Visual Analysis of Hierarchical Managment Data

Zhao Geng, Gathania Gaurav, Rober S.Laramee, ZhenMin Peng

Abstract

The salesforce management data in Thomson Reuters is often having multiple hierarchies and dependencies. However, the conventional business graphics are not sufficient for presenting and exploring such data sets. The Treemap is proved to be effective for depicting hierarchical data, although it lacks the structural clarity such that distinguishing the different levels within the treemap is difficult. In this paper, we develop a system which enables the structure-aware treemap using coordinated multiple views. The design of this system includes the hierarchy extraction, structure tracing and the direct manipulation on the treemap. We demonstrate our result on various sales force management data sets from Thomson Reuters.

Categories and Subject Descriptors (according to ACM CCS): I.3.3 [Computer Graphics]: Picture/Image Generation—Line and curve generation

1. Background Data

As a global company, the sales force management data in Thomson Reuters is consisted of several hierarchies. Each product is sold by a sales person. Each sales person reports to a sales manager. Each sales manager is located at one organization or country, such as UK, Germany or New York. Each organization or country belongs to a region, such as Europe, Asia or America. Each region belongs to an administrative channel. Also, each product has a type, such as revenue, reoccurring. The revenue means once the product is sold, the transaction is over, whereas the reoccurring indicates there will be a series of updates of the product once it is sold.

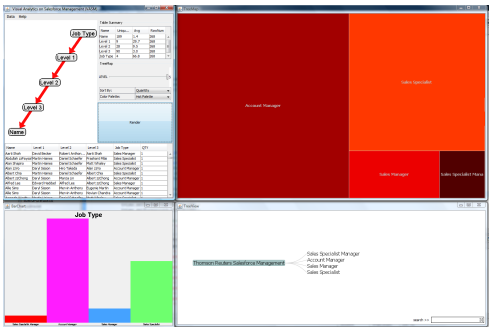

Figure 1: *This image shows the general overview of our system.*

2. System Overview

Our system is composed of two parts, namely the control panel and structure-aware treemap. The control panel is shown on the left half of Figure 1, which extracts the ontological hierarchy information from the input data sets and set up the configuration for the future visualization. On the right half of Figure 1, is a structure-aware treemap containing the coordinated views of the squarified treemap and DOI tree [CN02]. Our system is developed using Prefuse API [HCK*05]. In the next two sections, we introduce these two parts in more details:

2.1. Control Panel

Each data hierarchy can be derived and manipulated separately from the original input data sets. As shown on the bottom right of Figure 2, there are 6 tree levels represented by the force-directed graphs. User is able to freely move and position the graph nodes which drive the order rearrangement of the tree hierarchy. Also, by moving the slider bar, as shown on the top right of Figure 2, user is able to select the number of tree hierarchies to be displayed. In the top left of Figure 2, we provide the bar charts for the comparison of tree levels with low density leaves (often below 4096 leaves), as they are more effective and accurate than treemaps for depicting the small data [KHA10]. In addition, we also provide a summary table which contains the meta data of the hierarchical information, as shown on the bottom left of Figure 2.

2.2. Structure-aware Treemap

The treemap is able to compare the values in any tree level. But it lacks the ability to show the tree structure. In the previous work, several authors have addressed the importance of

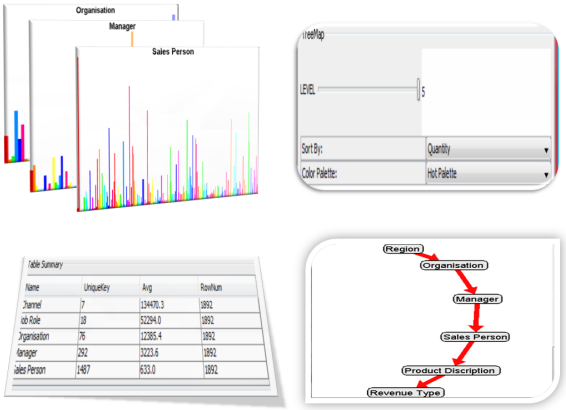

Figure 2: *This image shows four major parts of our control panel.*

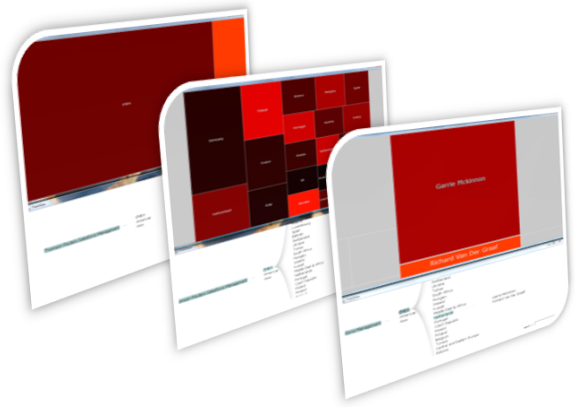

Figure 3: *This image shows how the word tree can be coordinated with our squarified treemap.*

presenting the change of hierarchy when traversing through intermediate nodes in treemap. Shengdong Zhao et. al create an elastic hierarchies which combine the treemap and node-and-link together [ZMC]. Renaud Blanch and Eric Lecolinet also propose a hybridization between treemaps and zoomable user interfaces [BL07]. Such mixture prototypes are very useful but sometimes can be hard to understand by the business intelligent [VvWvdL06].

For tracing the treemap hierarchy, it's not necessary to list the whole tree structure, instead only the relevant substructure which shows the ancestor and descendants of the interested node is needed. The Degree-of-Interest tree [CN02] provide a clear hierarchy at a low cost of the screen space by changing the viewpoint and filtering out the uninterested tree nodes. In addition, it offers the instant readability of the text to the business intelligent. Therefore, we can link the DOI tree with treemap to enable the structure tracing. As shown in Figure 3, as we traverse back and forth between the intermediate levels of treemap, the DOI tree view clearly keep track of how each selected node being derived from its ancestors.

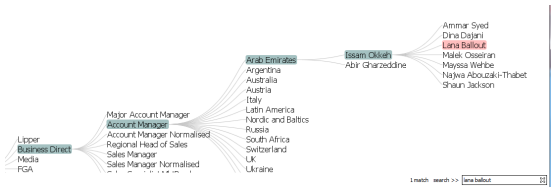

Figure 4: *This image shows a searching result of one sales person called Lana Ballout.*

On the interaction side, moving the mouse over the treemap brings up a tooltip indicating the additional information of the selected tree node. Clicking the mouse will drives the direct zooming between the tree levels. Also, the DOI tree could initiate the searching task, as shown in Figure 4.

3. Conclusion

In this paper, we have introduced an interactive coordinated multiple views visualization system on saleforce management data in Thomson Reuters. The structure-aware treemap takes the advantages of DOI tree layout to trace the change of treemap hierarchy. Also, we provide several interaction options, such as direct manipulation and hierarchy extraction for the treemap. In the future, we will focus on the treemap visualization on the time-varying data.

References

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