J Comput Eng Inf Technol 2015, 4:2
http://dx.doi.org/10.4172/2324-9307.C1.003

OMICS International
conferenceseries.com SciTechnol

2nd International Conference on
Computer Graphics & Animation
September 21-22, 2015 San Antonio, USA

Automatic image segmentation for large collections

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Image segmentation is one of the most significant tasks in computer vision. Since automatic techniques are hard for this purpose, a number of interactive techniques are used for image segmentation. The result of these techniques largely depends on user's feedback. It is difficult toget good interactions for large databases. On the other hand, automatic image segmentation isbecoming a significant objective in computer vision and image analysis. We propose anautomatic approach to detect foreground. We are applying Maximal Similarity Based RegionMerging (MSRM) technique for region merging and using image boundary to identifyforeground regions. The results confirm the effectiveness of the approach. This approach revealsits effectiveness especially to extract multiple objects from background.

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3D reciprocal diagrams and the equilibrium of spatial compression/tension-only structural forms

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Graphical methods of structural design use pure geometric methods for design and analysis of structural forms. Being used and developed by many researchers since 19th century, these methods known as graphic statics are based on the reciprocal relationship between the form and force diagrams formulated by Maxwell. This reciprocity provides an unprecedented control in design of funicular structural forms. However, the conventional methods of graphic statics are based on 2D reciprocal diagrams, and therefore, are quite limited in dealing with 3D structural forms. The idea of reciprocity in three dimensions was originally proposed by Rankine in 1864. Nevertheless, the lack of computational/representational tools at that time prevented its further development and application. This presentation is based on a novel research that proves and illustrates the three-dimensional reciprocity between the form and force diagrams 150 years from its original proposition. It shows that the design and analysis of complex, spatial funicular structural forms does not require sophisticated algebraic methods and can be achieved by pure geometric constructions. According to this research, the equilibrium of a 3D system of forces that is in pure compression/tension can be represented by a (group of) closed, convex polyhedral cell(s) with planar faces. This research clarifies the topological and geometrical relationships between the components of a system of forces (a polyhedral frame) and its reciprocal force diagram (polyhedron). Additionally, it provides a computational approach to construct a form diagram from a given group of convex force polyhedrons and vice versa. To further emphasize the potential of the application of this method in design, research, and practice, this presentation provides examples where manipulation of the force diagram results in generation of novel spatial structural forms. In conclusion, it shows how the reciprocity between the form and the force diagrams in 3D can be used to extend existing 2D methods of graphic statics to 3D, and therefore, open a new horizon in the field of structural design, architecture, and computer science.

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