for prediction of VO2max, from the best to the worst, is SVM-RBF, MLP, SVM-Linear and MLR.

Performance Comparison of Different Regression Methods for Predicting the Performance Measures of a Multiprocessor Architecture

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Keywords: Multi-layer Feed-forward Artificial Neural Networks, Support Vector Machines, Multiprocessor Architectures

In this paper, Multi-layer Feed-forward Artificial Neural Networks (MFANN), Linear Support Vector Machines (SVR-L), Support Vector Machines using the Radial Basis Function (SVM-RBF), Generalized Regression Neural Networks (GRNN) and Multiple Linear Regression (MLR) have been used to develop models for predicting the performance measures of a multiprocessor architecture interconnected by the Simultaneous Optical Multiprocessor Exchange Bus (SOME-Bus), which is a fiber-optic interconnection network. OPNET Modeler is used to simulate the SOME-Bus multiprocessor architecture and to create the training and testing datasets. Message passing with acknowledgments (MP-ACK), message passing without acknowledgments (MP-NO-ACK) and distributed shared memory (DSM) programming models have been implemented separately in the simulation. The predictor variables of the MP prediction models include ratio of the mean message channel transfer time to the mean thread run time (T/R), node number, thread number and traffic pattern whereas the predictor variables of the DSM prediction model includes T/R, probability that a block can be found in modified state (Pm), probability that a data message is due to a write miss (Pw), probability that a cache is full (Pcf) and probability of having an upgrade ownership request (Puor). The target variables for both MP and DSM prediction models are average network response time (NRT), average channel waiting time (CWT) and average processor utilization (PU), average channel utilization (CU), and average input waiting time (IWT). The performance of the prediction models is evaluated by calculating standard error of estimate (SEE) and multiple correlation coefficient (R).

The results and discussions are summarized below:

For MP models, MFANN-based prediction model performs better (i.e., higher R and lower SEE) than SVM-based, GRNN-based and MLR-based prediction models. SVM-RBF model shows the second best performance for prediction. The SEE for the MFANN-based prediction model decreases as the number of folds in the test set increases. The MFANN-based model performs a perfect job in predicting CU and PU (i.e. the SEE almost tends to zero for both predictions). The prediction errors related to NRT and IWT are higher than the ones related to CWT. This is because of the high standard deviation of NRT and IWT in the dataset.

For MP-NO-ACK: Predicting evaluators can be ordered as: MFANN, GRNN, MLR, SVM-RBF and SVM-L. MFANN records the best results using cross validation folds. For the CWT, MFANN performs the highest values (R = 0.9947 and SEE = 1.1835). Although the MLR-based prediction model provides good performance for prediction of CU and PU, it does not show the same performance for prediction of CWT, NRT and IWT. This is because of the non linear characteristics of CWT, NRT and IWT.

For DSM: Predicting evaluators can be ordered based on their accuracy as: Predicting evaluators can be ordered as MFANN, GRNN, MLR, SVR-RBF and SVR-L. MLR-based models relatively show similar results compared with the robust modern methods. Predicting CWT, MFANN model performs the best results when implementing high cross validation, for example R = 0.9969 and SEE = 0.0191. In CWT, the linear models (SVR-L and MLR) relatively report equal values for R and SEE over the whole cross validation folds. For CU, MFANN gives the best results for the correlation coefficient (R = 0.9968) and errors (SEE =11.5186). In NRT, the linear models (SVR-L and MLR) are not advisable to be used for predicting NRT for the DSM protocol. Assessing PU, techniques can be ordered based on their accuracy as: MFANN, GRNN, SVR-RBF, MLR and SVR-L.

The Effect of the Fluctiation Losses on Received Power for Doppler Radars

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While the technology has been advancing, the abilities of radars have increased likewise and radars have become one of the important components of modern defense industries. In this study radar equations and analysis of these equations and Swerling cases are searched and explained. Afterwards, a simulation of the echo signal reflected from the target has been made by entering the parameters of a target, a monostatic pulse Doppler radar with phased array antenna and the signal sent to the target on a computer software (MATLAB). The radar and target parameters used on this simulation were selected with respect to real models. In addition, another simulation has been made for a moving target and its realistic actions. Furthermore, the outputs of the simulation when the losses, noise and the Swerling cases are ignored have been compared with the outputs of the simulation when these conditions are not ignored, and the effects of them have been observed and stated.

Fuzzy Logic Based Pesticide Sprayer For Smart Agricultural Drone

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Agricultural drones are becoming a modern tools to provide farmers with a lot of details about their crops and to achieve some precise farming missions at specific times for special types of plants and for limited areas. Pesticide spraying is one of the most important agricultural chemical application. A new generation of smart unmanned aerial vehicle is proposed in our paper to make an efficient and economic spraying operations.

In this paper we present a theoretical study and some simulated results for a fuzzy logic based sprayer that depends on several parameters like : the drone altitude, the drone speed, the wind speed and the green surface density which is evaluated using some techniques of digital image processing. The drone supposed to be equipped by a camera, inertial unit, FPGA card, GPS module, Integrated wireless card, and one sensor for determining the drone altitude like ultrasound sensor. The most important part of our proposed fuzzy logic controller will be the (rules base) which is composed of linguistic conditional sentences that describe the drone behavior for each sensed situation of its surrounding during its flight. Our design of that rules base will be explained using several illustrated tables.

Smart Template Matching Algorithm Using Hill-Climbing Search Strategy

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Template matching is one of the most widely known algorithms, which is normally used to verify the correlation state between an indexed digital model (template) and a part of current given image. In spite of its good competence, its slow performance represents its main drawback. Our aim is to produce a faster version of this algorithm in order to make it more suitable for autonomous and embedded systems like in robotics applications
In this paper, we propose the employment of Hill-Climbing search strategy to improve the functionality of Template Matching algorithm in its classical version. Some technical ideas are also suggested and discussed to solve some practical problems like scale and angular variance between the image and the template. The new algorithm is well explained, and some experimental results are illustrated to prove its performance in the domain of mobile robot localization.

Analyzing the effect of the slit depth and width on the electrical performance of a squirrel cage induction motor

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In this study, a new design was suggested in order to improve the performance of induction motors. In these new designs, slits were applied in the middle of stator and rotor tooth. In these slitted models, the depth and width in the 56 different slitted motor models were optimized by Finite Element Method Magnetics (FEMM) software by using Finite Elements Method (FEM). What value the depth and width of optimum slit should be was determined in order to obtain nominal torque in the new motor models created with the proposed slitted structure, and how the depth and width of slit could affect the torques of motor was demonstrated. In modeling, polyphase, 3 kW, squirrel cage induction motor was used. As a result of modeling, increase in the coupling flux provided due to slits, 0.338%, 2.085% and 4% increase in starting, pull - out and nominal torque values respectively for 15 mm slit depth and 0.1 mm slit width.

Underwater Visual Tracking and Counting of Fishes

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Ecological observation is imperative for marine scientists to study marine ecosystems. Based on fish tracking, marine biologists are able to observe fish and their ecological environs. Directly observing and quantifying fish behavior within a turbulence or trawl environment is challenging. Normally marine biologists square of the existence and quantities fish types using: casting nets in the ocean, human underwater observation and photography[1], combined net casting and acoustic (SONAR: SOund Navigation And Ranging)[2]. Fish detection and tracking are complicated by the variability of underwater environment. School of fishes can vary because fishes can enter a scene simultaneously and disappear. They can split or merge, and different school of fishes can be relatively near to each other or far away from each other. Because there exists no leader and every fish can know about local situation only around itself, the school of fishes should have a kind of intelligent ability as a whole[3].

