

USABILITY TESTS

For SAS Visual Pipeline

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PARTICIPANTS

In this series of tests, we interviewed and observed seven participants. All the participants were SAS employees, but none had worked on the research, design or development of SAS Visual Pipeline. The participants represented a wide range of academic and professional experience; only one was a current college student, while 4 had already completed at least one post-graduate degree. Their academic backgrounds ranged from linguistics to statistics to business administration. Professionally, three had different job titles in the field of technical support, while two were technical interns and one was a solutions architect. The users were also well-distributed in terms of age and gender. Please see Appendix A for more detailed demographic information about the participants.

PROCESS

Prior to the testing sessions, we collaborated to write, edit and standardize three sets of tasks, one for each component of SAS Visual Pipeline. These three components are SAS Data Mining and Machine Learning (DMML), SAS Visual Text Analytics (VTA), and SAS Visual Forecasting (VF). We ran a pilot test (results not included in this report) to ensure that our tasks were both comprehensible and comprehensive. Throughout the official testing sessions, we rotated the order in which participants performed the three sets of tasks to mitigate bias from the learning effect.

The tests were performed individually over the course of two weeks in the usability lab in Building R in Cary. Paul Hankey oversaw logistics and took audio, video and screen recordings for each test, along with taking notes on the participants' comments and interactions. Elisabeth Parker facilitated the tests, walking each user through the setup, asking additional questions in reaction to their use of the software and taking notes of their comments, questions and suggestions. Each user also answered a preliminary background survey and a post-task wrap up survey. We also wrote intermediate surveys for the users to answer after each set of tasks, but we chose to make these optional depending on how quickly the users worked through the tasks, instead making it a priority to expose each participant to all three tools.

Please see Appendix B for a list of links to our testing resources, including the full task packet and the survey results.

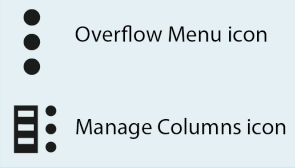
RESULTS

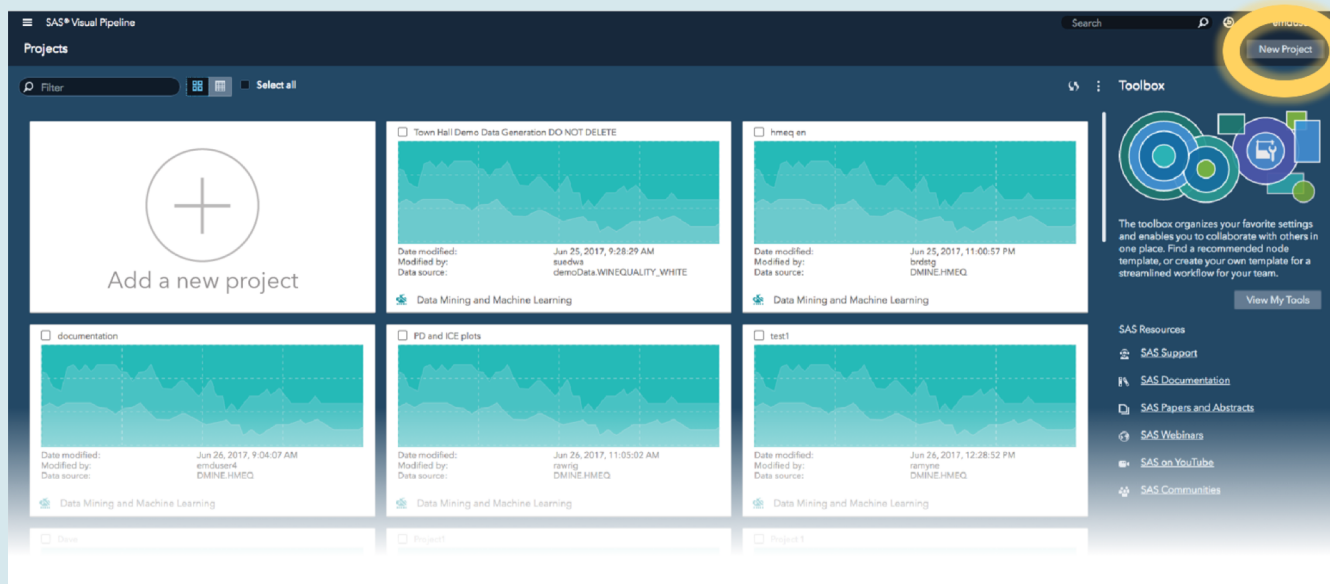
This section is a compilation of information from Elisabeth's and Paul's observations during the test sessions, the session recordings, and the participants' answers to the various surveys. We've categorized the findings as strengths, areas for improvement and suggestions, then clustered them by product. There were also a significant number of findings that applied to all three components and the overall platform, which are catalogued in the section labeled "Suite-wide Findings".

