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Interaction Techniques for a Strata Treemap

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Abstract

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The Strata treemap[1] is a new approach to hierarchy visualization that improves hierarchical structure visibility without distorting node sizes or missing nodes. In this poster, we present useful interaction techniques and visual cues that fit the Strata treemap.

More information and a demo video can be found at http://idlab.ajou.ac.kr/stratatreemap

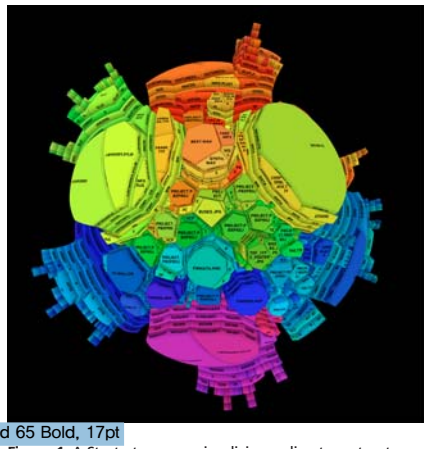

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Figure 1. A Strata treemap visualizing a directory structure (6138 nodes, 12 levels). The weight of each leaf node corresponds to the file size. Structure-based coloring is applied.

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Objectives

Internal nodes have to be shown in order to improve hierarchical structure visibility. It is necessary to find a new space to naturally illustrate the internal nodes and avoid node size distortion. Node size distortion in radial space-filling techniques is caused by an increase in the space available for the extended circle radius. In Strata treemap, that space is used to provide a natural padding between sibling nodes. Fig. 2 shows a simple overview of idea of the Strata treemap;

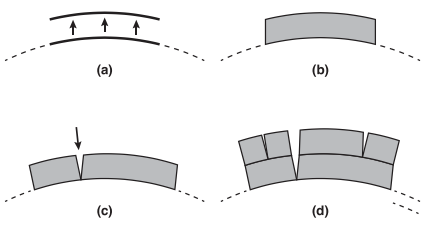

Figure 2. Basic idea of the Strata treemap

1. Formulate a treemap on the convex surface.
2. Extrude the surface of each node along its surface normal at the centroid (Fig. 2a, 2b), not by extending the radius of the sphere as done in RSF techniques.
3. Stack nodes according to the hierarchy structure (child nodes are stacked on their parent) (Fig. 2d).

Methodology

Navigating

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When a user selects a node(s), the point-of-interest can then be moved to the center of the selected node(s) for the camera to rotate (orbit) around the selected node(s). When the camera position changes, the labels rotate to correct the reading direction.

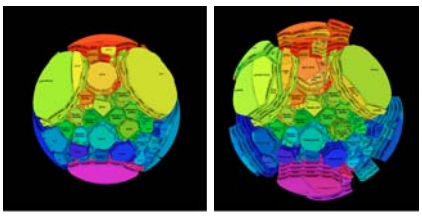

Figure 4. Peeling-off/Stacking-up. From root level, the left figure shows 3 levels and the right figure shows 7 levels.

Peeling-off/Stacking-up

To hide/expose sub-branches of the hierarchy, users can specify the local/global maximum level of visible nodes (Fig. 4).

Highlighting

Highlight the node(s) that have structural relations (e.g., ancestors, descendants, equal-level) with the currently highlighted node(s) in the hierarchy (Fig. 3a-c).

Highlight the node(s) that have similar attributes (e.g., file-type, weight, modified time) with the currently highlighted node(s) in the hierarchy (Fig. 3d).

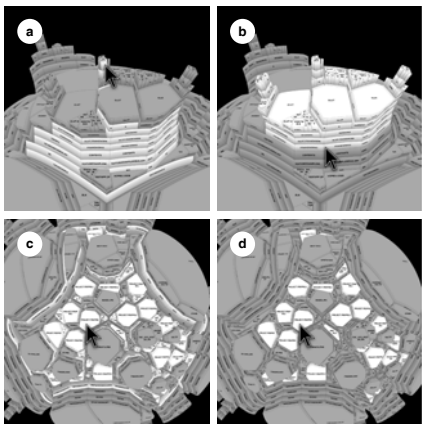

Figure 3. Highlight the node(s) that have structural relations (e.g., ancestors (a), descendants (b), equal-level (c)) or similar attributes (e.g., equal-file-type (d)) with the currently highlighted node (under the mouse cursor).

Transforming Node Height

To display lower level nodes clearly, the node height can be adjusted in such a way that the node height decreases as the level increases (Fig. 5a, 5b). To emphasize highlighted or selected nodes, users can increase the heights of these nodes or decrease the heights of the other nodes. (Fig. 5c, 5d).

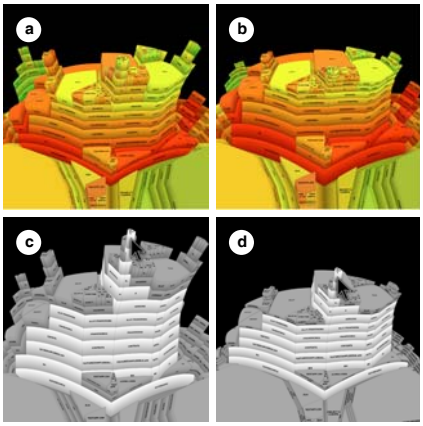

Figure 5. Transforming node height. Default height (a). The node height decreases as the level increases (b). Emphasizing the highlighted nodes by increase its height (c) or decrease the height of the other nodes (d).

Transforming Node Position

This technique is useful when users want to modify the layout (Fig. 6). If users compare node(s) across different portions of a layout, for example, users can manually/automatically reposition the node(s) until they are close enough to compare. The layout can be stably updated because it is based on a Voronoi diagram.

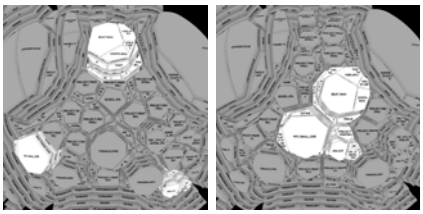

Figure 6. Transforming node position. To modify the layout, users can manually/automatically reposition the nodes.

Conclusion

Since these interaction techniques effectively utilize the geomertrical structure of the Stratat treemap, users can easily investigate a complex hierarchical data with the Strata treemap.

Our future work will includes techniques involving the use of transparency, layout methods using a curved Voronoi diagram and the partial surface of a sphere.

References

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