Water plants are regarded as foreground objects as a result of the severe drift from the interference of the water flow, which results in complexities and difficulties in discriminating moving fish from drifting water plants. So accuracy of fish tracking has been seriously affected if traditional methods are applied[4]. Recently, considerable research were conducted on video monitoring systems. Morais et al.[5] proposed a method, for underwater visual tracking and counting of fishes in vivo, based on the application of a Bayesian filtering technique that enabled tracking of objects whose number may vary over time. They demonstrated that their method could operate reliably under severe environmental changes and handle problems such as occlusions or large inter-frame motions. Wu et al.[6] proposed an algorithm to track fish group. The algorithm is based on the background subtraction and Delaunay triangulation. An improved background subtraction algorithm was used to segment each frame of the video and then the center of each fish was evaluated. An optimized Delaunay triangulation network was established and the center of the fish group was calculated. Experimental results showed their algorithm could track fish groups accurately and provide effective data for monitoring water quality. Shao et al.[7] presented a real-time tracking system for moving objects on a water surface. Their tracking system was used to construct a fish-like robot water polo competition platform. The robot water polo game provided a real-time multi-agent environment from the viewpoint of distributed artificial intelligence and multi-robot cooperation research within water circumstance. A robust tracking algorithm based on template-matching method was proposed to overcome the specular reections. Experimental results illustrated the effectiveness of their tracking

algorithm. Shijun et al.[8] studied the impact of water quality on fish activity by tracking and measuring the fish swim speed. To achieve the tracking and test the velocity to the fish movement under the complex background, they proposed a method of video tracking algorithm consists of background subtraction and adaptive Kalman filter. They took special care to improve tracking accuracy and reduce loss of targets. Simulation results showed that the tracking accuracy of their proposed method. Tracking fish using implanted radio transmitters is an important part of studying and preserving native fish species. Jensen et al.[9] focused on developing simple methods for multi unmanned aerial vehicles navigation and transmitter localization. Swarm-like navigation methods were used for such navigation, and a simple Kalman filter was used to estimate the location of the transmitter.

We addressed a computer vision based algorithm to estimate and analyze fish trajectories and counting in high turbulence conditions. Our method is similar to the method of Wu et al.[6]. We used background subtraction, estimation of fish centers, Hungarian method, and Kalman filter, whereas Wu et al.[6] used improved background subtraction, estimation of fish centers, and Delaunay triangulation network. We used the frequently used approach for discriminating moving target from background scene which is background subtraction. Fish center estimation technique is similar to Wu et al.[6]. Hungarian algorithm were used for data association. If we have m targets in any frame fm and n targets in frame fm+1, then Hungarian algorithm answers the question: How do m targets relate to n targets? For example, if there are two targets {m1,m2} in any frame fm and two targets {n1,n2} in frame fm+1.

Based on probability Hungarian algorithm figures out the most accurate assignments from assignment set {m1 = n1;..., m2=! n2}. Finally, an adaptive Kalman filtering has been employed to observe data for self-testing when in the filtering, immutably judging the dynamic changes of the fish, and processing adaptive updates by observing data.

Consequently, using videos obtained from fixed camera our method is able to estimate and analyze fish trajectories and counting them in high turbulence conditions over time.

The remaining part of this paper was organized as follows: Section 2 delineates our framework; Section 3 reports experimental results; finally, Section 4 presents conclusion of the work with few inklings for further study.

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Estimation of Targets from Satellite Images

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Keywords: target, detection, images

Satellite imagery consists of images of Earth or other planets collected by artifcial satellites. The use of satellite imagery in everyday life is by no means a novelty. Satellite images can provide huge amounts of data that in principle could be processed and provide very useful information in many areas. Satellite images are one of the most powerful and important tools used by the meteorologists, militaries, geographers, etc. For examples, satellite pictures help scientists to count number of penguins in Antarctica; or an authority would be interested to count the number of buildings in some region. Numerous works can be found in the literature that directly concern to the detection of targets from satellite images. For instances, Aytekin et al.[1] presented a bag of visual words algorithm for object detection in satellite images. In their algorithm steps a new descriptor was presented by adding scale information to SIFT descriptor and a novel visual word weighting algorithm was proposed considering that more occurrence in the object and less in the background was an importance measure. A new concept for the detection of small objects from modular optoelectronic multispectral scanner (MOMS-02) high spatial resolution panchromatic satellite imagery was presented by Segl et al.[2]. The authors combined supervised shape classication with unsupervised image segmentation in an iterative procedure which allowed a target-oriented search for specific object shapes. Pirzada et al.[3] compared edge detection based on bi-lateral filtering with canny edge detection technique for satellite images.Their proposed bilateral filtering based edge detection not only generated well localized edges but also simultaneously reduced considerable noise from real life images. Their results showed that the bilateral filtering based edge detection provide better edge maps than other comparable techniques. Ke et al.[4] proposed an automatic and rapid method to detect objects from satellite image with large size, which is the precondition for detailed object recognition. Their feature based method consists of some Haar-like structural features with the help of Adaboost classifier.

They claimed that the detected object by using their algorithm, object's details could be further recognized. However, pixel based method usually performs slower than feature based method, in many applications where execution time is not a big factor we can use pixel based method for better performance.

We have put forward a computer vision based algorithm to estimate the number of targets (e.g., buildings, trees, penguins, etc.) from satellite images. Our pixel based method deals with gray scale images and construct histogram thereof. Thus any kind of color satellite image will

be converted to gray scale as well as obtained its complement and then a histogram will be built to get the knowledge of thresholds. On constructing histogram, the image will be divided into pieces based on a set of thresholds. A standard connected components analysis algorithm has been applied on it. The connected component algorithm works by looping over the pixels of the divided image. Any set of pixels which is not separated by a boundary is call connected. Each maximal region of connected pixels is called a connected component, which gives the estimation information of target.

Although the method is computationally expensive, it is able to estimate the number of targets from some given satellite images, which primarily include buildings or trees or penguins or so on.

The remaining part of this paper has been organized as follows: Section2 delineates the proposed framework; Section 3 reports the experimental results; finally, Section 4 presents the conclusion of the work with few linklings for further investigation.

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A Metaheuristic Approach for Optimal Train Control

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Environmental concerns and growing demand for energy has increased significance of energy-efficient train operations. In this manuscript, an energy-efficient train operation based on optimal selection of switching times for control inputs is studied. One of the metaheuristic approaches, genetic algorithm (GA), is used to find the switching times for optimal train operation. In our problem formulation, the objective function comprises energy consumption, travel time and maximum speed with different penalty factors. In order to verify the optimization results we obtained, a simulation is performed using MATLAB. For the simulations, two test tracks are created with different grade profiles and track lengths. Two various strategies are simulated on each of these test tracks. The first strategy is the straightforward approach consisting of maximum acceleration and braking phases. The second strategy is combination of maximum acceleration, cruising, coasting and braking phases where optimal switching times are calculated by GA. Simulation results show that, compared to the first strategy, the second strategy can save energy up to 30% while travel time increases by 5%.

Preliminary investigations into geothermal energy potential of Gulf of Antalya

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Keywords: Airborne, Magnetic, Antalya Gulf, Geothermal

Previous research on west and central Anatolia showed large areas rich in geothermal energy by utilising the airborne magnetic data. In east Anatolia, however potential areas should be explored individually. In terms of offshore areas, there has not been research to explore any geothermal potential. Gulf of Antalya located at the south of Turkey and northwest of Cyprus appears to be promising for geothermal energy potential. Airborne survey shows three intense magnetic anomalies in the Gulf elongated almost along the north-south direction. Cross-section of a profile was taken along the peaks of the magnetic anomalies. This profile was also digitised to process the data in order to estimate the body parameters such as the depth and vertical extent of the causative bodies. An approximate depth of 1.19 km (excluding the flight height of 0.6 km from the sea surface) to the top of the anomalous bodies was estimated by utilising the method of power spectrum depth estimate. Upward analytical continuation enhances deep seated bodies while suppressing the shallow ones. It is also possible to observe if the buried anomalous bodies join at depth to form a single body or not. 2 km upward analytical continued profile shows that three separate anomalies appear to be single anomaly. These three shallow sources can be interpreted as the magmatic intrusions into the oceanic crust by mean of faults. Such sources if deep rooted could be prospective for geothermal energy as well as hydrocarbon maturation.