Some of the problems that the participants encountered were fairly serious and led to intense frustration. The areas for improvement that we considered most critical are highlighted at the top of each of the following sections. Also, some of the problems and suggestions that we gleaned from the users' feedback have already been filed as defects or even incorporated into more recent versions of the software. Please see Appendix C for a complete list of these defects and fixes.

SUITE-WIDE FINDINGS

High Importance Areas of Improvement

1. The suite's implementation of **overflow menus** to hold commonly used actions like "Open" was highly unintuitive for the majority of users. They also often mistakenly engaged with tables' "Manage Columns" menus, which are visually similar to the overflow icon and often appear immediately adjacent to it.
2. Users expressed a universal desire to be able to **edit tables directly**, either by interacting with a cell's content or by right-clicking on the cell to see a context menu with relevant actions. This R-click functionality is being built into the next release and will also mitigate the frustration created by the overflow menus by providing users a more intuitive method for editing table content.
3. The **physical distance between action items** often created confusion for users, who stated that they expected the click locations for any given process to be proximate to one another. For instance, every user hesitated, and some were completely stumped, by the location of the "New Project" button, pictured below. This image also includes our suggestion for a tile that allows the users to create a new project; because its visual impact is larger and its location is closer to the other primary content of the homepage, users may be more likely to see it and engage with it straightaway.



Strengths

Overall, the participants had very positive reactions to this trio of offerings. Users spoke particularly highly of the platform's stylistic and functional unity, which made them feel like they were working in one cohesive environment. An added benefit of this cohesion that was obvious from observing the test sessions is that learnability in one tool is applicable to the others, and the participants learned quickly. Users consistently increased the speed and comfort with which they completed tasks throughout the 1.5 hour tests, illustrating the transferability of comfort as they moved from tool to tool.

The Pipeline view was also popular with users, who enjoyed both the overall presentation and some specific functionalities. Participants expressed that they liked being able to engage with completed nodes even while the rest of the pipeline was still running. They were also comfortable with using the "+" tab to add a new pipeline, an action that one user compared to opening a new tab in a web browser. Finally, the ease of saving and sharing nodes and pipelines across projects was a big hit with users who articulated the convenience of creating a unique tool and then transferring it as a template across projects.

Areas for Improvement

The most significant pain point across the board for the participants of these tests was setting variable roles and changing other characteristics of individual variables in the Data tab. Much of this problem is related to the issues discussed above with the overflow menu and table editing. However, users also gave us further details about their expectations and frustrations in the Data tab, and many stated that they would prefer to be able to adjust all of the characteristics from within one dialog or view. For instance, in VTA,

users wished they could change the display setting and set the role for any given variable in one place rather than having to navigate back and forth between a dialog and the primary table view.

Users also had some negative comments centered on issues of inconsistency between the three tools, which was obviously mild enough such that they still described a strong sense of suite-wide unity and cohesion. One of the more common points of confusion stemmed from the fact that selecting “Open” from a node’s context menu takes you into the node in DMML and VTA but opens the node’s code in VTA. Also, some tables are right-click enabled, but the massive majority are not, which created a sense of disparity for some users.

