3D object compression using enhanced stripification technique

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Abstract

3D meshes are one of the most common representations of 3D objects that have been used in graphics applications. They often require a huge amount of data for storage and/or transmission. In this paper, we present a new compression algorithm based on stripification of the geometric models that enables us to progressively visualize the 3D models during their transmission. The proposed algorithm encodes the geometry and the connectivity of the input model in an interwoven fashion. The main idea is to store 3D objects as strips files. The algorithm achieves compression ratios above $61:1$ over ASCII encoded formats resulting in faster transmission and rendering of complex graphical objects.

Keywords**:** *Triangular strips, mesh compression, rendering*

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Matching 3D objects using principle curvatures descriptors

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Abstract

The ability to identify similarities between shapes is important for applications such as medical diagnosis, object registration and alignment, and shape retrieval. This paper focuses on handling this issue using one of the well-known features that describe the local intrinsic properties of the shape. This feature is the principle curvatures (k_1, k_2) of the 3D shape. We introduce a framework of stable mathematical calculations to approximate these geometric properties. Once the principle curvatures are calculated, we can construct, for each shape, a matrix that represents two dimensional distribution of these curvatures as a shape descriptor for further searching operation. This descriptor is invariant to shape orientation and reflects the geometric properties of the surface. Experimental results are presented and it proves the robustness of the descriptor.

Keywords: *Shape matching, similarity measure, principle curvatures.*

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Blind Deconvolution of Sources in Fourier Space Based on Generalized Laplace Distribution

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Abstract

An approach to multi-channel blind deconvolution is developed, which uses an adaptive filter that performs blind source separation in the Fourier space. The approach keeps (during the learning process) the same permutation and provides appropriate scaling of components for all frequency bins in the frequency space. Experiments indicate that Generalized Laplace Distribution can be used effectively to blind deconvolution of convolution mixtures of sources in Fourier space compared to the conventional Laplacian and Gaussian function.

Keywords: *Multichannel, Generalized Laplace distribution, Blind Deconvolution.*

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An Effective Web Mining Algorithm using Link Analysis

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Abstract

The search engines, such as Google, Yahoo and Bing, provide a powerful information retrieval on the Web. A number of Web Mining algorithms, such as PageRank, Weighted PageRank and HITS, are commonly used to categorize and rank the search results. The motive behind this paper is to present and analyze the currently important algorithms for ranking of web pages such as PageRank and Weighted PageRank and HITS. Second, this paper proposes a ranking algorithm based on Weighted PageRank and the existing profile of the user to yield more accurate search results. Simulation Program is developed for the proposed algorithm. The experimental results shows that the proposed algorithm provides acceptable results compared to the Weighted PageRank algorithms.

Keywords: *Web search, page rank, wighted page rank*

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Incremental Fourier transform of triangular closed 2-manifolds

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Abstract

In this paper we present a technique for the calculation of the Fourier transform for functions defined on oriented closed 2-manifolds. The objects are given as oriented triangular meshes. We focus in this paper on the characteristic function of the model i.e. the function that is equal to one inside the model and zero outside. The advantage of our approach is that it provides an automatic, simple, and efficient method for computing the Fourier coefficients directly from the mesh representation. This avoids the approximation of the mesh by a grid of voxels which leads to a loss of details and error prone in calculation. The main idea is to distribute the calculation of the Fourier coefficients over the elementary shapes composing the mesh. Then we use the divergence theorem to simplify the computation by calculating the coefficients using integrations on simpler domains. The algorithm is simple and efficient, with many potential applications. Some examples are given to demonstrate the effectiveness of our approach.

Keywords: *Fourier coefficients, triangular mesh, local calculation.*

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