A Hybrid Algorithm for Exam Timetabling Problem in Marmara University

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Exam timetabling problem, a well-studied combinatorial optimization problem, is one of the important administrative activities of universities and other educational institutions. There are a lot of different techniques to solve this problem. Some of these techniques use only one algorithm and others combine different algorithms. We solve the exam timetabling problem of Marmara University using a hybrid algorithm. Four local search based meta-heuristics, Tabu Search, Simulated Annealing, Hill Climbing and Great Deluge algorithms are used. Every algorithm has its own structure and parameters. It is necessary to fine-tune the basic parts of each algorithm for generating successful solutions in hybrid approaches. The application for exam timetabling problem is implemented in Marmara University. It is observed that the hybrid algorithm gives more successful results.

RSRP: Risk Sensitive Routing Protocol in Wireless Sensor Networks

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Wireless Sensor Networks (WSNs) get high popularity due to several important properties such as easy deployment, self maintenance, low energy spending, high resistance to node failures, etc. These properties mostly depend on the underlying communications method. One of the mostly implemented methods is to pass the messages between source and destination node via intermediate nodes. That is, source and destination nodes do not have a direct link; rather, they rely on the intermediate nodes forwarding the messages. In general, this way of communication is called multi-hop communication. The advantages of the multi-hop communication are dynamic routing, robust to node failures due to energy or malicious attacks, ease of deployment and management.

However, WSNs has their own drawbacks as well. One of the important drawbacks is the sensitivity of the communication links among nodes. An attacker can attack to these wireless connections among the nodes such that some nodes cannot communicate with the sink [3]. The most routing algorithms used in WSNs are adapted from the Ad-Hoc Wireless networks [1][2]. The high priority design challenges of the proposed routing protocols are usually Minimal computational and memory requirements, self-organization, energy efficiency, scalability, etc. [2]. Thus, most of these routing protocols do not directly consider the security treats directly [3]. Actually, there are many different kinds of security treats based on wireless communications: jamming, flooding, tampering or destruction, continuous channel access, replaying existing messages, sybil and wormhole attacks, etc. [3].

One solution to provide security in routing can be Trust Management System (TMS). Trust, or the trust on the behavior of the elements of the network, is a key aspect for WSN. A trust management system can distinguish a node that does not function as expected due to either faults or malicious acts [4][5]. There have been many different proposals for TMS. TMS can be used to improve the routing security of WSNs if a sensor node knows which other nodes in the network can be trusted for forwarding a packet [4][5]. Thus, nodes can use other nodes reputation to decide which one of these to trust. Thus, TMS evaluate the node operations in WSN and assign each of them with some reputation value and broadcast these reputations. In this work, we focus on using reputations of nodes to create a path with minimum risk sensitivity. The proposed algorithm aims to generate a routing path such that the total reputation of the intermediate nodes between the source and the sink node has the lowest security risk. The solution is based on the Ant Colony Optimization [6].

RISK SENSITIVE ROUTING: Assume that a TMS has been implemented to observe nodes in a WSN and produces some reputations per nodes as shown in Fig. 1. For ease of interpretation, we suppose that TMS determines the risk of a given link between two nodes rather that a node's risk. For instance, sending a message from Node 1 to 2 has a low level of security risk (10%), where transmitting a package from Node 7 to sink has a high level of security risk (60%). Using the given topology and the risk assessments in Fig. 1, we can create many different routes with different number of hops and cumulative risk values. In Fig. 2, we present 3 possible routes. In Route 1, the path from Source to Sinks via Node 7 has only 2 hops and the cumulative risk would be 68%.

However, if we follow Route 2, hop number would be 4 but the total risk value becomes 34%. As a last example, Route 3 produces 3 hops with an aggregated risk of %35. The bottom line of these examples is the importance of selecting immediate nodes on the number of hops and accumulated risk values. To save intermediate node's energy, most routing algorithms attach high importance to minimizing the hop number between source and target nodes. However, this requirement can conflict with the requirement of low level risk involved in the routing as seen below example.

In this work, we provide a Risk Sensitive Routing Protocol (RSRP) such that the trade-off between hop number and risk value of the routing path can be done depending on a system parameter, Risk Sensitivity (RS), defined by the WSN operator. RS shows how much WSN is sensitive to possible lost of packages due to low level of reputations of the nodes in the network. RS can be any value between 0 and 1. When RS is assigned 0 it means that we do not care the risks at all and we definitely want to minimize the number of hops in the routes. On the other hand, if RS is assigned 1 this states that we do care about the risks in the routes and want to minimize the level of the risks at the cost of increasing number of hops. Any value between 0 and 1 is an intermediate sensitivity to the risks.

After implementing the proposed solution we have conducted various tests to observe its performance under different risk level. The obtained results clearly indicate the success of the RSRP.

A Service Oriented Architecture to Recognize Car Plates by Mobile Devices

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Mobile devices such as smart phones, tablet pc, etc., have gained high popularity in real life applications to ease the performing daily jobs. However, due to their limited resources, e.g. battery, computation power, memory, there are novel challenges in applying mobile solutions. In this paper, we propose a Service Oriented solution for image processing on mobile devices and partial implementation of it.

Motivation: Consider a university campus in which hundreds or thousands of people enter and park their car. University administration would like to locate the owner of any car in some situations. In most cases, professors, students, and administrative personnel have registered their car plate and identity to some car information system located at campus gates. Visitors are also requested to register to the some information system as they arrive in as well. However, when people park and leave their cars, security officers can only locate the owner of a car by calling the gate and exchanging the plate number and identification of the owner. Proposed Solution: In this scenario, we offer using a mobile application to remove any human intervention. In the proposed mobile solution, security officers carry a smart phone connected to campus intranet. They use the mobile application to take a picture of the plate of the car and send it to the central server for identification and recognition of the plate number. The central server applies image processing techniques to extract the plate number. After determining the number, the central server communicates with the registration information system and pull up the identification details of the owner end sends them to the mobile application on the smart phone.

Implementation Details: In the proposed service-oriented architecture, the heavy work is done by the central server. Thus, we can save mobile device\\\'s resources. In the work, we implement the image processing as a service at the central server. Thus, mobile application uses this service for the identification details by sending a plate picture. The central server has two main modules: Image Processing and Identification Retrieval. In the Image Processing module, we identify and extract the plate number as text from the given picture. In the Identification Retrieval module, we query the car registration database with this plate number to find the owner's details. Then, the central server sends this piece of information to the requesting mobile device. In this paper we focus on the Image Processing module and test it performance. The promising results support the success and feasibility of the proposed architecture.

There several different approaches to recognize the plate number [1,2,3]. However, in these work they mostly assume that car is moving and a video recorder record the moving car. Thus, they try to extract the frames including plate number. However, in our case, car is

stationary and we have a picture of the plate. Therefore, our approach is much more direct. First of all, we created an image database including plates printed by various fonts. We collected these images from the cars park in the Atilim University campus. Each image is cropped such that each single image in the database holds only a single number or a character. Then using Matlab [4], we extracted their features according to Scale-invariant feature transform (SIFT) [5] and Speeded Up Robust Features (SURF) [6] algorithms. Thus we have a feature database for numbers and characters printed on plates in various fonts. After then, when a plate image is input, the proposed algorithm first identifies the plate in the picture. This section of the image is cropped to investigate further. Calculating the distances between characters and numbers in the cropped image we split the image such that each new image holds a number or a character only. In the last step of the algorithm we calculate the match points between the given number or character and the raining set according to SIFT and SURF. Using a voting scheme, we categorize the image and integrate the resulting plate. In the experiments of the proposed method, we observed that we can extract the correct plate at a very high probability. We think that it is due to using two important feature extraction algorithms together to decide a match. As a future work, we would like to deploy the proposed algorithm on a Android based mobile phone so that an integrated solution would be ready to be used in Atilim University.