Within the homepage, the users’ primary struggle was that the project tiles were only clickable on the small project title rather than across the whole tile. This issue has already been fixed. Two participants also expressed frustration about the sort functions when viewing the projects in a list. Column sort was only implemented on two of the columns, and the sort itself was unexpectedly slow. While the sorting was happening, the table displayed a non-sequitur zero state message stating that there were no projects available.

Once the users clicked the “New Project” button and opened the data source dialog, they had some complaints and confusions. The biggest struggle that this dialog posed was simply that the myriad of information displayed once a data source was in focus led users to believe that they needed to perform additional interactions within the dialog. One user commented on the unnecessary usage of a context menu here when the only menu option was “refresh”, while another was frustrated by the tiny amount of horizontal side-scrolling caused by the tabs being slightly wider than the container.

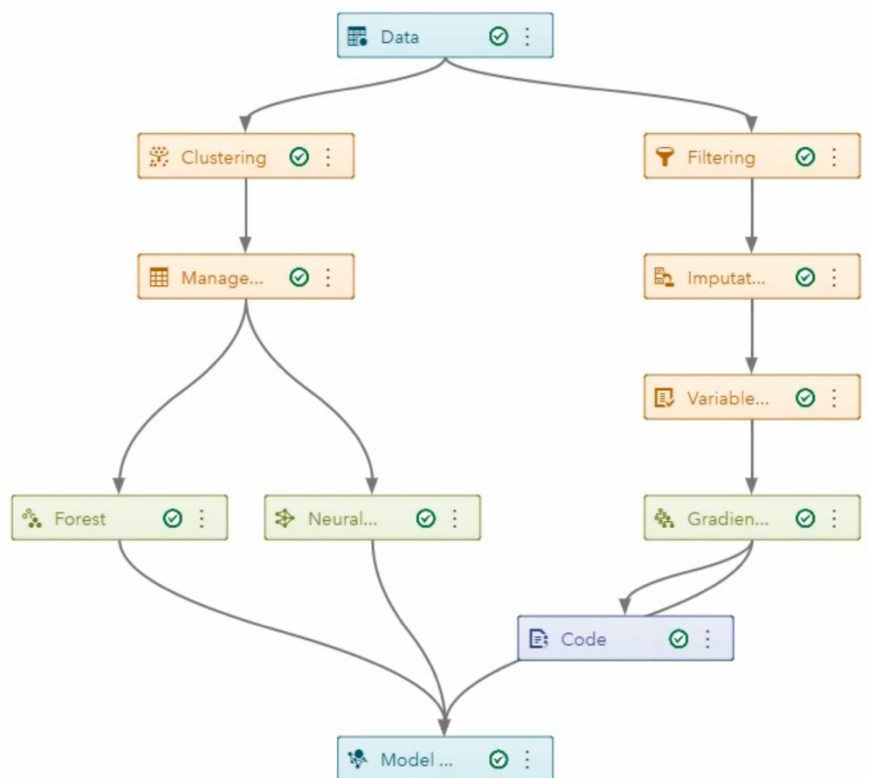
Additional pain points:

- Overwhelming content on summary and results pages
- Hover hand icon over cells is misleading because cell isn't actually actionable
- Not intuitive to interact with a node's Properties sidebar in Pipeline tab; users consistently glossed over or didn't see the options they needed in this bar
- Column widths hide long variable titles and there's no "expand all" control to make all titles visible

Suggestions

The area with which users offered the most suggestions was table editing. The ubiquitous request to be able to edit tables directly is the subject of an active defect, which addresses right-click interaction to open context menus for individual table cells. Users also suggested making it easier to batch edit variables.

