What’s new in TIBCO Spotfire® 7.0
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Introduction
Spotfire 7.0 is an exciting release that delivers faster, easier to use visual analytics for everyone. It enables business users to benefit from visual analytics through the Spotfire Recommendation Engine and a range of new, easy to access and easy to use capabilities both in the web and installed clients. For the advanced analysts Spotfire 7.0 provides important new capabilities such Nested aggregations, Calculated columns for external data and importing data from OLAP Sources.

Further to the analytic improvements, for the dashboard designer Spotfire now comes with the capability to customize the visual appearance. In addition to the out of the box “Dark” and “Light” visual themes, a dashboard designer may now customize the visual appearance of Spotfire to harmonize with the corporate graphical profile.

New visual Design
Spotfire 7.0 introduces a new visual design for the Spotfire clients and gives the user the option of choosing from two options for the visual appearance of Spotfire – the “light” or the “dark” visual theme.

Spotfire “Dark” Visual theme
In addition, as described in more detail in the below section, it is now possible to customize the visual appearance of Spotfire according to your needs.
**Custom Styling**

Spotfire 7.0 allows users to give their own look and feel to Spotfire by changing the colors, fonts, margins and padding etc. for most elements in the user interface. This enables creating dashboards that follow a corporate graphical profile, or in web mashup scenarios it can be used to make the Spotfire components harmonize with the overall web design.

The custom styling editor is accessed through the style selector button and selecting “Edit Custom Theme”.

It is also possible to import a custom style form a DXP file on disk or in the library.

In the Custom Styling Editor, the General tab allows the user to define whether the visual theme should use the Spotfire Light or Dark theme as a starting point as well as defining other visual aspects.

Example custom style with no visualization borders etc
General options for visual styling

The “Base color” allows the user to define the general background color used, and the “Accent color” is used for example to indicate active page tab and ranges in filters.

The Active visualization in Spotfire normally has a slightly different border color in order to signal to the user which visualization is currently selected. This can be used for example when exporting to PowerPoint in order to export just the active visualization. The color picker “Border color for active visualizations” allows the user to specify the color of the border of the active visualization, to either color it to stand out or to set the border color in a way that it is not different from other visuals.

“Distance between visualizations” can be used in order to separate the visualizations further, or to remove any distance between visualizations altogether.

“Distance between visualizations and panels” specify the distance from for instance the filter or data panel to the visualizations.
The general Font and its size and color can be set. This setting takes effect in various places such as in the legend, axis scales, labels etc. – unless specifically overridden at a more detailed level (see later examples).

The Details tab provides more detailed level of control such as configuring the visual appearance of the visualization title area or the scale lines etc.

Detailed options – Page Navigation Bar

In the visualizations area section the user may set a specific color for the visualizations area – this is the area that shows up between the actual visualizations.
In the “visualizations general” section, various properties of visualizations visual appearance can be set, such as their background color, padding,
There are also specific sections to configure the visual appearance of the Visualization Title, the Visualizations Scales and the Column Selectors.
Custom Styling Example

Example style to illustrate the effect of various styling properties

Borders, Padding and Margin – the box model
The Styling editor uses a “box model” in order to specify layout and other visual properties of many objects in the user interface. Objects such as visualization title and Visualization General are “boxes” where the user may set margin, padding etc.
Recommendations

Spotfire Recommendations is a new, easier and faster way of creating visualizations, learning about your data and letting you get to insights quicker - regardless of whether you are an experienced analyst or a newcomer to visual analytics. Spotfire Recommendations allows you to look your data from different angles, discover new insights, and get a visual overview of your data - all this faster than ever!

When you load new data, the first thing you see is the Recommendations window. Here, you can see all your data columns to the left. Select which columns interest you, and alternative visualizations of your data will display on-the-fly. Start with one column, and see the distribution of the data. Add more columns and see relations between them, how measures are distributed amongst categories, or even view your data on a map.
Initial view before selecting any columns

With one column selected, a few alternative visualizations are provided
Select more columns and watch the visualizations change.