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Determining firm logos using image processing techniques on a mobile device to aid blind people

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1. INTRODUCTION

According to the Merriam-Webster Dictionary, logo is "a symbol that is used to identify a company and that appears on its products" [1]. Logo recognition is one of the well known image processing problems faced in many different areas of applications [2,3,4,5,6,7,8,9]. Some researchers use the vehicle logos to describe the vehicle brand [2], some researchers exploit the logos on the printed documents to classify them [3,4,5], and even some researchers benefit logo display times in the determination of the key moments of a game in a TV broadcast [6].

As the variations in the applications, a variety of different image processing techniques have been proposed to solve this problem successfully. In some studies, by using color histogram information of logos which can be considered as colored objects, a method based on edge detection is proposed [5]. Similarly in another study, a method to identify limiting the rectangular shapes in the logo area is proposed [7]. In another study, exploiting low-level gradient channels to identify quickly the logos has been proposed [8]. In order to identify logos from different angles solutions based on SIFT have also been proposed [9]. Similarly for recognition logos in rotated images a further method is based on identifying the logo components are provided in [10].

2. PROBLEM DEFINITION

Assume that you are blind and would like to have lunch in a nearby shopping center. You arrive the food court and would like to know which fast food companies are around you. Now, you have to ask help from someone and memorize all these shop locations for the next visit. Whenever a new fast food shop opens or whenever you visit a new shopping center you need to ask and memorize again.

Nowadays, mobile devices such as smart phones or tablet PCs are used widely in solving daily life problems. Using the example problem as a motivation, we propose a new application to detect and recognize the logos used in a food court of a shopping center. Thus, the logo recognition problem can be defined as: "detecting and recognizing the firm logos in a food court by using a mobile device and speak out their names to a blind or vision impaired person".

3. THE PROPOSED SOLUTION AND IMPLEMENTATION DETAILS

We have a number of steps for solving the logo recognition problem has three main phases. In the pre-processing phase, the clip that a mobile device records is examined and frames are extracted as images. In the second phase, these images are processed to extract their features and these features are compared with the features of the logos stored in the logo database. A voting system evaluates the matching of a given image to the known logos. In the last phase of the algorithm, name of the determined logo is read to the user.

The proposed solution is implemented using MATLAB [11]. The details of the solution are provided below.

3.1 Creating Training Logo Database
To have a training set, we have recorded videos of logos at food courts of various shopping malls located at Ankara, Turkey. We have recorded videos from 9 different angles and relative distance to the logos as shown in Fig. 1. Then, we extract a number of logo images from these videos and label them according to the firm name. We use Speeded Up Robust Features (SURF) [12] technique to detect feature points and extract SURF descriptors in each image. We build an index based on k-dimensional tree (KD tree) [13] to store feature vectors of feature points and their descriptors. Thus, we have a logo database holding feature vectors and names of logos.

3.2 Comparing Frames with Logo Database
A mobile application is initiated by the user to record surroundings. As the video is recorded, the application extracts frames and compares them against the training data set. To do so, we first create a feature vector from the given frame as explained above using the SURF technique. Following that, we compare this vector with the stored vectors in the KD tree. The comparison counts the number of matched feature points between the test and training images and normalized it according to the total number of feature points in the given vectors. Since we have more than one test image for a single logo we calculate the total matched points for each logo. Thus, we use each test image as a voter. Lastly, if the voting is higher than a threshold value determined by the system, we select the logo label with the highest matching point as the candidate winner. We consider a candidate winner as a final winner if it wins the voting in three consecutive frames.

4. PERFORMANCE TESTS AND RESULTS

We have collected 9 different versions of 5 logos from 4 different shopping malls. Total number of videos is 180 and average duration of each is 15 seconds. We have prepared Training Logo Database including 72 samples from each logo which makes 360 samples on total. To test the success of the proposed algorithm we select randomly 10 videos for each logo and observe the recognized logo with respect to the given logo video. The results in Table I are given in percentage of the successfully recognized logo number to the total test number. We further report the ratio of mis-classification incidents and unclassified cases. In the discussion section, we present some justifications about the reported results considering the given videos and Training Logo Database.

5. CONCLUSIONS

As a conclusion, we can argue that the proposed algorithm is able to recognize the logos in the given videos with an high success ratio as much as 80%. Even the videos are recorded from different angles and distance with respect to the logos and under different lighting conditions and noise levels, the proposed algorithm manages to determine the logos embedded in the videos successfully. Secondly, we observe that the computation takes considerably less time such that the results could be reported near real time.

Efficient Data Gathering in WSN with a Range Constrained Mobile Relay

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In Wireless Sensor Networks (WSN), Mobile Relay (MR) is used to collect data from the sensors dispersed in a region. Sensors sense the surrounding environment and record the measurements into their memory. MR has some range constraint which limits the traveling distance of MR in the region where the sensors are located. In this paper, we proposed a Genetic Algorithm (GA) based method to direct MS in such a way that the amount of the data gathered from the sensors are maximized for a given range value. Since the amount of data collected in the memory of each sensor is dynamically increasing with individual sensory rate, this problem brings out different challenges compared to well-known problems such as, Traveling Salesman Problem (TSP) and Vehicle Routing Problem (VRP). Two different mutation algorithms -one that mutates within parent sensor nodes, another that mutates using the entire sensory field- are implemented and compared. As for the crossover, since the sensory data values dynamically change with time, we had to modify some known crossover functions to come up with a suitable one. We have simulated the proposed method and obtained promising results under different simulation and algorithm settings.

1. INTRODUCTION

Wireless Sensor Networks (WSN) and their challenges are studied in depth due to its popularity [1][2][3][4]. There are many different data collection approaches used which can be classified into two main categories according to the sink mobility: Static Sink (SS) and Mobile Sink (MS). When SS is implemented all the sensors in the network should route their data to the SS by using some wireless communications methods. On the other hand, if MS is chosen, MS itself visits the sensors and collects data directly from each sensor. MS can be categorized according to their data gathering function. If MS is collecting and transferring the data to a remote central, it is a Mobile Sink [1]. However, in some cases mobile element

visiting sensors is not a sink at all but it can collect data and transfer it to a SS. Thus, this kind of mobile element is called Mobile Relay (MR) [1].

In this work, we focus on data collection with a MR. We propose a method to produce a schedule for the MR to visit sensors such that it can collect maximum amount of data at the end of its tour.

2. PROBLEM DEFINITION

We assume that sensors are located in a grid topology and their locations are known. SS is located in the middle of the grid. There is a single MR to collect the sensory data. MR's trip should start from and end in the SS. Sensors have infinitive memory so that there is no memory overflow. Sensors have a constant sensing rate. MR velocity is fixed and data transfer time between MR and sensors is negligible. MR can travel at most according to the given travel range.

The problem is to prepare a sensor visiting schedule for MR such that it can collect maximum amount of data from the sensors and transfer them to the SS at the end of the tour. We name this problem as Maximum Data Gathering by a MR with Limited Range (MDGMR/LR).

4. MAXIMIZING GATHERED DATA

We have developed a solution based on the GA for the MDGMR/LR problem. Details of the proposed solution are provided below.