Three users discussed issues with size in the Pipeline view, and indicated that auto-sizing would be a good solution to the problems they saw. Two **wanted the nodes to automatically expand so you could see the full title** of the node, and



Pipeline with many nodes' titles truncated

one participant suggested making the entire pipeline auto-size to fit the screen when you open or close the right-hand sidebar by selecting or deselecting a node. Some also requested that the lists of Nodes in the Node panel be expanded by default so that the search bar is more effective, as it only displays matched results from expanded categories. One user pointed out that finding nodes would also be easier if the list of nodes were sorted alphabetically.

The final area in which users had multiple suggestions for improvement is the Toolbox. The biggest pain point here is that the search is case sensitive; we have filed a defect about this. Two users also wanted to have an option to display only the tools that they themselves had saved. Some users mentioned that the toolbar panel took up a lot of space on the homepage and that it should be collapsible in order to allow more space for the list of projects.

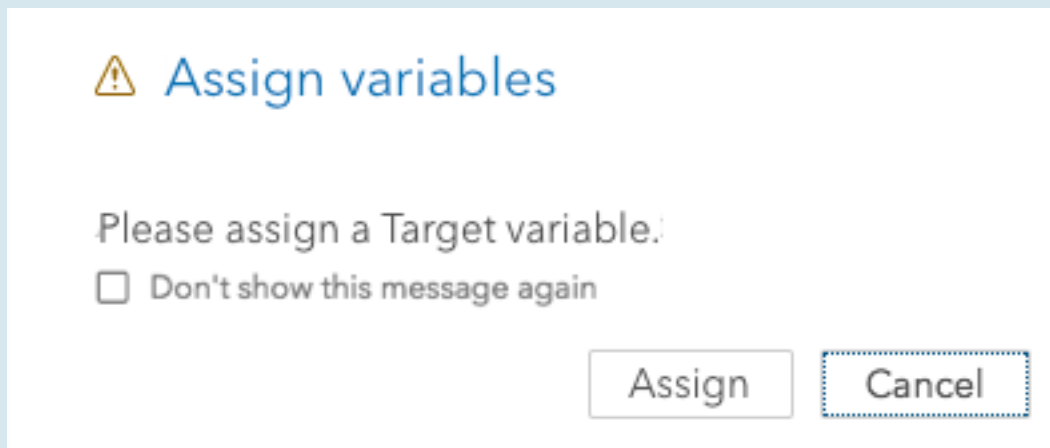
Additional suggestions from users:

- Provide one-click way to get back to projects page no matter how deep you are
- Give information in tool tip when you hover over warning icons (e.g. in message strip and assign variables dialog)

DMML

High Importance Areas of Improvement

1. In six of our seven tests, the facilitator had to provide hints and prompts for users who didn't understand that the **Pipeline Comparison and Model Comparison views** are separate, or what their distinct purposes are. The tables that the two views use are visually very similar, and the Pipeline Comparison tab lists models without making their pipeline of origin immediately obvious. These characteristics led users to experience confusion and frustration when trying to differentiate between the modes.
2. Here, as in the other tools, participants struggled to **assign variable roles** in the Data tab. The Message Strip component that alerts the user that they need to assign variables didn't include a link so it wasn't actionable, and users often skimmed over it without even reading it. Perhaps some other component that looks less like an advertising banner, or one that requires user action before continuing, would make this step less frustrating.



One example of a message that would require user action, bringing clarity to the data setup workflow

Strengths

In addition to the suite's overall strengths and their impact in DMML, one user also praised the plethora of variable roles that are available for selection. This comment came from a participant with in-depth experience in data mining, indicating that users with domain

knowledge may have a more intuitive understanding and therefore be able to navigate the variable assignment flow more easily.

