Visual Analytics for the Masses

1   State of Visual Analytics

Visual analytics, in the field of business intelligence, is the integration of data visualization and interactive visual interfaces for reasoning and observation making. Before data visualization was widely adopted in the area of business intelligence, visual analytics was mostly applied in the scientific and research fields. As such, it normally involved a different set of tools and methods than its application in business.

Visual analytics in business is a relatively recent phenomenon. Many advanced concepts from scientific research concerning visual analytics have only recently been included in business software. Some people may argue that since the advent of Excel, producing graphs has been a common business activity. Therefore, visual analytics should have a history at least as long.

However, visualization and visual analytics is much more than just producing a bunch of charts. In fact, as demonstrated by many researchers in this field, badly conceived charts can cause more harm than good. If not designed following effective visual design guidelines, a chart can create a more compelling lie than mere words.

In this white paper, we define visual analytics tool as a software or application, through which users may interact with and explore data using the visual interface, and arrive at insights that are not obvious from staring the underlying raw data. It's out of the scope of this paper to discuss the criteria for qualification to be a visual analytics tool. We will instead focus on the distinctions of how the tools serve the user, with the assumption that they do follow the well established visual analytics principles and theories.

1.1   Audiences

There are two camps of users for visual analytics tools:

1. Analysts who are trained in analysis techniques, and often analyze data on a full-time basis.
2. Business users who don't have any formal training in data analysis but need access to business insights as part of their daily activities.

Of course there are finer grades of categorization. For example, analysts could be statisticians with PhD's in math, or they could be people who have taken the time to learn the basic statistical concepts and are well versed in computer software. Since we are focused on addressing the problem of providing visual analytics to the masses, we will direct our attention to the business users, who are our target audiences.

By our definition, business users are not proficient in the mathematics behind the analysis. They are generally competent in interpreting the result of visualization, but are normally not adept at creating new visualizations. With this assumption, let's proceed to examine the different approaches to serve this community, and how the various solutions differ in the tradeoff between simplicity and flexibility.

There are two main usage scenarios: Analyze-and-Publish, and Design-and-Deploy. We will explore the differences and the identifying characteristics next.

1.2　Analyze-and-Publish

The target users for the analyze-and-publish tools are mostly analysts. The normal business flow of this type of tool involves the analysts using the tool to discover insights, and then publish and share their results with business users.
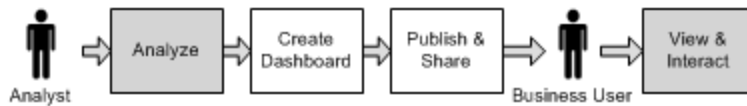

In this flow, the most important steps are the first and last. The whole process is normally triggered by a need of an analyst to check and hypothesize, and then the analyst proceeds to use the analytics tool to analyze the data. Once insight is discovered, the analyst may decide it's worth sharing. As a result, s/he would create a dashboard and publish it to be viewed by a wider business user community.

The key is that the activities revolve around the analyst. S/he is the instigator of the analysis, the creator of the contents to be shared, and the business users are merely the recipients of the information that the analyst decided to share.

To support this activity, the software tool normally has the following characteristics:

1. It's normally a desktop-based application.
2. It resembles more an application (e.g. Excel) than a development tool (e.g. Report Designer).
3. A Web option is available for publishing and sharing the result of the analysis.
4. There is no or very limited programmatic (e.g. scripting) support. Almost all interactions on the published output rely on the built-in interactions and relationships. The interface is typically a drag-and-drop interface, where the user starts from a blank slate, and creates a visualization from the scratch.
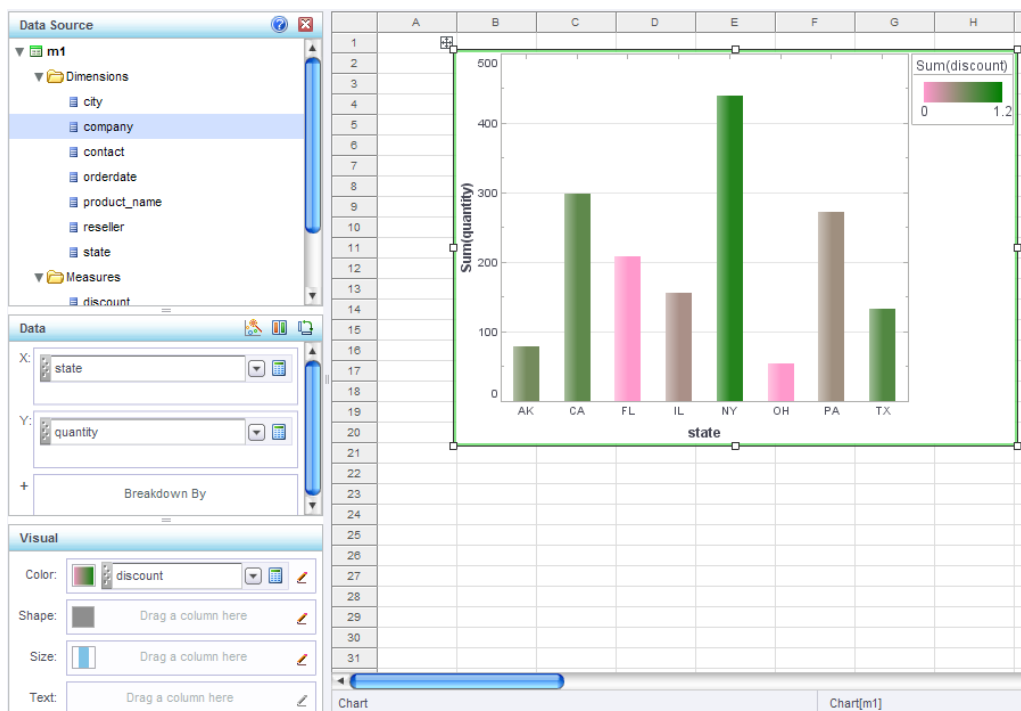
1.3   Design-and-Deploy

The design-and-deploy approach differs from the analyze-and-publish approach in two key points. First, the direct users of the tool are usually IT professionals, who create interactive visual interfaces to be used by business users (the end user). Furthermore, the goal of the exercise is to create an application-like interface that is shared by a large population of users, with elaborate requirements and planning. Instead of a drop-and-drop desktop application, the user interactions are normally performed through point-and-click actions and simple brushing and selection.
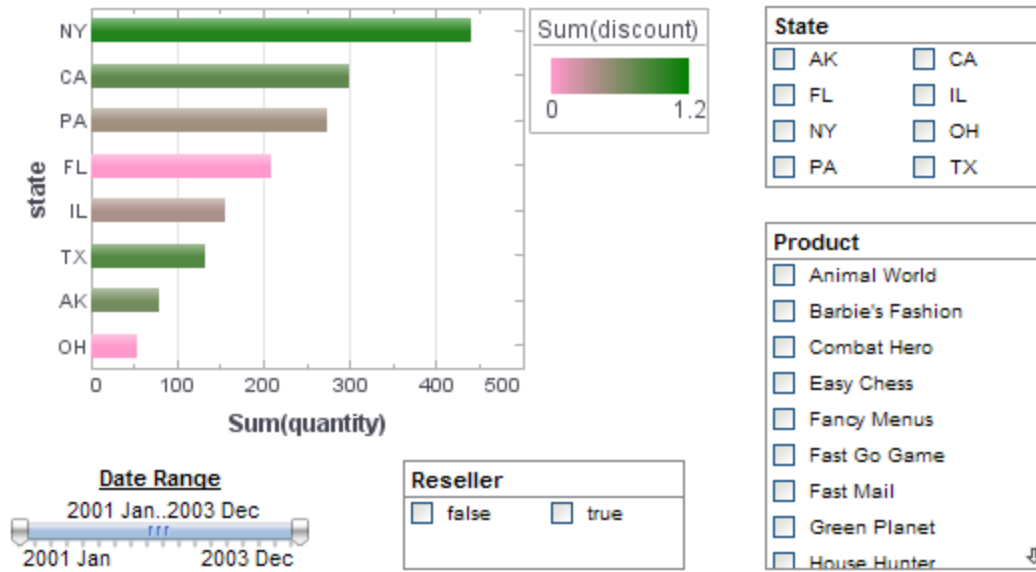
The design-and-deploy process looks like the following:
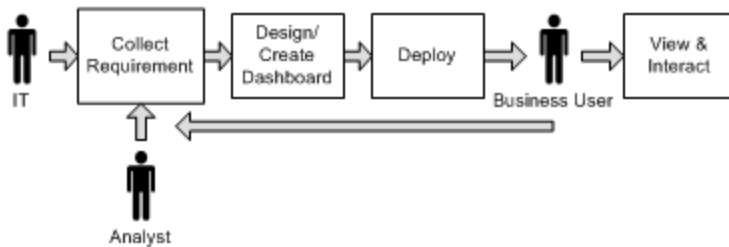
Unlike the analyze-and-publish approach, the IT is the key in creating the visualization. Both analysts and business users help create the requirements and design of the dashboard. IT is typically responsible for implementing the dashboard and deploys it on an information management infrastructure for access by a large population of users.