4.1 Schedule Validation

When a sensor visiting schedule is produced by the proposed method it needs to be validated according to the given assumptions and the constraints. For example, the total tour length of the schedule must be less than or equal to the given range of the MR. As another example, identical tours should be eliminated in the population as well.

4.2 Preparing Initial Population

The initial population for the GA is produced selecting sensors randomly. As the number of sensors depends on the tour length each individual can have different number of sensors. Therefore, we validate each individual using the schedule validation algorithm discussed above. Total number of individuals in the initial population is a GA parameter to the system. After schedule validation, we are ready to continue with the next GA phase.

4.3 Applying Crossover

Whenever two pairs are selected to produce off-springs, we apply following crossover methods.

In the first method single point crossover is applied. But since sensors continue to gather data continuously, and the position in the tour directly affects the data collected by the sensor, ordering of two parents are taken as crossover. After the ordering is formed, all the necessary calculations and timeframe limitations are applied as validation.

The second method employs two-point crossover. The problems which arise in one-point crossover are also seen in this method. So the crossover only done using the ordering of the parents, then the offspring fitness is calculated from scratch.

4.4 Applying Mutation

Each off-spring is undergone the mutation process. There were two similar mutation processes that are applied to this problem. Both employed the switching of the individual sensors in a tour. In the first mutation method we only chose sensors from parenting tours. In the second one, we chose sensors from all the available ones, regardless of their existence in the parent tours.

4.5 Selection of Candidates for Next Generation

In this phase we select new members of the next population among the parents and the off-springs according to the fitness value. We eliminate the individuals with low fitness value.

4.6 Determining Fitness Value

Fitness value is the amount of data that can be gathered at the end of the given schedule.

5. CONCLUSIONS

In this work we focus on the data gathering in WSN using a MR with a limited range. We have adapted the GA to solve this problem and implemented the solution. We have conducted various experiments to observe the impacts of the simulation and GA parameters on the behavior of the proposed methods. The results show that under different simulation settings, the proposed method produces efficient schedules to collect maximum data.

Differential Search Algorithm with Levy Flight

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Keywords: differential search algorithm, levy flight

In solution of optimization problems, metaheuristic algorithms inspired from nature widely took place. These algorithms (e. g. Cuckoo Search, Bat, and Artificial Bee Colony) imitate movement behaviour of superorganisms to obtain optimum solution. One of recent naturally inspired algorithm, differential search algorithm has got successful results on many common test problems. In this algorithm, a type of random walk, Brownian motion is applied to simulate migration of superorganism which looks for food.

In this paper, instead of Brownian motion another random walk model, Levy flight is integrated with differential search algorithm to gain angle to search path. New algorithm is compared to the original DS algorithm by testing on optimization test problems, rastrigin, rosenbrock and sphere.

Evaluation of Semantic Similarity Measurement Algorithms For Word Sense Disambiguation

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Keywords: word sense disambiguation, semantic similarity

Many words have more than one meaning. These words are called as polysemious. Word Sense Disambiguation (WSD) is the process of identifying the correct sense of a polysemious word in a context.

WSD algorithms measure the similarity between two words with different methods. In this article, Java WordNet Similarity (JWS) and DISCO are represented by giving the detailed information of their similarity measurement metrics.

The aim of this article is to evaluate the similarity metrics behind the research of WSD algorithms. Data is taken from Keymantic Search Engine Group for the evaluation of algorithms. There are two different datasets named as Unimore and IMDB. Unimore is a dataset containing keywords and elements related with university. IMDB is related with cinema. Each dataset consists of the sample keyword queries and data elements and attributes. A similarity value is measured using the similarity metrics in the JWS and DISCO for each pairs of keyword and data element.

The similarity metrics are evaluated by using these similarity values for all of the metrics with two different dataset. We have defined two different similarity metrics named as Sim1 and Sim2. Sim1 represents the synonym or the same words. It shows an IS-A relation, like the relation between "movie" and "film". Sim2 represents the hypernym or hyponym relations of the words. Hypernym relation represents "a word or phrase whose referents form a set including as a subset the referents of a subordinate term". Hyponym represents "a more specific term; a subordinate grouping word or phrase". The evaluation is made by determining three intervals and counting the true matches of the values in these intervals. The precision values are calculated with the proportion of true matches to the all matches. With all these processes the similarity metrics are evaluated.

Jiang-Conrath and Path similarity metrics have the highest precision values for Sim1 using IMDB. Leacoc-Chodorow, Path and DISCO are the similarity metrics have the maximum precision values for Sim1 using the Unimore dataset. For Sim2, most of the algorithms give lower precision values, only the Wu-and-Palmer method finds the words that have the Sim2 similarity.

Energy optimization of current limiting low power LED drivers

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As the world population increases, energy consumption also increases. Sources of energy that meets the needs are decreasing rapidly. As the necessity of finding alternative energy sources, to use more efficient systems and to save up is important. Therefore, the selection of lighting elements used is of importance. Nowadays, power LEDs, smaller than conventional lighting sources, durable and long lasting. Besides, one of the most important reasons to prefer LEDs over other systems is that they are much more efficient. Power LEDs high current draws. For this reason special drivers are needed. Power LED drivers, voltage limiting and current limiting are possible to classify. In this study, the analysis on limiting current LED driver was performed. Optimization in terms of LED light output efficiency 1W, 3W and 5W power driver circuit design have been carried out. Subsequently, the efficiencies of these driver circuits were determined and the data were tabulated.

Determination power correction parameters of CCM Buck and DCM Buck Boost LED drivers for LED lighting applications

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Today, power LEDs have properties of durability, long-life, and high efficiency. Due to this reason, they are widely used for lighting applications. Because LED drivers for lighting applications are connected to the electricity distribution network, they must comply with the terms of some power. Only in this way, the harmonic distortion between the AC mains voltage and current and displacement factor can be maintained as low as possible. Today, power supplies used for lighting applications in Europe are determined in accordance with EN / IEC 61000-3-2 standards. These standarts includes power factors and total harmonic distortions. Considering these standards LED lighting applications in recent years, power factor correction (PFC) techniques have been developed. In this study, the buck-boost converter and buck converter structures were discussed. Simulations of unisolated active PFC Buck LED driver at Continuous Conduction Mode (CCM) and unisolated Buck-Boost LED driver at Discontinuous Conduction Mode(DCM) were prepared. According to the results of these simulations, the data of LED driver Power Factor (PF) and Total Harmonic Distortion (THD) were obtained. The results were examined in accordance EN / IEC 61000-3-2 standards.

Continous Time Linear and Nonlinear Signal Processing.

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Keywords: Signal,System, linear,nonlinear, signal processing, multi-plicative calculus.

Traditional signal processing systems, based on linear and nonlinear modelling principles face difficulties to meet present-day demands caused by large amount of signal data generated, transmitted and processed across the world. The target is to improve on processing time and accuracy while introducing a new research method.

This work focuses on direct processing method under system analysis aiming to solve differential equations with nonzero initial condition. These type of signal and system configurations have a wide range of applications in the analysis and processing of real-world examples, i.e noise, filter, audio etc. Accurate processing is not always easy. Accuracy in this work achieved by selecting the workspace in multiplicative calculus which enables direct processing. Different type of input signals applied to a sytem and processed to determine the accuracy at the output. Same work has been repeated with ordinary methods and results are tabulated.

Simulation tests confirm that the newly introduced method produce accurate results while using substantially less computation time. It also provides support for applying the new method in the field of continous time linear, nonlinear, constant or Gaussian type input signals for processing through systems described by ordinary differential equation.

Application of a Qualitative Occupational Safety Risk Assessment Model in North Cyprus Construction Industry

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The aim of this study was to apply and modify a qualitative occupational safety risk assessment model using fuzzy set theory in order to reduce occupational risks in the North Cyprus construction industry.