Suggestions

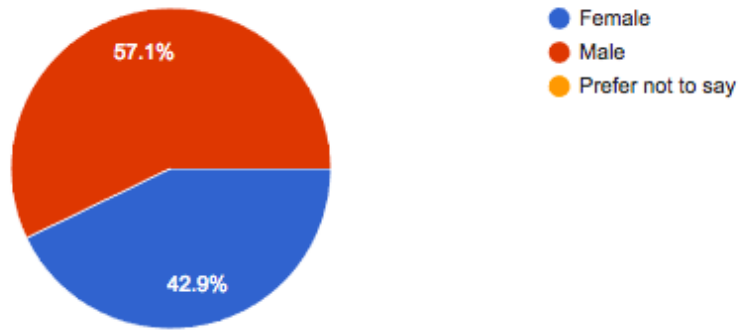
One user, a technical support engineer with extensive experience in SAS Enterprise Miner and SAS Visual Analytics, suggested implementing clickability on individual models in the Model Comparison node. She stated that clicking a model to open a dialog or window displaying its results would clarify what data corresponded to which model, as well as removing the need to scroll.

Another aspect of model comparison that this user wanted to see relates to the “Compare” view within the Compare Pipelines tab. Upon using this button to compare two selected models, the participant hoped to see a delta column in the Fit Statistics table.

APPENDIX A: DEMOGRAPHICS

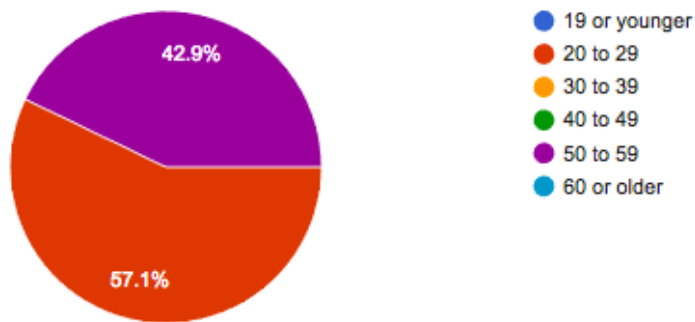
Gender

7 responses



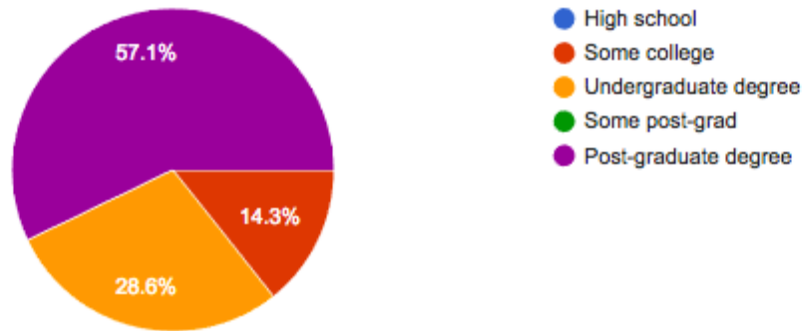
Age

7 responses



What is your highest level of education?

7 responses



What field did you study, or are currently studying?

7 responses

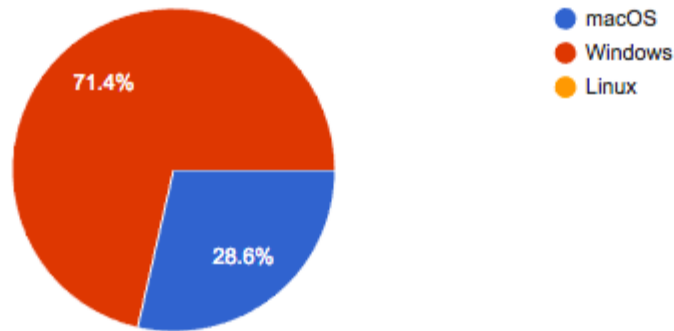
Statistics
statistics and mathematics
Applied Statistics
Computer Engineering; Linguistics
Masters in Business Analytics
Business Administration
Experimental Psychology

What is your job title?

Technical Intern
Analytical Technical Support Manager
Sr. Tech Support Statistician
Technical Intern
Solutions Architect
Associate Technical Support Engineer
Manager, Software Development

What operating system do you prefer to use?