Click Add this to add to the current page. Click More Like This to view some variations of the specific visualization.
You will learn more about your data by looking at it from various angles. With a few clicks, based on your selections and the suggested visualizations, you can create one, two, or an entire dashboard of connected and interactive Spotfire visualizations. You may even find new insights just by browsing through your data within the Recommended Visualizations window. All of this functionality is faster than ever before; first to insight - first to action.

When you click Close, the Recommendations window closes and you get back to the current page. If you want to bring up recommendations again, click the icon in the installed client or in the web authoring client.

**Analytic Improvements**

**Interactive Grouping of categories**

The new easy-to-use grouping feature allows you to combine two or more categories displayed in the visualization into one.

This is very useful in several situations:

- When you want to compare the total of more than one category against other categories like comparing the sales in (Boston + New York) against sales in Los Angeles.
- When you spot spelling errors or alternative spellings that cause data to be split into more categories than needed.
- When you want to compare, for instance, the top 10 categories against the rest.

Just mark the categories you want to group, right-click and then select “Group from marked categories”. As with most operations in Spotfire, if you are not happy with the result, just undo it.

**Combining several categories for comparison**

The bar chart below displays the sales of different kinds of fruit. However, it categorizes the different kinds of fruit in a somewhat arbitrary manner, for example, all sorts of apples are lumped into one category, but there are three separate categories for melons (Cantaloupe melon, watermelon, and honeydew melon). We want to display the total sales of melons as a single category, so we can easily understand the comparison.
If you mark Cantaloupe melon, honeydew melon, and watermelon, and then right-click and select Group from marked, you can simply name the new group "Melons".
Correcting a misspelling
In some cases misspellings in the data cause some of the data to be displayed as different bars, while in reality they represent the same thing.
As you can see above, "Cantaloupe melon" has been spelled both correctly and incorrectly in the data set, which causes it to be displayed as two bars. We would like to have all cantaloupe melon sales displayed within one bar, which is easily corrected. Mark both spellings, and then right-click and select Group from marked categories to join both categories into one.

Comparing top 10 vs. the rest

Another good use of the "Group from marked" feature is to bundle categories to compare against the top (or bottom) performers. Look at the bar chart below that shows sales per state. A sales executive may want to understand how the top 10 performing states compare against "The rest".
By selecting all states except the top 10 performers and grouping them, the bar chart below is formed. We can see that "The rest" sells more than any individual state that is also among the top performers.
By combining the top 10 into one group, we can compare the total of "Top 10" vs "The Rest".

Structured Grouping of categories

In addition to the interactive grouping of categorical values by marking and right clicking, in the installed Spotfire clients, it is also possible to create a binned column by grouping values of the column. See the bar chart below that has several misspellings of categories that make tomatoes, Pears, and Cantaloupe melons appear twice (one time correctly spelled and one time misspelled).
It's easy to correct this with a new option in the "Insert Binned Column" dialog called "Values".

![Insert Binned Column dialog]

As you can see above, the new column name can be specified ("Binned Name").
The below screenshot shows how to create a new bin (in this case, it's called "Tomatoes") and how to select the values that should go into that bin ("Tomatoes" and "Tomatos").

Below is an overview of all the bin definitions when complete.
Now, after these binnings, the following bar chart can be displayed.

To further illustrate, if we use the original column "Name" to color bar segments we can see the proportion of tomatoes that were incorrectly spelled (90%) and correctly spelled (10%).
New Quick Calculation – TopCategory

In many cases it is useful to be able to pick out the “Top Category” in some respect, like picking the product with highest sales in each state from a transactional data set. The TopCategory quick calculation makes this really easy.

To study an example, let’s consider the NameByState data set. It contains the count of each name of all babys born per state per year. We would like to pick out the most popular name per state and display on a map chart, and thus we need to sum the count for each name for all years, per state.