The occupational accidents that took place in North Cyprus construction industry during the years 2008-2013 were analyzed. The accidents were classified according to the type of work employees are doing at the construction site.

A previously developed risk assessment model was applied on construction sites and modified by using fuzzy set theory in order to best assess and reduce occupational safety risks in North Cyprus construction Industry.

Performance assessment of different search equations for artificial bee colony algorithm

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Keywords: Global Optimization, Artificial bee colony algorithm, swarm optimization

Artificial bee colony algorithm (ABC) is a swarm based meta-heuristic which mimics the foraging behavior of honey bee swarms. In this study, we present a comparative study of different search techniques, which have been used widely in ABC. The search equation, which controls the exploration and exploitation balance of the algorithm, guides the search in ABC. Using continuous benchmark problems, this study compares performances of seven different search equations. Results indicate that search techniques affect the performance of ABC.

An improved electromagnetism-like algorithm for team orienteering problem

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Keywords: Electromagnetism-like Algorithm, Team orienteering problem, Meta-heuristics

Team orienteering problem (TOP) belongs to the class of vehicle routing problems, in which m tours should be set to maximize the reward received from visiting a subset of customers and each tour is restricted to a predetermined limit. This study proposes an electromagnetism-like algorithm (EMA) for solving TOP. EMA is a relatively new physics-inspired meta-heuristic algorithm, which mimics the behaviors of charged particles in an electrical field. An improved version of EMA is introduced and compared with the traditional version. Computational results show that proposed algorithm outperforms the traditional one.

Performance Simulation of Gossip Relay Protocol in Multi-hop Wireless Networks

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Keywords: GRP, TORA, RTS/CTS mechanism, OPNET simulation, throughput.

The Gossip-Based Relay Protocol (GRP) is developed based on Ad Hoc On Demand Distance Vector Protocol (AODV) and proposed to increase the efficiency of package routing functionality in ad hoc networks through specific flooding scheme. This lightweight protocol reduced the collisions on the network. Request to Send / Clear to Send (RTS/CTS) mechanism is widely used in ad hoc environment with Temporarily Ordered Routing Algorithm (TORA) in order to eliminate collisions and allow access to the shared medium through proposed authentication methods. In this paper, TORA protocol with RTS/CTS mechanism is simulated and compared with proposed GRP in terms of specific performance metrics such as network throughput, end-to-end delay and message flooding rate over the network through OPNET simulation package in order to expose the optimal solution to increase overall network throughput in ad hoc environment.

Using Data Mining on Linked Data

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Semantic web is an extension of the current web that presents semantic data whereby machines and humans can work in collaboration. Linked data is one of the approaches used for acquiring a semantic integrity through bringing together datasets related to a data by creating semantic links between the webpages constituting the semantic web. Linked data allows gathering various data coming from different sources at a single service point. According to the Linked Data principle, the amount of data published in the web environment increases gradually. In the Linked Data network, data mining technology is used in the datasets included in the linked data cloud in order to search for the relations that may allow reaching the information among large-scale data and making predictions about the future. This study aims to put forward recommendations for enhancing the effectiveness of data mining processes on bibliographical sources by using the power of linked data.

Improving Accuracy of Recommender Systems with Simulated Annealing Based Bayesian Network

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Keywords: simulated annealing, bayesian network, recommender systems

Recommender systems assist users by making suggestions and providing information about products. This personalization of the web has been of immense benefits to users as we are faced with the problem of information overload. However in recommender systems there have been problems of data sparsity, the cold start problem, as well as other imminent drawbacks. Data mining algorithms has been applied in tandem as a way of proffering solutions to these problems.

In this paper we contribute to an improvement in the accuracy of recommendation systems by using an optimized Bayesian Belief Network algorithm. Several other algorithms have been used in this domain, however our research have proven to improve on the recommendation accuracy based on a standard recommender dataset. We have also tested our algorithm on some test datasets and recorded impressive results. A comparison of our result with other algorithms shows a statistically significant improvement in the recommendation accuracy.

Web Based Decision Support System using Analytic Hierarchy Process Method

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Keywords: Analytic Hierarchy Process, Decision Making, Internet, Web

AHP is a method which is introduced by Thomas L. Saaty in 1970 to solve complex decision making problems by separating into parts as objective, criteria, sub criteria and alternatives, and finding the result with the best alternative to be the solution of the problem.

In many specific decision making applications it is possible to find AHP as core unit. Because of its easily applicable nature, high success rate and short execution time, AHP is preferable by application developers. It is also possible to apply AHP to specific problems by using readily available tools of mathematical applications.

All steps of AHP is based on mathematics and achievement of result is based on demands, requests, needs and psychology of user. Technical data about a decision making process is used to create system and choices of user is used to achieve result.

The purpose of this project is to create a public general purpose decision making application which can be applied to any desired subject and can be used by any Internet user. In brief, the project enables AHP on computer where there is an Internet access. Application is written through browser based languages using Html, JavaScript and PHP, because these languages are efficient in execution and presentation of results.

Web Based Decision Support System can be created by any user who has enough technical data about a subject. The technical data includes all criteria (also sub-criteria), importance of criteria compared to each other and available options having the same criteria properties. Once the system is created, any other user can use the system by locating his/her own choices about provided criteria. As result, the system combines technical data and user choices to find best option for that user who determined the choices.

Kidney Segmentation from Abdominal CT Images by Using Connected Component Labeling Algorithm

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Abdominal Computer Tomography (CT) scan data are used in many clinical studies as a correct and efficacious help for diagnosis and treatment. Segmentation of viscera on abdominal imaging facilitates diagnosis and focusing on the areas of interest. Among abdominal imaging tasks, kidney segmentation is a difficult one given the proximity of different organs and the similarities between abdominal tissues.

This study proposes a fully automated approaches to kidney segmentation and discusses the degree of success of these .Data was obtained to imaging series from 30 patients in the FIrat University Medical Faculty Radio diagnostics Department archive system. The material consisted of CT images with 5 mm section thickness, acquired in the portal phase following the intravenous administration of contrast medium; they were all in the DICOM format.

The proposed methods essentially consist of three stages. Since the spine was used as reference in the study, the images were first treated to define the coordinates of the spine. The application of filters to the images provided a differentiation of closely connected intrarenal cortical and medullary areas and the clear delineation of the spine. In the second stage, kidney fields were obtained using the Connected Component Labeling (CCL). CCL is an algorithm that labels objects adjacent or confused together on the image and groups neighboring pixels together in a way to allow distinguishing objects. At the end of the clustering operation, each group on the image is numbered so as to represent one object. This allows to perform various operations by separating objects by their group number. In the last stage, the kidneys were segmented by applying different filters according to the method used to the imaging fields.

After all a manual segmentation was then performed by specialist physicians. The performance evaluation of the used algorithms was done based on the algorithm-based and the manual segmentation results. The criteria used to confirm the accuracy of the segmentation operation was those of the Zijdenbos similarity index (ZSI). ZSI is an assessment index based on the difference between the area segmented by the segmentation algorithms and the area segmented by a specialized physician, both represented in pixels. These assessments resulted in a success rate of 85.2 % for right kidney and 86.8 % for left kidney, respectively, by the CCL algorithms. This system is expected to be helpful both in clinical diagnosis and in medical training. Results indicate that the proposed segmentation procedure may be used to assist medical diagnosis and decision.

A pattern classification application for the effect of smoking on lung cancer

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Lung cancer, the lung tissue is a disease in which cells proliferate uncontrollably. This uncontrolled growth of cells invade surrounding tissues or organs other than the lungs can result in the spread. Smoking, lung cancer is the most common cause.