7 responses



Please list any SAS software that you have used (for example, SAS Studio or JMP).

7 responses

SAS Studio, SAS Visual Analytics, SAS Enterprise Guide, SAS Enterprise Miner

EM, EG, SAS Studio, SAS/STAT, SAS/ETS, Base SAS, JMP

SAS/ETS , SAS/STAT, Forecast Server, JMP

Base SAS, SAS Studio, Enterprise Miner, Enterprise Guide, Visual Analytics

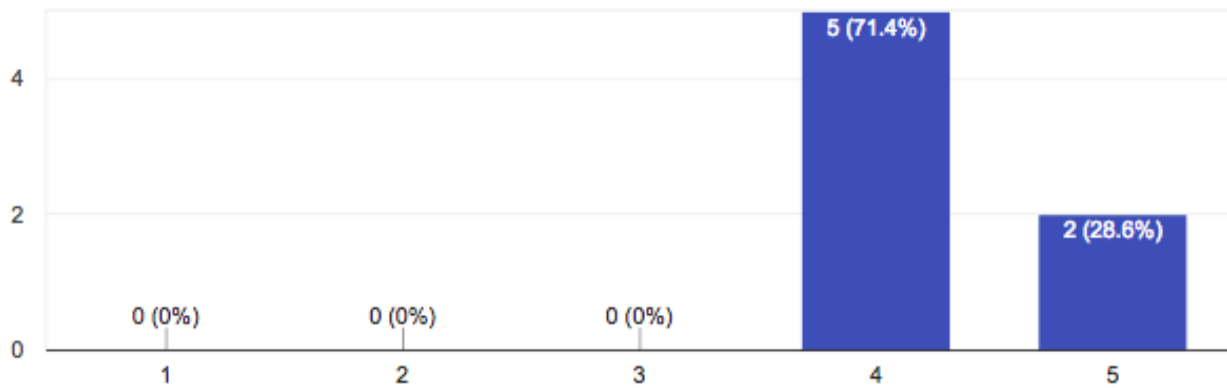
SAS Studio, Enterprise Miner

Base SAS, SAS Enterprise Guide, SAS Studio, SAS Data Integration Studio, SAS Visual Analytics, SAS Enterprise Miner, SAS Forecast Server, JMP

SAS BASE/STAT/FS/EM, Fraud Framework Suite (with SNA), various iterations of Text Mining, Credit Scoring (via EM), Visual Analytics, Visual Statistics, others

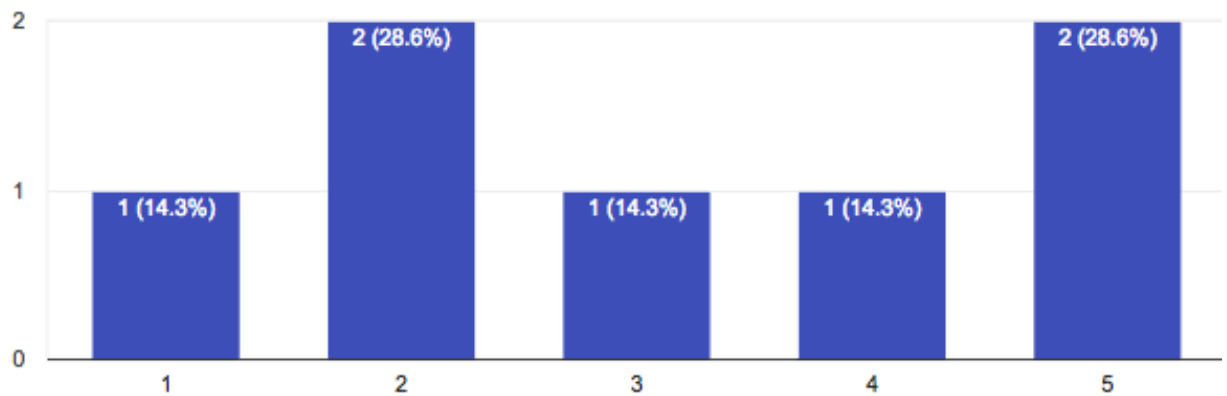
How much do you think graphics help you understand complicated ideas?

