

that include only optically isotropic translucent objects and media. This work is devoted to a new material of optically anisotropic semitransparent (absorbing or colored) objects like crystals, crystalline aggregates. The study allows to extend the diversity of objects included into virtual reality scenes.

A new algorithm is developed to the following 2 statements.

1. Given: parameters of two optically anisotropic semitransparent media, parameters of light ray falling onto a boundary between the media. To compute: parameters of all reflected (up to 2) and refracted (up to 2) rays.

2. Given: parameters of an optically anisotropic semitransparent medium, parameters of light ray coming into a medium. As a rule, it is a reflected or refracted ray. To compute: parameters of this ray in an interior point.

Object-oriented data as prefix rewriting systems

A.E. Gutman

A new approach is suggested for representing and analysing object-oriented data by means of rewriting systems. A deterministic longest-prefix rewriting system is a rewriting system such that there are no rewriting rules $X \rightarrow Y$, $X \rightarrow Z$ with different Y , Z and only longest prefixes of words are subject to rewriting. Given such a system, analogs are defined and examined of some concepts related to object-oriented data systems: inheritance of classes and objects, instances of classes, class and instance attributes, conceptual dependence and consistency, conceptual scheme, types and subtypes, etc. A special attention is paid to the effective verification of various properties of the rewriting systems under consideration. In particular, algorithms are presented for answering the following questions: Are all words finitely rewritable? Do there exist recurrent words? Is the system conceptually consistent? Given two words X and Y , does X conceptually depend on Y ? Does the type of X coincide with that of Y ? Is the type of X a subtype of that of Y ? (See the following file for details: http://math.nsc.ru/LBRT/g2/files/OOD_as_PRS.pdf).

Information visualization based on hierarchical graph models

V.N. Kasyanov, E.V. Kasyanova, T.A. Zolotuhin (Invited talk)

Visualization is a process of transformation of large and complex abstract forms of information into visual form, strengthening user's cognitive abilities and allowing them to take the most optimal decisions. Graphs are the most common abstract structure encountered in computer science and are widely used for abstract information representation. Any system that consists of discrete states (or sites) and connections between them can be modeled by a graph. In the paper, we consider a practical and general graph formalism called hierarchical graphs and graph models. It is suited for visual processing and can be used in many areas where the strong structuring of information is needed. We present also the Higes and Visual Graph systems that are aimed at supporting of information visualization on the base hierarchical graph modes. Higes is a visualization tool and an editor for attributed hierarchical graphs and a platform for execution and animation of graph algorithms. Visual Graph was developed to visualize and explore large hierarchical graphs that present the internal structured information typically found in compilers.

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On some combinatorial optimization problems in a connection with the off-line analysis and recognition of sequences

A.V. Kel'manov

The research subject of the report includes discrete optimization problems induced by actual data analysis, pattern recognition and classification problems. In addition, the problems considered in the report are important and take place, in particular, in computational geometry, in approximation theory, in mathematical programming and in statistics. The purpose of this report is to review new results on the studying of computational complexity of these problems, and on the substantiating polynomial algorithms with performance guarantee for solution to these problems. The main results are following. Some new (previously not studied) and known (weakly studied) problems, and also generalizations and special cases