<table>
<thead>
<tr>
<th>State</th>
<th>Sex</th>
<th>Year</th>
<th>Name</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Hannah</td>
<td>58</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Madison</td>
<td>50</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Emily</td>
<td>48</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Sarah</td>
<td>39</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Ashley</td>
<td>36</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Anna</td>
<td>34</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Elizabeth</td>
<td>32</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Emma</td>
<td>32</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Alyssa</td>
<td>31</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Jessica</td>
<td>31</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Abigail</td>
<td>28</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Haley</td>
<td>27</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Victoria</td>
<td>27</td>
</tr>
<tr>
<td>AK</td>
<td>F</td>
<td>2000</td>
<td>Grace</td>
<td>26</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>F</td>
<td>2010</td>
<td>Jessica</td>
<td>6</td>
</tr>
<tr>
<td>ME</td>
<td>F</td>
<td>2010</td>
<td>Juliet</td>
<td>6</td>
</tr>
<tr>
<td>ME</td>
<td>F</td>
<td>2010</td>
<td>Kaleigh</td>
<td>6</td>
</tr>
<tr>
<td>ME</td>
<td>F</td>
<td>2010</td>
<td>Lilliana</td>
<td>6</td>
</tr>
<tr>
<td>ME</td>
<td>F</td>
<td>2010</td>
<td>Lola</td>
<td>6</td>
</tr>
</tbody>
</table>

This is easily done by using the TopCategory Quick calculation as shown below: Select the column Count, the Aggregation Top Category, and the name Column as the categorical column. The inner aggregation is set to Sum by default and means that we Sum the Counts, per name (and per State which is implicit if we use marker by state in the map chart).
Using the TopCategory Quick Calculation

The most common name per state, by using the quick calculation TopCategory

Nested aggregations
Spotfire 7.0 enables analysts to write custom expressions including nested aggregations. This enables more powerful analytic expressions such as the one used by the TopCategory quick calculation. As a
slightly more simple example study the below expression that uses the same data set as in the previous section.

\[
\text{ValueForMax(Sum([Count]) OVER(Intersect([Name])), [Name])}
\]

Here the ValueForMax is the first aggregation, and Sum([Count]) is the inner aggregation. The Over clause tells that we should group the Sum([Count]) by Name. Finally the [Name] parameter tells ValueForMax that it should extract the value from the [Name] column for the Name with highest Sum([Count]) - per state since the map chart has markers per state. This expression does essentially the same thing as the TopCategory expression, with the exception that it does not handle ties which the TopCategory expression does.

**Calculated Columns for external (in-Database) data for RDBMS**

It is now possible to create calculated columns also when data is kept external in the database (not brought into memory). The calculated columns are calculated by the DBMS and thus can use only the expressions supported by the database, but otherwise works like any other column. This feature also enables the new features Interactive and Structured Grouping of categories for external data.

**Import of data from OLAP sources**

It’s now possible to import data from OLAP type data sources. This enables TIBCO Spotfire’s powerful in-memory analytics also for data from OLAP cubes. It is possible to select a subset of the cube and limit data retrieved from the cube before importing data.

**Column value transformation when matching values between data tables**

When visualizing data from different data tables in one visualization there may be issues that even if columns contain the same data, the actual column values may be different. For instance the Column [State] in one data table may have the values AK, CA, CO, but a similar column in another data table has the values Alaska, California, Colorado. If you want to visualize data from these two data tables in the same visualization you can now transform the values of one of the columns to match the other data tables. As a simple example to transform CO to Colorado the following expression works:

\[
\text{If([Value]="CO","Colorado")}
\]

Normally a case statement might be more convenient if there are many different values that need to be matched. Data types that differ are another common issue that can now be addressed using Spotfire’s internal type casting.
Mark from Legend

Spotfire 7.0 introduces the ability to mark elements in the plot by clicking on categories in the legend. This is useful especially in plots with many graphical elements and lets the user compare the marked category with the others. Mark from legend works for the color and shape axis for categorical and binned columns.

Clicking on “Indiana” in the legend marks all markers corresponding to the state Indiana in the plot.
New Data panel

Spotfire 7.0 allows the user to get an overview of the loaded data in the new data panel. Here, all columns of data are visible. By default the columns are categorized by number, category, or time, for example, which makes it easier to find what you are looking for. The data panel is the base for interacting with your columns; you can grab a column and drop it on the visualization, rename a column, delete a column, or filter the data based on the columns. The data panel is available in the installed Spotfire clients and the web authoring client.

Click the filter icon to filter data based on the selected column. You can see an overview of currently applied filters within the bottom of the filter panel – and from here you can also interact with the modified filters.
Right-click the data panel to rename or delete a column.