7 responses



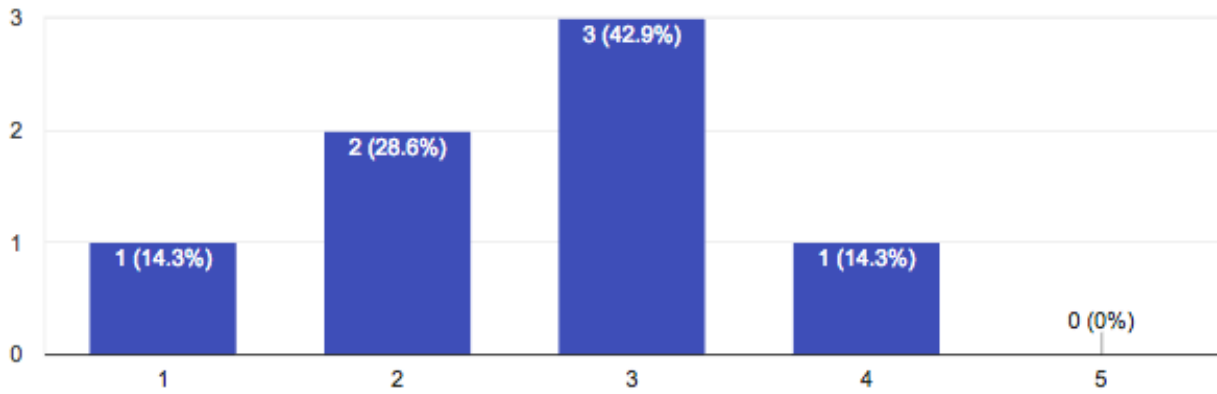
Please rate your familiarity with data mining.

7 responses



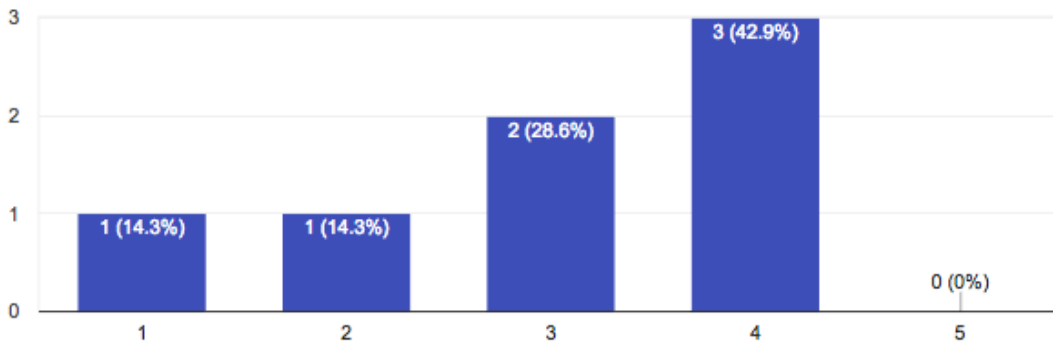
Please rate your familiarity with text mining.

7 responses



Please rate your familiarity with forecasting based on analyzed data.

7 responses



APPENDIX C: IMPLEMENTATIONS

Already fixed

- Project tiles clickable area extended to full tile
- Sort model comparison criteria alphabetically in Forecasting node options
- Search functionality in Text Parsing node (planned for next release)

Defects

- Right click interaction with tables in Data tab
- Toolbox search not case sensitive
- Breadcrumb navigation bug fix
- Stability of term tables in Text Parsing node
- Clearer representation of on/off setting for display status of Forecasting variables
- Include name of variable that corresponds to each level of hierarchy in Forecasting