Zhao et al. In their work, *Indexing 3D Scenes Using the Interaction Bisector Surface*, explore new methods of 3D classification and retrieval. These play an important role in fields such as computer vision, image-comprehension and can find applications in video surveillance. The authors argue that geometry of objects alone does not provide sufficient information to fully describe a context of a scene and should be augmented with a description of interactions between objects. Their approach utilizes **Interaction Bisector Sruface** (IBS) which is a subset of Voronoi diagram. The framework developed allows to index a scene by the means of topological structure and geometric attributes of the IBS.

The work provides a way to represent spatial relationships between objects including both geometric and topological information. It also provides a mechanism to construct heirarchical structure for a 3D scene based on relationships between objects. The paper includes a description of similarity metrics for said relationships. These metrics are used in carrying out the context-based relationship retrieval.

The paper illustrates significant advanteges of using IBS over previous, geometry-only based, approaches. Unedrlined is the fact that the approach presented in the work is more computationally expensive than other approaches but the authors argue it is a good tradeoff for amount presission that is gained.

Several methods are used to evaluate the results in the paper. There are three experiments carried out throughout: classification of interactions, building hierarchical structures of a 3D scene and content-based retrieval. The first one invloves comparing different combinations of metrics that IBS has to offer and an approach used in previous related work. The second experiment involves determining the stability of the proposed algorithm using Goodman-Kruskal approach. The last experiment is a user study. The users were asked to select a single object in the scene and then rate the the similarity of objects returned in the query based on similarity of surroundung objects.

The paper describes algorithms that are to be implemented in software. There is a great potential for parallelization on different levels and the authors claim that their approach favours multicore systems, compute-units or even multi-computers. It is though still early for this approach to be used in real-time applications due to complexity and current hardware not being fast enough.

The use of figures throughout the paper certainly improves the overall quality of the publication since they make it easier to visualize and digest some of the difficult concepts being described. Also the figures are absolutely necessary to demonstrate the results of some of the evaluations, for instance, the results of object relationship queries.

As the authors admit, the potential of IBS for spatial relation representation is far from being fully comprehended. In any case, we are currently limited by the technology to utilize the findings in the paper for animated scenes and, in general, extending them to the temporal domain.

References

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