Tableau's data visualization software is provided through the Tableau for Teaching program.

http://www.tableausoftware.com/data-visualization-software
Mission

“Enable researchers to gain keen insight into their data by equipping them with tools and resources that will allow for visualizing the expected, and discovering the unexpected in their data.”

~ Vetria

Clemson Computing and Information Technology
Center of Excellence in Next Generation Computing

Agenda

• Introduction to Visualization (High level)
  – Purpose
  – Process
• Visualization Applications
• Introducing Tableau
• Q&A
INTRODUCTION

What does visualization mean?

To make visual or visible

Dictionary.com
What is the purpose of visualization?

“The purpose of visualization is “insight”, not pictures.”

~Ben Shneiderman
in•sight [in-sahyt]

An instance of apprehending the true nature of a thing, especially through intuitive understanding.

Dictionary.com

An understanding of relationships that sheds light on or helps solve a problem.
“The greatest value of a picture is when it forces us to notice what we never expected to see.”

~ John Tukey, 1977

Why is “insight” important?
Why is “insight” important?

- Analysis of Data
- Explanation
- Discovery
- Decision Making
- Tells a story

Basics of Visualization

- The process of visualization is taking raw data and converting it to a form that is viewable and understandable to humans.
Basics of Visualization

• The process of visualization is taking raw data and converting it to a form that is viewable and understandable to humans.
**Visualization Applications**

- **Input Data**
  - Biological Data
  - Non-Numerical Data
  - Geospatial Data
  - Simulated, 3D Phenomena

- **Research Fields**
  - BioVis
  - InfoVis
  - GeoVis
  - SciVis

---

**Information Visualization**

- Emerged from Research in
  - Human-Computer Interaction
  - Computer Science
  - Graphics
  - Visual Design
  - Psychology
  - Business Methods
Information Visualization

• Often applied to data that is not generated by scientific inquiry
  – Non-numerical information
  – Survey data
  – Social media
  – Test scores
  – Shopping habits
  – Etc.,

Information Visualization

• Researchers aim to provide compact graphical presentations and user interfaces
  – interactively manipulating large numbers of items
  – possibly extracted from far larger data sets

Facebook has more than 901 million active users generating social interaction data.

Wal-Mart handles more than 1 million customer transactions an hour.

340 million tweets are sent per day. That's nearly 4,000 tweets per second.
Information Visualization

- Information visualization focused on the creation of approaches for conveying abstract information in intuitive ways.

<table>
<thead>
<tr>
<th>City</th>
<th>Product Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer ID</td>
<td>Product Container</td>
</tr>
<tr>
<td>Customer Name</td>
<td>Product Name</td>
</tr>
<tr>
<td>Customer Segment</td>
<td>Product Sub-Category</td>
</tr>
<tr>
<td>Order Date</td>
<td>Region</td>
</tr>
<tr>
<td>Order ID</td>
<td>Row ID</td>
</tr>
<tr>
<td>Order Priority</td>
<td>Ship Date</td>
</tr>
<tr>
<td>Postal Code</td>
<td>Discount</td>
</tr>
<tr>
<td></td>
<td>Product Base Margin</td>
</tr>
<tr>
<td></td>
<td>Profit</td>
</tr>
<tr>
<td></td>
<td>Quantity ordered new</td>
</tr>
<tr>
<td></td>
<td>Sales</td>
</tr>
<tr>
<td></td>
<td>Shipping Cost</td>
</tr>
<tr>
<td></td>
<td>Unit Price</td>
</tr>
</tbody>
</table>
About

http://www.tableausoftware.com

Tableau for Macs

• Mac version will be released in the next couple weeks.
  – Once it’s available, students will be able to use the key and landing page (info sent via email) to download it.

