INTRODUCTION
The department of radiology (RD) of the University Hospital Basel in Switzerland collects time-stamped data like admission day, length of stay (LOS), intervention day (day of the week) as well as scan modality and other patient associated demographic parameters. Medical imaging is considered as one of the most important biomarkers: It determines diagnosis, treatment and predicts the outcome of patients. Furthermore the diagnosis enables to prevent prolonged LOS and to improve clinical care and efficiency. An interactive visualization of the data helps the analysts to validate their experiences and generate new insight.

CONCEPT
The hospital manages about 35'000 visits annually. More than one third needs at least one diagnostic by the RD. Overall about 27'000 visits at the RD with over 75'000 scan interventions are found in 2014 and 2015. This master thesis enables the preparation and import of different data sources into one database and provides a single interface for the application. More precisely, a new developed application offers mainly three views with sorting and filtering functions.

- The Attribute-View: gives an overview of the attributes of the visits showing small embedded charts.
- The Chronological-Scan-View: visualizes the visits and its scans during a stay to identify patterns related to order, time and scan modality.
- The Distribution-View: clusters cases into groups in order to compare their distributions and median values.

Attribute-View (Figure 1) is the entry point for the analysis and displays attributes of all visits (cases) treated in RD in a table. Each row represents a case. The table is sortable by columns. Four small embedded graphics (a-d) in the table help to interpret numbers and give a quick overview of the data. The intention of this view is to give an overview of the data, to identify DRG outliers and at the same time allow to focus on detail information.

RESULTS
In average, one visit including radiology intervention records 2.5 scans. The Attribute-View and the Chronological-Scan-View compare detail information of the visits and highlight outliers without losing the context. The two views demonstrate the large variance of the data. All the more the filter functions are important to explore subgroup of visits interactively. The views identify process patterns of scans over time for specific disease groups. The new findings answers some hypotheses of the analysts for improving the process in the RD. Together with statistic tools and the Distribution-View an inhomogeneous distribution of the admitted visits during the week was detected (p<0.01) with a higher registration at the beginning of the week. Also a significant higher LOS was shown for visits admitting on Friday (p<0.05). Additionally the first scan was conducted in most cases (58%) on admission day. A conduction of the first scan on the third residence day increased LOS significantly (p<0.05) compared to the conduction of the first scan on the second day.

CONCLUSION
The new developed application enables to explore visualized data and gives a tool to analyze with interactive functions. This visualization provides broader view of the collected time-stamped data with the possibility to focus on specific groups. This supports developing new hypotheses. The implemented architecture of the application allows adding new functionalities to follow new hypotheses.

REFERENCES