“Power” Tools for IR Reporting

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AIR Annual Forum 2014

- 10,107 students
- Master's Comprehensive
- Mountain location
- Residential and Distance

Why Pivot Tables
- Summarize large datasets
- Quickly add, remove, rearrange elements
- (Little to) No formula-writing
- Can be a basis for self-service data
- Can connect to a refreshable data source
Limitations of Pivot Tables

• Connected to only 1 table
• Formatting not maintained
• Calculated fields need to be created for each Pivot Table
• Can’t count the way universities usually want to count

Connecting to Data

• Wide variety of data sources, including:
  – Access
  – SQL Server
  – Text files (.csv)
  – XML
  – OLEDB
  – Etc.
Connecting to Data

- Connects to:
  - Tables
  - Queries
Connecting to Data

Displaying Data – Pivot Tables

Connecting to Data
Displaying Data – Pivot Tables

Displaying Data – Pivot Tables

Displaying Data – Power Pivot

New and improved Pivot Tables!
Displaying Data — Power Pivot

- **Set-up**

  - Installed with Excel 2013
  - Downloadable add-in for Excel 2010
  - Not available prior to Excel 2010

Displaying Data — Power Pivot

- **The Power Pivot environment**

  - Open Power Pivot
  - Data Model
Displaying Data — Power Pivot

• Import data

Displaying Data — Power Pivot

• How the imported data look

Displaying Data — Power Pivot

• Bringing data into Excel
Displaying Data — Power Pivot

- **PivotTable vs. Power Pivot PivotTable**

- **DAX**
  - Data Analysis Expressions (DAX)
  - Formula language for Power Pivot
  - Used to create Calculated Columns and Calculated Fields

- **Calculated Columns**
  - Used to add an additional column to data table
  - Can be a column added from a related table (like a VLOOKUP) or new data, derived from existing data (sum to combined SAT, length of name, substring of longer string, etc.)
  - Column can be used in any area of the pivot
Displaying Data — Power Pivot

• Adding a calculated column to pivot table

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Labels</td>
<td>Count of R</td>
<td>Average SAT Count</td>
</tr>
<tr>
<td>Information Management</td>
<td>138</td>
<td>1088.19819</td>
</tr>
<tr>
<td>Information Management</td>
<td>116</td>
<td>1088.18819</td>
</tr>
<tr>
<td>Library Science</td>
<td>37</td>
<td>1067.552941</td>
</tr>
<tr>
<td>College of Journalism</td>
<td>67</td>
<td>1045.5</td>
</tr>
<tr>
<td>Journalism</td>
<td>67</td>
<td>1045.5</td>
</tr>
</tbody>
</table>

Evaluation Contexts

• Row context

• Filter context

Evaluation Contexts

• Row context
  • The one row being evaluated
  • Automatic for calculated columns
  • Can be created in other ways as well (SUMX, AVERAGEX, etc.)

• Filter context
Row Context

- The filters being applied by the pivot table
- Filters can be explicit or implicit
- Can add additional filters only with CALCULATE

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Filter Context
Displaying Data — Power Pivot

- **Calculated Fields**
  - Used to add a calculated element
  - Aggregate function that applies to whole table, column, or range
  - Something that needs to be recalculated
  - Fields can only be used in the VALUES section

Displaying Data — Power Pivot

- **Adding a Calculated Field**

Displaying Data — Power Pivot

- **Adding a Calculated Field**

- **DISTINCTCOUNT(WorkerID)"**
Displaying Data – Power Pivot

- Calculated Field in Power Pivot

- DISTINCTCOUNT

  DISTINCTCOUNT( <column> )

  - Counts unique values in column
Displaying Data — Power Pivot

• Adding a Calculated Field

```
| College of Information Studies | 151 | 152 |
| Information Management         | 116 | 116 |
| Information Management         | 116 | 116 |
| Library Science                | 37  | 37  |
```

Displaying Data — Power Pivot: DAX CALCULATE

• CALCULATE

CALCULATE(expression, <filter1>, <filter2>…)

