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Contents

MARKOV, M. On The Vertex Separation of Maximal Outerplanar Graphs (pp. 207–238)

BORISSOV, Y., M. H. LEE, S. NIKOVA. On the Asymptotic Behavior of the Ratio Between the Numbers of Binary Primitive and Irreducible Polynomials (pp. 239–248)

SHTRAKOV, S. Essential Arity Gap of Boolean Functions (pp. 249–266)

SAVIĆ, A. D. TOŠIĆ, M. MARIĆ, J. KRATICA. Genetic Algorithm Approach for Solving the Task Assignment Problem (pp. 267–276)

RADENSKI, A. Patterns for Active E-Learning in CMS Environments (pp. 277–294)

POLIMIROVA-NICKOLOVA, D. L. Study of the Information Security of File Objects under Information Attacks with a Record of Effect of the Methods of Compression (pp. 295–312)

Abstracts

ON THE VERTEX SEPARATION OF MAXIMAL OUTERPLANAR GRAPHS

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ACM Computing Classification System (1998): G.2.2

Key words: algorithmic graph theory, computational complexity, vertex separation, linear layout, layout stretchability, maximal outerplanar graph.

Abstract. We investigate the NP-complete problem VERTEX SEPARATION (VS) on Maximal Outerplanar Graphs (mops). We formulate and prove a “main theorem for mops”, a necessary and sufficient condition for the vertex separation of a mop being k . The main theorem reduces the vertex separation of mops to a special kind of stretchability, one that we call affixability, of submops.

ON THE ASYMPTOTIC BEHAVIOR OF THE RATIO BETWEEN THE NUMBERS OF BINARY PRIMITIVE AND IRREDUCIBLE POLYNOMIALS*

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ACM Computing Classification System (1998): F.2.1.

Key words: finite fields, primitive and irreducible polynomials.

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Abstract. In this paper, we study the ratio $\theta(n) = \frac{\lambda_2(n)}{\psi_2(n)}$, where $\lambda_2(n)$ is the number of primitive polynomials and $\psi_2(n)$ is the number of irreducible polynomials in $GF(2)[x]$ of degree n . Let $n = \prod_{i=1}^{\ell} p_i^{r_i}$ be the prime factorization of n . We show that, for fixed l and r_i , $\theta(n)$ is close to 1 and $\theta(2n)$ is not less than $2/3$ for sufficiently large primes p_i . We also describe an infinite series of values n_s such that $\theta(n_s)$ is strictly less than $\frac{1}{2}$.

ESSENTIAL ARITY GAP OF BOOLEAN FUNCTIONS

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ACM Computing Classification System (1998): G.2.0.

Key words: essential variable, identification minor, essential arity gap.

Abstract. In this paper we investigate the Boolean functions with maximum essential arity gap. Additionally we propose a simpler proof of an important theorem proved by M. Couceiro and E. Lehtonen in [3]. They use Zhegalkin's polynomials as normal forms for Boolean functions and describe the functions with essential arity gap equals 2. We use instead Full Conjunctive Normal Forms of these polynomials which allows us to simplify the proofs and to obtain several combinatorial results concerning the Boolean functions with a given arity gap. The Full Conjunctive Normal Forms are also sum of conjunctions, in which all variables occur.

GENETIC ALGORITHM APPROACH FOR SOLVING THE TASK ASSIGNMENT PROBLEM*

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ACM Computing Classification System (1998): G.1.6.

Key words: evolutionary approach; genetic algorithms; assignment problems, multiprocessor systems, combinatorial optimization.

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Abstract. In this paper a genetic algorithm (GA) for the task assignment problem (TAP) is considered. An integer representation with standard genetic operators is used. Computational results are presented for instances from the literature, and compared to optimal solutions obtained by the CPLEX solver. It can be seen that the proposed GA approach reaches 17 of 20 optimal solutions. The GA solutions are obtained in a quite a short amount of computational time.

PATTERNS FOR ACTIVE E-LEARNING IN CMS ENVIRONMENTS

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ACM Computing Classification System (1998): K.3.2.

Key words: Course management systems; active learning; pedagogical patterns.

Abstract. The proliferation of course management systems (CMS) in the last decade stimulated educators in establishing novel active e-learning practices. Only a few of these practices, however, have been systematically described and published as *pedagogic patterns*. The lack of formal patterns is an obstacle to the systematic reuse of beneficial active e-learning experiences. This paper aims to partially fill the void by offering a collection of active e-learning patterns that are derived from our continuous course design experience in standard CMS environments, such as Moodle and Blackboard. Our technical focus is on active e-learning patterns that can boost student interest in computing-related fields and increase student enrolment in computing-related courses. Members of the international e-learning community can benefit from active e-learning patterns by applying them in the design of new CMS-based courses – in computing and other technical fields.

STUDY OF THE INFORMATION SECURITY OF FILE OBJECTS UNDER INFORMATION ATTACKS WITH A RECORD OF EFFECT OF THE METHODS OF COMPRESSION

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ACM Computing Classification System (1998): D.4.6.

Key words: Information Security, Information Attacks, Methods of Compression, File Objects, Risk Assessment.

Abstract. This report examines important issues pertaining to the different ways of affecting the information security of file objects under information attacks through methods of compression. Accordingly, the report analyzes the three-way relationships which may exist among a selected set of attacks, methods and objects. Thus, a methodology is proposed for evaluation of information security, and a coefficient of information security is created. With respects to this coefficient, using different criteria and methods for evaluation and selection of alternatives, the lowest-risk methods of compression are selected.