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Altered fingerprints analysis based on sift keypoints  
*Adina Petrovici and Corneliu Lazar*



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Fingerprint recognition is used in a wide range of applications and it is considered a very challenging pattern recognition problem. Fingerprint systems still have security issues regarding individuals who are trying to fool or evade the identification system by using fake fingerprints or altering their own fingerprints. Using the SIFT operator, a reduced set of keypoints is extracted at different scales that are located on singular points and on altered regions in an excessive number. A new method is proposed for altered fingerprints analysis by applying SIFT on fingerprint images.

**Key words:** biometrics, SIFT, keypoints, fake fingerprints, altered fingerprints.

*2010 Mathematics Subject Classification: 68T10, 68U10.*

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## Survey of Data Clustering Algorithms *Corina Cîmpanu and Lavinia Ferariu*



[Full text](#)

Unsupervised grouping of patterns remains a challenging problem, especially because this task should be performed without rich a priori information, and sometimes even without knowing the number of categories. Given the intense research effort in field, this paper aims to provide an updated survey of the most important clustering algorithms. Recent approaches are introduced in comparison with traditional methods involving similar category of clustering policies, and key open issues are outlined. The paper also discusses the opportunity of evolutionary algorithms within the context of data clustering, together with helpful exemplifications.

**Key words:** data analysis, clustering algorithms, classification, evolutionary algorithms

*2010 Mathematics Subject Classification:* 62H30, 68T10

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## A Hybrid Genetic Algorithm for A Combinational Circuits Partitioning Problem

*Adrian Vilcu*



[Full text](#)

This paper presents an efficient hybrid genetic algorithm for solving the partitioning problem of combinational circuits for pseudo-exhaustive testing. This study defines a mathematic model and an objective function for the partitioning problem, the basic components of the genetic algorithm - specific operators for mutation and crossover are described, the way of local hybridizing it with an efficient heuristic algorithm (forward search technique) acting as a hyper-mutation operator and the experimental results are compared to those given by other existing heuristics on known literature benchmarks.

**Key words:** partitioning VLSI circuits, VLSI testing, graph partitioning, heuristic algorithms, evolutionary algorithms

*2010 Mathematics Subject Classification:* 68M99, 68W35.

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## Visualization Techniques for 3D Multimodal Medical Datasets: A Survey

*Paul Corneliu Herghelegiu*



[Full text](#)

Accurate medical diagnosis based on images acquired with various medical imaging techniques commonly requires multiple images inspection. These images can be obtained using the same scanning technique but with different scanning parameters. Alternatively, the physicians can use images obtained with different scanning equipments. The visualization of multimodal data in the same rendering scene currently represents a growing avenue of research, with multiple results. This paper aims to give the reader an overview of recent innovations in multimodal visualization techniques used nowadays by physicians in their clinical practices. Several types of data combining methods are presented, such as CT-MRI, MRI-fMRI, CT-SPECT or 3D ultrasound-CT or MRI, each one being suited for a typical type of pathology. Since the structure of the combined data usually presents significant differences, there is no general method that can be applied. The theoretical concepts of combining the mentioned types of data are presented along with their use in the medical imaging field. A short introduction to commonly used medical scanning techniques is also presented.

**Key words:** multimodal visualization, medical multimodal data, review

*2010 Mathematics Subject Classification:* 65D18, 68U05.

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## Display of Outlines, Contours and Surface Features from Volume Data

*Marius Gavrilescu*



[Full text](#)

Volume visualization is an ever-growing field of computer graphics with multiple applications in the representation and analysis of 3D scalar data. Such data often comes with a high degree of complexity, making it a challenging task to render a proper 2D image which highlights relevant information while discarding other less significant data. In this paper, we present techniques for the rendering, identification and representation of various features which are meaningful to the human vision system, such as contours, outlines or various surface shapes. We use several approaches, based on the orientation of gradient vectors or on image processing techniques, and show how they can be successfully employed to highlight relevant details from volume data. We illustrate the differences between images obtained through 3D rendering directly and those subjected to contour and feature identification techniques and show how these provide a better visual understanding of the underlying data.

**Key words:** volume rendering, contour

*2010 Mathematics Subject Classification:* 68M99, 68W35.

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