– Supercharged SUMIFS
– Allows filtering (IFs) on any aggregate function (imagine “MAXIFS”, “MEDIANIFS”, etc.)
– Operators for filters: =, <, >, <=, >=, <>
– Can also use | | in filter on same column

First-time Freshmen Distinct Students :=

```
CALCULATE( [Distinct Students],
            WorkshopData[Class level]="Freshman",
            WorkshopData[Is new student this term]="Yes")
```
Displaying Data — Power Pivot: DAX CALCULATE

Table 1: Calculating Distinct Enrolled Students

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Freshmen</th>
<th>Sophomores</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-2010</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>2010-2011</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2011-2012</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Displaying Data — Power Pivot: DAX ALL

- **ALL**

  ```dax
  ALL( table_or_column, <column1>, <column2>, …)
  ```

  - Returns all the rows in a table, or all the values in a column, removing any filters that might have been applied

  ```dax
  All Distinct Enrolled Students:=
  CALCULATE( [Distinct Enrolled Students],
              ALL( WorkshopData[Class level] ) )
  ```
Displaying Data — Power Pivot: DAX ALL

% of All Distinct Enrolled Students := 
DIVIDE( [Distinct Enrolled Students], 
[All Distinct Enrolled Students] )

• DIVIDE
DIVIDE( <num>, <den>, [<alt>] )

  – “Safe” divide
  – Can specify alternate result for divide by zero
Displaying Data — Power Pivot

FILTER

FILTER( TableToFilter, FilterExpression )

– Returns a table filtered by FilterExpression

Displaying Data — Power Pivot: DAX FILTER

Above Average GPA Enrolled Undergraduates:

CALCULATE( [Distinct Enrolled Students],
FILTER( WorkshopData,
WorkshopData[Institutional cumulative GPA] > [Average GPA Enrolled Undergraduates] ) )
Displaying Data – Power Pivot: DAX FILTER

- **ALLEXCEPT**
  
  \[ \text{ALLEXCEPT( } \text{table}, \text{ <column>[, <column>…]} \) \]
  
  - Similar to ALL function, but excludes the column(s) specified from the ALL.
Displaying Data — Power Map and Power View

• Power Map
  – Automated way to map geographic data
  – Doesn’t require geo-location information like longitude and latitude (just country, state, or county names)
  – Can add elements to look at aggregate function on variables across physical space
Displaying Data — Power Map and Power View

• Power View
  – Dashboard builder
  – Allows synchronized filtering
  – Bring together tables, graphs, maps
Power Query – Advanced

• Retrieve data from a variety of external sources
  • Pull in external data from the Internet
• Limit the data you bring into your model (filter on rows and columns)
  • Keep your model to a reasonable size (< 1M records) to prevent processing problems
  • Bring in only what you need

• Consolidate multiple tables into one
Power Query – Advanced

- Consolidate multiple tables into one
- In-line data transformations
- All transformation steps are listed, and reversible

Access to sources of data not readily available to Power Pivot
Power Query – Advanced

- Facebook pages and groups

- Drill down for additional data fields in Facebook records

- Availability of data fields depends on your personal status with the group/page, and Facebook data fields completed and available

Power Query – Advanced

- Employment data
Power Query – Advanced

- Connect to online faculty database
  - Import active users from Digital Measures
  - Merge with local data
  - Export updated data to Digital Measures

Power Query – Advanced

- Microsoft SQL Server and Access
Resources

• Rob Collie (http://powerpivotpro)
  – DAX Formulas for PowerPivot, 2013
• Bill Jelen (http://mrexcel.com)
  – PowerPivot for the Data Analyst: Microsoft Excel 2010, 2010
• Alberto Ferrari and Marco Russo
  – Microsoft Excel 2013: Building Data Models with PowerPivot
• Chris Webb (http://cwebbbi.wordpress.com)
• Kasper de Jonge (http://www.powerpivotblog.nl)
• Purna Duggirala (http://www.chandoo.org/)

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