

## Abstract of Main Thesis

### Title of Thesis

# Visual Recommendations and Label Layout for Stacked Graphs

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### Abstract on the Content of the Applicant's Thesis

Interactive stacked graphs have gained importance for visualization of time series data. For stacked graphs with hundreds of time series, two problems are still unsolved. The first problem is the difficulty of searching for views, displayed results, in the view search space. To do this, users usually require domain knowledge and skills to navigate the stacked graph. Moreover, the production of views is completely delegated to the users. The second problem is the hidden labels of time series with low occurrences. Stripes representing such time series are small, and, to avoid overlapping, the associated labels are usually hidden, preventing the users from finding potentially useful information.

To support the stacked-graph users, two intelligent methods are proposed and incorporated into the visual analysis process. First, a recommender method is proposed to guide the users during exploration of stacked graphs; dwell times and view property data are used to infer user preferences and recommend potentially useful views, which the user might be interested. Next, a method using a genetic algorithm is proposed to exploit the unused space of views so that labels can be placed there free from overlapping, while keeping their intended positional relation with the corresponding stripes.

Usability studies of our recommender method show that the average accuracy to predict users' interested views is 63%, which is 13% higher than that of a baseline method. These results indicate that accurate user profiles can be generated by analyzing user behavior and view property data, and that dwell times can be a useful indicator of preference. Usability studies of our label layout method show that the average time for users to find their desired labels is 20 seconds, a half of that with traditional stacked graphs. These results indicate that our solutions can increase users' efficiency in visual analysis using stacked graphs.