However, lung cancer, can be seen in non-smokers. In this study, smoking causes lung cancer, the positive or negative effect on the classification techniques were examined using data sets. As a set of data, The National Center for Biotechnology Information (NBC) also was used in the GDS3257 dataset.

Applied three different feature selection method on two different classification techniques were applied to the data. According to the results obtained classification techniques which have tried to explain that better.

Performance analysis of artificial bee colony algorithm for rule extraction

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In today\\\'s information age, data mining, also known as extracting logical and understandable information from raw data, is creating a significant competitive advantage. Artificial neural network structure is one of the commonly used techniques in data mining for extracting classification rules because of its high accuracy. However, black-box nature of artificial neural networks makes this technique insufficient in extracting clear and comprehensible rules from big data. In this study, artificial bee colony algorithm is used in accordance with trained artificial neural networks, in order to take advantage from the high accuracy of artificial neural networks and also to be able to extract comprehensible rules from them. Artificial bee colony algorithm is a metaheuristic method inspired by the intelligent foraging behavior of honey bee colonies. The original artificial bee colony algorithm is mainly used for continuous optimization problems, whereas in this study a binary artificial bee colony algorithm for 0-1 integer programming problems has been developed. Binary multilayer artificial neural network is trained on the output vector corresponding to an input vector and weights of the hidden layers are obtained. The output transfer function of the trained neural network is then used as the objective function for the binary artificial bee colony algorithm. The accuracy of the proposed algorithm is compared with other machine learning algorithms such as C4.5, DecisionTable, NBTree, PART and results show that proposed algorithm has comparatively high accuracy on several benchmark data sets

Real Time Power Distrubution System Modelling and Harmonic Estimation Using Neural Network

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The importance of power quality in Electrical systems increases with each passing day and has become an important criterion in energy system. The main factors affecting the quality of power are harmonics, flicker, transients, voltage sags (Sags), sudden voltage surges (Sweels) . The harmonics causes resonance, sudden trips, loss and so on and this problems adversely affect the quality of power . In this study THD_I values of residential and industrial zones were examined. Different ways are used for the analysis and the estimation of the harmonics. In order to get an estimate of the value of THD_I values Artificial Neural Networks were used. THD _I values were estimated with using this ANN model. With this method, accurate estimated values obtained. This estimated THD_I values can be used to selecting the required filter system. In this way, by reducing harmonic values, a significant improvement in power quality can be achieved. With the proposed ANN model, equipment that improve the power quality can be preselected while planning energy distribution systems. This model can be used for the planning the energy systems which has the high Power Quality. This ANN model can be used to estimate THD_I values in different systems .

Distance Education Studio Distribution Software Carried Out By Artificial Intelligence

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The studios, in which there are systems whose infrastructures are strong enough to make it easy to provide effective and efficient ways, are used in all the institutions implementing distance education courses. However, the number of these studios, which are created with the high cost, mostly do not meet all the needs of the institutions simultaneously. When current studios are required by the different units of the same institution, it becomes a difficult process to provide the studios with the institutions. Moreover, that the instructors demand studios for themselves at more or less the same hours show similarities and the fact that the common courses in different units have the same hours are the factors which make studio distribution difficult. In this study, it is targeted that studio distribution should be done according to specific priorities and by finding the optimal solution, the distribution process must be written as an artificial intelligence.

Comparison with different models of bending stress analysis of the cantilever beams under different profile section, materials and loads

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Keywords: beam, tensile and compressive stress, regression analysis, finite element method, artificial neural network

In this study, the constraints and requirements for the analysis are determined during the cantilever beam model by using 6 different lenghts and 4 different profiles with 6 different loads. The materials used in this study are 60 types. The bending stresses on a cantilever beam model are calculated. The results of emprical model are compared with the results of Regression Analysis (REGA), Finite Element Method (FEM), Artificial Neural Network (ANN) Model. In this work, 4 different method are used to shown the tensile, compressive and bending stresses and tested the accuracy of emprical model. The ANN model gives the best results. The Statistical error analysing methods are used to compare the emprical results and ANN predictions. The Levenberg-Marquardt (LM) is used the ANN with 12 two hidden layers to produce Absolute Fraction of variance R2 values approximately to 1 and the mean % errors and Root Mean Square Error (RMS) values are found to be very low. It can be used ANN model instead of emprical model. The ANN with an acceptable accuracy is used to determine the tensile, compressive and bending stresses. This study shows that ANNs can be used as an alternative method to determination of stresses on beams.

Comparison with different models of tensile and compressive stress analysis on a cantilever beam model

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In this study, the constraints and requirements for the analysis of the cantilever beam model are determined. According to 7 different lengths, 6 different profiles, 7 different cross sectional areas and 6 different loads and 60 different materials, tensile and compressive stresses on a Cantilever Beam Model are invegistated. The emprical model is compared with the Regression Analysis (REGA), Finite Element Method (FEM), Artificial Neural Network (ANN) Model. The tensile and compression stresses are modelled with 4 different methods and tested the accuracy of emprical model. The best results are obtained using ANN model. The emprical results and ANN predictions are compared by using statistical error analysing methods. The ANN with 18 two hidden layers using Levenberg-Marquardt (LM) model produce Absolute Fraction of Variance (R2) values approximately to 1 and the mean % errors and Root Mean Square Error (RMS) values are found to be very low. ANN model can be used instead of emprical model. The tensile and compression stresses are determined by the ANN with an acceptable accuracy. It is concluded that ANNs can be used as an alternative method to determination of stresses on beams.

A Novel Method for Islanding Detection of Distributed Generation Units

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Over the past decade renewable energy has been intensively developed and it generates lower pollution than do fossil fuels and nuclear generation systems. The new paradigm of distributed generation (DG) thus increases in technical importance and increases profits globally. In principle, DG is a small-scale generation unit installed to the load and connected to the grid, for selling or buying of energy.

Distributed Generation (DG) units such as photovoltaic generation, wind power generation, small gas turbine generation, fuel-cell generation, cogeneration and etc. operate in parallel with power distribution system. This parallel operation of a dispersed generation unit with the utility distribution system may bring about some critical problems, that is, difficulties and complications for the reliable and safe operation of both systems.
One of those problems is islanding. The islanding condition occurs when a portion of the utility system that contains both load and distributed resources remains energized while it is isolated from the remainder of the utility system. IEEE standard recommends disconnecting all distributed generators immediately after the formation of island. Islanding can be intentional or unintentional. Intentional islanding may be due to preplanned event such as maintenance and in case of an unintentional island, the DG should be disconnected within 2 s after the grid failure.

Islanding is generally defined as a situation where the power from utility is off, but one (or more) sections of the system still continues to have power flow through it as it still being energized by DG. This sectionalized area is called an island. Unintentional islanding refers to a formation of island due to faults on the utility side that result in the opening of the circuit breaker in the upper stream of the grid.

Fast and accurate detection of islanding is one of the major challenges in today's power system with many distribution systems already having significant penetration of DG as there are few issues yet to be resolved with islanding. Islanding detection is also important as islanding operation of distributed system is seen a viable option in the future to improve the reliability and quality of the supply.

Islanding detection schemes are commonly evaluated based on the Non-Detection Zone (NDZ). The NDZ corresponds to the range of active and reactive load-generation mismatches within the island in which the islanding detection approach fails to identify the islanding state. The islanding detection schemes can be grouped into two categories: remote and local.

Remote techniques are based on communication between the electric utility and the DG units. Despite the fact that remote techniques are reliable and effective, they suffer high implementation cost. This technique does not have NDZ and does not degrade the PV inverter power quality. In multi-inverter systems it is effective but expensive to implement (especially in small systems) and has a complicated communication technique.

