A NECESSARY AND SUFFICIENT CONDITION FOR THE EXISTENCE OF AN \((n, r)\)-ARC in PG\((2, q)\) AND ITS APPLICATIONS

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Key words: \((n, r)\)-arcs, projective plane, linear codes.

Abstract. Let \(q\) be a prime or a prime power \(\geq 3\). The purpose of this paper is to give a necessary and sufficient condition for the existence of an \((n, r)\)-arc in PG\((2, q)\) for given integers \(n, r\) and \(q\) using the geometric structure of points and lines in PG\((2, q)\) for \(n > r \geq 3\). Using the geometric method and a computer, it is shown that there exists no \((34, 3)\) arc in PG\((2, 17)\), equivalently, there exists no \([34, 3, 31]_{17}\) code.

APPLICATION OF SERVICE-ORIENTED ARCHITECTURE IN SOFTWARE QUALITY MANAGEMENT

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Key words: Service-oriented architecture, software quality management, quality and test management tools, application lifecycle management, software quality, services.

Abstract. This article examines the quality management software processes and offers a model for their automation based on Service-oriented Architecture. The prerequisites for creating such a solution are analyzed, as are existing automated tools in this area. The possibilities of service-oriented architecture are presented along
with its advantages in the context of this research on developing a quality management system that will operate effectively against defined requirements, consistently and regardless of the used platform, database management system (DBMS) and other technological features of the applications.

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A LINEAR TIME ALGORITHM FOR COMPUTING LONGEST PATHS IN CACTUS GRAPHS
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Abstract. We propose an algorithm that computes the length of a longest path in a cactus graph. Our algorithm can easily be modified to output a longest path as well or to solve the problem on cacti with edge or vertex weights. The algorithm works on rooted cacti and assigns to each vertex a two-number label, the first number being the desired parameter of the subcactus rooted at that vertex. The algorithm applies the divide-and-conquer approach and computes the label of each vertex from the labels of its children. The time complexity of our algorithm is linear in the number of vertices, thus improving the previously best quadratic time algorithm.

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A NEW METHOD FOR COMPUTING THE ECCENTRIC CONNECTIVITY INDEX OF FULLERENES
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Abstract. The eccentric connectivity index of the molecular graph \( G, \xi^e(G) \), was proposed by Sharma, Goswami and Madan. It is defined as \( \xi^e(G) = \sum_{u \in V(G)} \deg_G(u) \text{ecc}(u) \), where \( \deg_G(x) \) denotes the degree of the vertex \( x \) in \( G \) and \( \text{ecc}(u) = \max\{d(x, u) \mid x \in V(G)\} \). In this paper this graph invariant is computed for an infinite class of fullerenes by means of group action.

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AN ALGORITHMIC APPROACH TO INFERRING CROSS-ONTOLOGY LINKS WHILE MAPPING ANATOMICAL ONTOLOGIES
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Abstract. The ontology, anatomical ontology, anatomy mapping, anatomical ontology mapping, probability, scoring, external knowledge source, algorithm, graph, directed acyclic graph.
Abstract. Automated and semi-automated mapping and the subsequently merging of two (or more) anatomical ontologies can be achieved by (at least) two direct procedures.

The first concerns syntactic matching between the terms of the two ontologies; in this paper, we call this direct matching (DM). It relies on identities between the terms of the two input ontologies in order to establish cross-ontology links between them.

The second involves consulting one or more external knowledge sources and utilizing the information available in them, thus providing additional information as to how terms (concepts) from the two input ontologies are related/linked to each other. Each of the two ontologies is aligned to an external knowledge source and links representing synonymy, is-a parent-child, and part-of parent-child relations, are drawn between the ontology and the knowledge source. These links are then run through a set of simple logical rules in order to come up with cross-ontology links between the two input ontologies. This method is known as semantic matching. It proves useful and reasonably accurate; in this paper, we call it the source matching predictions (SMP) procedure.

Not all cross-ontology links that semantically (i.e., from a biological/anatomical standpoint) exist between the two input ontologies will be discovered by either DM or SMP. To improve the discovery of cross-ontology links we propose a novel algorithmic procedure which involves a probability-like scoring scheme. This procedure is called the child matching predictions (CMP) procedure. Describing the DM, SMP, CMP procedures, and particularly the CMP procedure in formal terms is the main goal of this paper.

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VARIABLE NEIGHBORHOOD SEARCH FOR THE FILE TRANSFER SCHEDULING PROBLEM
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Key words: Metaheuristics, scheduling, file transfers, variable neighborhood search, optimization.

Abstract. In this paper a file transfer scheduling problem is considered. This problem is known to be NP-hard, and thus provides a challenging area for metaheuristics. A variable neighborhood search algorithm is designed for the transfer scheduling of files between various nodes of a network, by which the overall transfer times are to be minimized. Optimality of VNS solutions on smaller size instances has been verified by total enumeration. For several larger instances optimality follows from reaching the elementary lower bound of a problem.

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AN ANALYSIS OF COLOUR SEMANTICS IN ART IMAGES*
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Key words: Colour Theories, Content-based Image Retrieval, Metadata Extraction, Cultural Heritage.

*This article presents the principal results of the Ph.D. thesis A Novel Method for Content-Based Image Retrieval in Art Image Collections Utilising Colour Semantics by Krassimira Ivanova (Institute of Mathematics and Informatics, BAS), successfully defended at Hasselt University in Belgium, Faculty of Science, on 15 November 2011.

Abstract. The article briefly presents the results achieved by the PhD project R-1875 “Search in Art Image Collections Based on Colour Semantics”, Hasselt University, which finished successfully. The main goals of this work were to provide a detailed analysis of the colour theories, especially on existing interconnections in successful colour combinations, as well as to formalize them in order to implement automated extraction from digitized artworks.