**Data Connectors**

**OData connector for SharePoint and Microsoft Azure Marketplace**
OData is a standard for providing data as a web service. The new OData connector allows connecting TIBCO Spotfire to data in SharePoint or Microsoft Azure Marketplace, or any other web service implemented according to the OData standard. Read more about OData at [http://www.odata.org/](http://www.odata.org/)

**Amazon Redshift connector**
The Amazon Redshift Connector allows connecting to TIBCO Spotfire to data in the Amazon Redshift cloud data warehouse. The connector supports SSL username/password authentication.

**Other data connector improvements**
SAP HANA – Now supports Kerberos SSO and SSL username/password authentication

Postgres – Now supports SSL username/password authentication

Hortonworks – Now supports Kerberos SSO and SSL username/password authentication
**Business Author Improvements**

The improvements to the Business Author web authoring client now allow for an even quicker and smoother workflow due to the new drag and drop capabilities, improved capabilities to load data and other general improvements.

**Drag and drop in Business Author**

In Spotfire 7.0 the web authoring client Business Author introduces the capability to configure visualizations through drag and drop. For example, a user can easily add a column to the color axis by dragging it from the data panel to the color drop target in the center of the visualization or to the color axis in the legend.

![Drag and drop in Business Author](image)

**Drag and drop data to Business Author**

It is now possible to load data into Business Author through dragging and dropping the data either in the library browser or in the business author analytical client.
Quick configuration of visualizations in Business Author

It is now easier and faster to configure most visualization properties in Business Author. Users may directly select configuration options after clicking (left-clicking) on the axis of visualization. A set of configuration options are shown in a pop-up menu. The available options vary between different visualization types and which axis the user clicks on. On touch devices, taping on an axis invokes the pop-up menu.
Quick configuration options on the categorical axis of a barchart

Quick configuration options on the value axis of a barchart

Configure Mapcharts in Business author

It is now possible to create map charts in the web authoring client. Users can select to create map charts with either one marker layer or one feature (shape) layer.
If the data contains longitude and latitude, these values are used to place markers or shapes. If the data has no longitude or latitude, Spotfire places markers or shapes based on geo coding (translating the name of known states, cities etc. to geographical positions.

**Improved Context menu in Business Author**
The context menu that is available through right-click in the visualizations have been extended with two new operations

- Duplicate visualization
- Reach the visualization properties window

**Advanced Analytics**

**Syntax highlighting in TERR Scripts**
To make TERR scripting easier and more productive, when writing TERR scripts in Spotfire for either Data Functions or Expression Functions, different elements will automatically be highlighted in different colors.

**TERR Tools**
Under the Tools menu you can now access TERR Tools which are a collection of useful features when working with TERR. For example, it is now possible to launch a TERR console, access the TERR language reference and launch RStudio (if installed on your machine). It is also now much easier to install R packages locally for use with the embedded TERR engine.
Broader R compatibility in TERR

The embedded TERR engine features much broader R compatibility, performance improvements and many features for integration with a variety of products. See the TERR Release Notes for full details.

Highlights include:

Non-linear optimization
Comprehensive support for non-linear optimization, including nlme, nls and nlminb.

Broader Package Compatibility
Including broad compatibility with RCurl, caret and many Rcpp-dependent packages (such as plyr, reshape2 and initial compatibility with dplyr).

Curve/contour functions
TERR now supports the following functions related to curve/contours, which can be used to compute curves for plotting in Spotfire.
• loess family of functions (fitting local regression models to multiple predictors)
• loess.smooth (scatterplot smoother using local regression).
• chull function (convex hull)
• contourLines (Calculate contour lines)
Other Improvements

Add transparency to WMS layers
The user can now set the level of transparency when using WMS layers in a map chart. This allows overlapping the base map with WMS layers, but still being able to see information from the base map through the WMS layers. This capability is available in the installed client only.

Example of overlaying the base map with a WMS layer without transparency (right) and with transparency (left)

Trellis item in the legend
The legend now indicates which column that is used on the trellis axis.

Drop target to remove a column from an axis
By dragging a column from the axis to the new “Remove” drop-target, a column can be removed from an axis using a drag and drop operation.