Local islanding schemes can further be divided into active, passive and hybrid.
Active methods: It relies on injecting perturbations in the distribution system to facilitate significant changes in the power system parameters and hence allow easy detection of the island. Active techniques have small NDZ, but their operation results in degrading the power quality because they introduce perturbations in the voltage and/or current at predefined intervals which defeats the objective of having digital-grade power quality attribute as aimed in smart grid.

Passive methods: Passive islanding detection techniques are based on local measurements of power system parameters at the point of common coupling (PCC) of the DG. Passive methods detect islanding conditions by measuring changes in the electrical quantities at the DG output. Unlike active methods, passive methods are inexpensive, easy to implement due to reduced complexity and maintain the quality of power. However, passive methods are less effective compared to active methods in detecting island operation due to their large NDZ.

Hybrid methods: They are combinations of both active and passive schemes. They introduce perturbations through active methods only after the detection of the island by passive scheme and thus, reducing the amount of perturbations injected into the system. However, hybrid methods need longer time to detect the island compared to active and passive methods.

Existing active techniques are generally very effective in detecting islanding phenomenon, but have the significant disadvantage of requiring a direct influence on power system such as overcurrent, voltage quality and etc. Because the exported real and reactive power must be large enough to perfectly operate the over/under frequency relay for detecting islanding operation. Passive techniques can avoid this problem and are generally the least expensive to install, but they cannot be guaranteed to operate under all islanding condition.

In this paper, as an active technique for detecting the islanding, active and reactive power variation method of DG unit is proposed. The proposed new algorithm detects the islanding by distinguishing the differences in the system characteristic between those experienced when the DG unit is running in parallel with the utility supply and when it is operating independently.

The results show that the accuracy and speed of the proposed method are much better than other active islanding detection method.

A Comparison of Reinforcement Learning and Evolutionary Algorithms for Container Loading Problem

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Container Loading Problem (CLP) is a space utilization problem subject to various constraints. An example of it is the placement of containers in storage so as to minimize the waste of space. Other constraints that may be imposed include a certain loading order and an even weight distribution. This work explores the use of Reinforcement Learning (RL) for tackling CLP so as to minimize the waste of space while maximizing the number of containers. We have applied five different RL algorithms (Q-learning, TD-Lambda, Monte-Carlo, TDQ and SARSA) and two types of evolutionary algorithms (EA), Genetic Algorithm and Ant Colony Optimization, to solve this problem, and experimentally compared them based on completion time, space utilization, number of containers, and speed of convergence. For any set of parameters, each algorithm has been run 100 times. Comparisons of the average performance of RL algorithms without restriction to the number of containers and comparisons between RL and EAs with restrictions to the number of containers are summarized in tables. As to the convergence time of the RL algorithms without restriction to the number of containers, TD-Lambda leads in all the cases. In terms of the number of containers that can be packed into a storage yard when the number of containers is not restricted, all RL algorithms give approximately the same result, but Monte-Carlo has a slight edge. For the comparison of the performance of the GA and RL algorithms with restriction to the number of containers, GA is the fastest for smaller storage yard areas. Overall, however, TD-Lambda has been observed to be the best due to the combination of its speed of convergence, completion time and number of containers loaded. The results show that the RL approach which has not been previously paid enough attention to for solving CLP is a viable alternative.

Signal Analysis of Optical Sensor System Components

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Optical communications systems, which are capable of interacting with conventional systems and play an important role in communication technologies, are becoming more popular with time. Minor losses and high channel capacities of these systems make them the preferred choice in optical communication systems with high data transmission rates.

In this study, the performance of some optical circuit elements such as optical directional couplers, optical fiber sensors and optical amplifiers, which are widely used in optical communication systems, are analyzed. The characteristic properties and data transmission of the circuit elements are investigated. The factors which require special attention in designing the optical circuit elements are determined.

FTTX Technology and its Applications in Optical Communication Systems

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In this study, fiber optical cable structure, principles of optical communication systems, advatages and disadvantages of fiber optical cables in the communication industry have been investigated. Information about active and passive optical network architectures in the FTTX, Fiber to the X, applications have been given and technical equipments used have been studied. Multiple access methods which became increasingly important recently have been studied as FTTX applications. Next-generation access networks in the optical communication systems have been examined and architectures of the destination of the letter X in the FTTX have been illustrated. GPON FTTH and GPON FTTB simulations of passive optical networks in FTTX applications have been performed on the OptiSystem 7.0 simulation software and the results were analyzed.

In Search of Optical Properties of Mediterranean Sea Causing Errors in Ocean Color Algorithms

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The two main algorithms used by NASA to estimate concentration of chlorophyll-a (chl-a) are OC2 and OC4. These algorithms are empirical algorithms derived from comparison of global in-situ and radiometric readings of SeaWiFS satellite. It is a well known and common failure to estimate chl-a value in case 2 waters for these algorithms. On the other hand, for case 1 waters it has been accepted that especially the newer of the two algorithm, OC4, should work without any major error. In various studies it has been shown that OC4 is overestimating chl-a values for Mediterranean, which has case 1 water, in the order of two times. Some studies suggested new modified regional OC algorithms for this sea; Bricaud et al. (2002), D'Ortenzio et al. (2002), Sancak et al. (2005). However, the optical background causing the error was not fully analyzed yet. In this study, with the help of various in-situ optical measurements of the Mediterranean Sea, the reason for this error has been searched and discussed.

Exact Solution procedure for Unidirectional Loop Network Problem

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This paper addresses of the layout problem occurs in flexible a manufacturing system which has a unidirectional loop layout. The problem arising in this layout is finding the assignment of stations to available locations to minimize the total flow times distances per unit time. The problem is known to be NP-Complete. In this paper, a special branch and bound method are proposed to solve layout problem. The method avoids the use of the quadratic assignment problem which is a traditional model of the unidirectional layout problem.

An Overview on Damage Indices Applied on the Structures Subjected to Cyclic Loading

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An overview on damage indices applicable to structures subjected to cyclic, earthquake or monotonic loading is submitted. During their service life, structures accumulate damages resulting from the actions of various environmental cyclic loading and impacts. The cumulative damage causes changes in the properties of the structural system, especially in case of an earthquake. The use of a damage index (D) enables the quantification of the structural damage caused by earthquakes for each structural element.

Existing damage indices are based on different characteristics such as the number of cycles (Palmgrem-Miner, Shah, Oh and Chung), stiffness (Lybas, Roufaiel and Meyer), ductility (Park, Gupta, Bertero) and energy (Banon, Darwin, Park, Meyer, Sadeghi). Within the energy based damage indices, the damage index proposed by Meyer is oversensitive to the number of cycles and is, therefore, not applicable in case of loading comprising repeated cycles. Damage index proposed by Meyer is criticized by Sadeghi, Garstka and Fardis. The damage index recently proposed by Amziane is applicable to reinforced concrete (RC) structures under uniaxial bending with axial load. It is not applicable for biaxial bending moment with axial loading cases.

The energy based damage index "D" proposed by Sadeghi is applicable to structures subjected to earthquake, cyclic or monotonic (push over) loading. This proposed damage index has been validated by experimental data obtained in laboratory tests. This damage index is a practical means for determining whether to repair or demolish structures after earthquake. It can also be employed in the design of new structures as a design parameter to define the acceptable limit of damage as set by building codes. This damage index reaches exactly 100% at failure, while starting from 0% at the intact state of the structure. It considers the real temporal sequence of loading cycles, gives a regular distribution adapted to different phases of damage up to failure and can be applied to structures under both cyclic and monotonic loading in any direction. The goal of this paper is to present the methods for assessment of the global and local damages of structures based on the local degradation of materials under cyclic loading in any direction.

In this paper, the advantages and disadvantages of the existing damage indices are compared and the energy based damage indices are recommended to evaluate structural damage.

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