• http://kb.tableausoftware.com/articles/knowledgebase/tableau-products-mac
Products

• Tableau Desktop – Fast Analytics
• Tableau Server - Collaboration
• Tableau Online – Cloud
• Tableau Public - WWW

Opens Data From

Desktop

• Actian Vectorbase 1.5 or later
• Amazon Redshift
• Cloudera Hadoop Distribution via Hive (CDH4/5, which includes Hive 1.1, or later, with options for Beehive and Hivemask)
• Cloudera Impala 1.0 or later
• DataStar Enterprise Edition 2.2 or later
• EMC Greenplum 4.0 or later
• EXASQL 4.2 or later
• Firebird 2.0 or later
• Google Analytics
• Google BigQuery
• Hortonworks Data Platform (HDP) 1.1 or later
• HP Vertica 4.x or later
• IBM DB2 9.1 or later for Linux, UNIX, or Windows
• IBM Netezza release 4.6 or later
• MapR Distribution for Apache Hadoop
• Microsoft Access 2003 or later
• Microsoft Excel® 2003 or later
• Microsoft PowerPoint 2009 (whether or not published in SharePoint) or later
• Microsoft SQL Server 2005, 2008, 2008R2, or 2012
• Microsoft SQL Server Analysis Services 2005, 2008, 2008R2, or 2012 (Multi-dimensional mode only)
• Microsoft Windows Azure Marketplace Datalink
• MySQL 4.0 or later
• OData
• Oracle Database 10.x or later
• Oracle Hyperion EPM 11.1.1.2 or later
• ParAccel Analytic Database (PADB) version 3 or later
• PostgreSQL 8.3 or later
• Progress OpenEdge 10.2B patch 4 or later
• Salesforce.com, Force.com, and Database.com
• SAP HANA 1.0.035 or later
• SAP NetWeaver Business Warehouse 7.30 with SP20+ recommended, also requires SAP GUI for Windows 7.20 Client or later
• SAP Sybase ASE 15.5 or later
• SAP Sybase IQ 15 or later
• Splunk Enterprise 6 or later
• Teradata v8.0 16.2 or later
• Teradata Aster Data /Cluster 4.5 or later
• Teradata OLAP Connector 14.10 or later
• Text files — comma separated values (CSV) files
• Also, many databases and applications that are ODBC Version 3.0 compliant
Desktop

- License Keys provided via email
- Valid for 1 year (June 02, 2015)

- Show Me Feature
- Drag & Drop Technology
- Web Offering on Mobile Devices

Getting Started

- Watch product tour
- Watch Training Videos
- Publish dashboards to web

Data

Connect to data

Saved data sources
- Sample - Coffee Chain (Access)
- Sample - Superstore - English (Extract)
- Sample - Superstore Subset (Excel)
- Sample - World Bank Indicators (Excel)

Sample Workbooks

- World Indicators
- Finance
- Sales
- Science
Quick Tour – Byrd’s Eye View

http://www.tableausoftware.com

CONNECTING TO DATA
Connect to Data

- In a file
  - Tableau Data Extract
  - Microsoft Access
  - Microsoft Excel
  - Text File
  - Import from Workbook

- Server
  - Tableau Server
  - IBM DB2
  - MapR Hadoop Hive
  - Microsoft SQL Server
  - My SQL
  - Oracle
  - Salesforce
  - Google Analytics
  - Other Data (ODBC)
Connect locally

- Excel file
  - Microsoft Excel
- Sample – Superstore Sales (Excel.xls)
- Ships with Tableau

Connect to Data

In a file
- Tableau Data Extract
- Microsoft Access
- Microsoft Excel
- Text file
- Import from Workbook

OR

Saved data sources
- Sample - Coffee Chain (Access)
- Sample - Superstore - English (Extract)
- Sample - Superstore Subset (Excel)
- Sample - World Bank Indicators (Excel)

Excel Workbook Connection

Step 1: Select an excel workbook

Step 2: Select the worksheet (table) to analyze

Step 3: Does the data include field names in the first row?