Hierarchy slider for timespan columns
Just like for DateTime columns, columns of type TimeSpan now automatically get a Hierarchy slider.
**Improved Organize filters dialog**
The organize filters dialog now includes a search capability and the capability to select/deselect all filters in a specific data-table or group.

![Organize filters dialog](image)

**Search for a column hide or show all columns in a specific data table**

**Improved Script Management and Script Trust**
When opening a DXP file contains scripts that are not trusted, the user is notified and a dialog enabling the user to easily review and trust all scripts if he wants. The dialog is also accessible at any time from the document properties dialog and serves as a central access point to reviewing or editing any script in the DXP file.
The Scripts tab in Document Properties gives an overview of all scripts in the DXP, and works as an access point for reviewing or editing them. If scripts are not Trusted, the tab works as an access point for trusting them as well.

New expression language functions

- BinByTimeSpan – a binning method for timespan columns
- Find with optional third argument for multiple matches
- Base64Encode/Base64Decode
**File cache for scheduled updates**

Minimize downtime when restarting the web player server by letting the scheduled updates be cached. This avoids having to reload all scheduled updates jobs when restarting a web player server.

```xml
<scheduledUpdates ...>
  <cacheSettings enabled="true" path="C:\TIBCO\Spotfire\FileCache"
maxDiskSizeMb="0" cleanerIntervalMinutes="1" maxAgeMinutes="1440"/>
</scheduledUpdates>

Use a network path to share the cache between several Web Player servers.

**SBDF cache on web player server**

In-memory cache of Geo Coding tables enables faster map charts on web clients.

```xml
<sbdfCache enabled="true" cacheTimeoutMinutes="30" />  
It is possible to configure it to cache other SBDFs that are not geocoding tables. The default query picks out only geocoding tables but it is possible to configure it to cache other files as well.

```xml
<sbdfCache ...>
  <preloadSettings enabled="true" libraryCheckIntervalMinutes="10"
librarySearch="MapChart.IsGeocodingTable::true AND MapChart.IsGeocodingEnabled::true"/>
</sbdfCache>

**Enhanced preview when creating calculated columns**

The new preview dialogue displays a 100 row preview of the calculated column next to its input columns.
Automatic sorting of months and days
Spotfire now automatically finds months and weekdays columns in in-memory data and automatically sorts these in the expected order. Spotfire uses the existing custom sort order feature which makes it easy to adapt the sorting if needed.

Spotfire now also recognizes images in data blobs.
Automatic update of data tables based on other data tables
Tables that are created with another data table as source are now automatically updated when the source table is updated.
Memory usage and load times saved as analysis file metadata
It’s now easier to see how much memory an analysis file is using and how long it takes to load an individual file as this can be viewed as metadata attached to the dxp files in the Spotfire Library.
API improvements

Library for creating and reading SBDF files and streams (C# and Java)
This is a library for creating binary SBDF files. It can be used to both read and/or create binary files that can be used for TIBCO Spotfire and TERR. The binary SBDF files have an advantage in that they are optimised for reading data fast, and as such present one of the fastest ways of getting data into and out of TIBCO Spotfire.

The library has a License with redistribution rights.


Support for cancelling data functions / on-demand jobs.
We’ve added support for getting information about current background processes as well as a way of cancelling them.

Improved API for Column Matches
There is a new constructor available for setting up column matches that allows for adding transforms to the supplied expressions. The transforms are applied on the values after they are retrieved from an external system, and can therefore use the full transformation language available in TIBCO Spotfire, as opposed to the sometimes more limited expressions that are available in data connectors.

DataTableDataSource support for automatic refresh
The DataTableDataSource now has an option to be automatically refreshed when the underlying DataTable is refreshed.

API for Sorting of persistent data view
When setting up a persistent data view the view was previously sorted by the grouping by default. It is now possible to sort it by other columns instead.

API to Get and set custom sort order for columns
There is now an API to check if the column has a customer sort order, to get or set the custom sort order.

API to get all methods supported by a data table (name, description, display name)
It is now possible to obtain all supported methods (custom expression functions) supported by a data table, which is useful for example for external data tables. There is also an API to check if a data table is external or not.

RefreshAsync API provides a call-back after on demand or data function completes
It is now possible to check if an on demand or data function job has finished through a call-back.