In this picture, the analyst plays an adviser type of role, and the business user drives the requirements and is the ultimate user of the end product.

The tools that support this usage scenario are characterized by the following:

1. It has a strong design interface that is typical for developers.
2. It provides features to support team development and allows reuse of common components.
3. A rich programmatic interface is provided to encode business logics that are not normally captured by the default associations and relationships in the database.
4. The server environment provides enterprise level deployment options such as security, access control, user management, and high performance data processing.

Of course it's not to say there is no overlap between the two tools. After all, many analysts are well versed in database and basic programming concepts to serve as a casual developer. It's also quite common for business users to gradually mature into analysts as his/her business and analytical skills grow overtime.

But the basic distinction is clear, and different characteristics are obvious. In selecting an appropriate tool for visual analytics, it's not a matter of which is better, but what usage scenario matches your situation and narrowing your search by understanding the differences.

2   Style Scope

The visual analytics tool from InetSoft, Style Scope, is designed to serve the design-and-deploy usage model.

2.1   Design & Create

The creation of a dashboard happens in a Web-based rich client interface. But before any visual component is created, there are normally other steps to be performed to prepare for that stage:

1. A data modeler is provided as part of the tool set to model databases and create queries and data models.
2. A data composer is part of the design environment and is ideally suited to prepare data specifically to be used in a visualization. It could be used to massage data into forms that are readily used in a dashboard or code business logics as part of the data processing.
3. The visual design environment provides a rich JavaScript API to code business logics and interactions. Simple interactions and data relationships are automatically maintained, but scripting allows additional logic to be included.

The same design interface could be exposed to advanced users to create new dashboards or make small modifications. But it's primarily intended to be used by developers to create interactive dashboards.

The data access drag-and-drop interface is also available on the viewer and can be made available to advanced users. This is ideal when the user population consists of both casual users and users who are more skilled in analysis who could perform some ad hoc analysis on their own.

2.2   Deploy

A dashboard created through the visual composer is automatically deployed on a Web server. Style Scope comes with a sophisticated security system to control the access to the components and data. For

example, it's possible to share a dashboard among users with different access control, and the server can automatically restrict the access to sensitive data and only expose the authorized sub-set to each user group.

The Style Scope server also provides an advanced data-caching layer based on the columnar database concept in a grid architecture. It can be deployed as a distributed data grid and enables near instantaneous response to user interactions for large volumes of data.

It also contains a robust set of enterprise deployment features:

1. User management for large user populations, and options to integrate with existing enterprise application architectures.
2. Audit log to track access and analyze usage.
3. Server monitoring for high availability and easy performance tuning.
4. Failover and improved scalability with a clustering option.

3   Conclusion

Style Scope is a unique blend of modern interactive visualization and robust enterprise deployment runtime. It's ideally suited to be used as a development and deployment environment for enterprise analytical and visualization applications. The features provided by Style Scope go beyond the default data association and allows developers full control of the interactivities.

Given the overlapping between the analyze-and-publish and the design-and-deploy options, the distinctions may not be as obvious when we only look at the end result of the production. However, the differences are substantial, and it's a decision that has to be made based on the actual needs with the understanding of the two different intended usages.

For more information on InetSoft's Style Scope software, please visit www.inetsoft.com.