Step 4: Give the connection a name for use in Tableau
Data Connection

- **Connect Live**: Connect directly to your data; speed of data source determines performance
- **Import all data**: Import all of your data into Tableau’s data engine
- **Import some data**: Select a subset of your data to import

Data Connection

- **Connect Live**: Data updates frequently
  - Every time you update the data the results show in the visualization
- **Import all data**: Useful when importing big data
- **Import some data**: Useful when importing big data
Tableau connects data and automatically generates **dimensions** and **measures** brought straight from the dataset.

**Dimensions:** Identifiers
**Measures:** Numbers

---

**Start Asking Questions**

**What are my total sales?**

Click or Drag and Drop Sales.
Start Asking Questions

What are my total sales by Container?

Add a subcategory: Department

Just 3 Drag & Drops
One click sorting:
Ascending by Sales
Group different subcategories
Add Labels

Add Profit Numbers
• Drag and Drop Profits over graph
• Show Me Icon Appears (release mouse)
  • Tableau gives you the best way to visualize the data
  • Given Tableau’s visualization best practices
**Sum Profit**
- Added to Color shelf
- Easy to see which items are doing better than others
- Hover over each bar for more information

**Swap easily to see a different view**
Add Region

Easily Change Thins
Column for Each Region

Hover over a field to see the actual data points

Click view data
All changes made within Tableau Right Click Save for subsequent sessions with this data; save the meta data
VIEWING DATA OVER TIME
• Double Click Sales
• Drag Order Date to Columns

• Time data has drill-ability
  – Year
  – Quarter
  – Month
• Time data has drill-ability
  – Year
  – Quarter
  – Month
• Click + to expand; - to retract

• Right Click on Month(Order Date) and choose a continuous month view
Easy Forecasting

- Right click on white space
- Select Forecast
- Show Forecast

Right Click
Show Forecast

- Forecast Options
  - Forecast Length
  - Source Data
  - Forecast Model
  - Describe Mode
SHOW ME FEATURE

Select new Tab
Good place to start when you've got data and you don't know where to start in terms of visualization

Show Me gives you chart types to help you to begin your analysis

Hover over the chart types and Show Me will tell you what dimensions, measures and how many of each are needed to generate the chart.
1. Click State (Dimension)
   Tableau automatically recognizes as geographic in nature
2. Go back to Show Me feature and click Field Map

Tableau automatically generates a map where you have data
It's ready for more data: Drag & Drop
- Profit to the Color Mark
- State to the Label Mark
Iteration

- Save Bar chart
- Duplicate Worksheet
- Iteration is the showpiece
  - Show Me Tab
  - 23 Chart Types

- Tableau automatically populates the visualization with dimensions and variables necessary to build the chart

Training and Tutorials From Tableau

- On Demand – Free
- Live Online Training – Free
- Class Room Training

http://www.tableausoftware.com/learn/training
Free Tableau Desktop

• Instructors who are faculty
  – Interested in teaching with Tableau

• Students who are
  – Enrolled full time

Advanced Visualization

• If there is interest:
  – Training
  – Hands on Workshops

Topics
• Introduction
  – Working with data
  – Formatting
  – Calculations
  – Dashboard development

• Advanced
  – Basic Mapping
  – Google Analytics
TEST DRIVE TABLEAU

Tableau Public - WWW

http://myweb.clemson.edu/~gammill/irnc/index.html

look for download button at bottom of page to get spreadsheet.

The data is a list of scientific facilities around the world that are either generating or storing large amounts of data of interest to the int’l science community.

Please DO NOT distribute the data to anyone. If you want to publish (eg., poster, in powerpoint) your images anywhere contact Dr. Jill Gemmill (jbg@clemson.edu) before doing so.
A BEGINNER’S GUIDE TO VISUALIZATION

Featuring

REU Site Collaborative
Data Visualization
Applications
June 10, 2014

Vetria L. Byrd, PhD
Advanced Visualization, Director
REU Coordinator
Visualization Scientist
vbyrd@clemson.edu

Clemson Computing and Information Technology
Center of Excellence in Next Generation Computing