

تحليل الأعمال والبيانات باستخدام Power BI الجزء الثاني

Business and Data analysis by using
Power BI
2Part



مقدمة عن ال DAX

Data analysis Expressions

هي لغة نستخدمها لنستطيع عمل عمليات حسابية أكثر تعقيداً ومتقدمة لكي توصلنا لتفاصيل أعلى
من البيزنس الخاص بنا.

وتنقسم إلى:

- Calculated Column •

- Measures •

Calculated Columns

- الأعمدة الحسابية تقوم بإضافة قيم جديدة لكل صف من صفوف الجدول كنتاج لعملية حسابية معينة
- Calculated columns generate values for each row, which are visible within tables in the Data view
- الأعمدة الحسابية تعمل على مستوى الصف، وليس التجميعية الكاملة برقم فردي
- Calculated columns understand row context; they're great for defining properties based on information in each row, but generally useless for aggregation (SUM, COUNT, etc)

Calculated Columns

- قم باستخدام الأعمدة الحسابية عندما ترغب في إضافة معلومات ثابتة بشكل دائم مع محتوى الجدول
- Use calculated columns when you want to “stamp ” static, fixed values to each row in a table (or use the Query Editor!)
- لا تستخدم الأعمدة الحسابية عندما ترغب في عمل عمليات حسابية، أو جمع متوسط للقيم أو أي قيم تريد تحليلها رقمياً كقيمة في المستقبل
- DO NOT use calculated columns for aggregation formulas, or to calculate fields for the “Values ” area of a visualization (use measures instead)

Measures

- تأثير القياسات Measures يمتد على جميع جداول الأعمدة مثل الأعمدة الحسابية على عكس الأعمدة الحسابية فإن Measures لا تظهر داخل جدول البيانات، فالمكان الوحيد التي يمكن استخدامها به هو Values

داخل ال Pivot Table

- Like calculated columns, measures reference entire tables or columns
- على نقيض الأعمدة الحسابية - تلك القيم غير المرئية في الجداول يمكن فقط رؤيتها عن طريق صورة مثل رسم بياني
- Unlike calculated columns, measure values aren't visible within tables ; they can only be “seen ”within a visualization like a chart or matrix

Measures

• Measure تقوم بتغيير القيم الخاصة بها بناء على محتوى الفلتر المستخدم مع البيانات، وهذا يعني أن Measure تعيد العمليات الحسابية بمجرد تغير الفلتر لإعطاء نتائج مختلفة مطابقة ومناسبة للفلتر الجديد

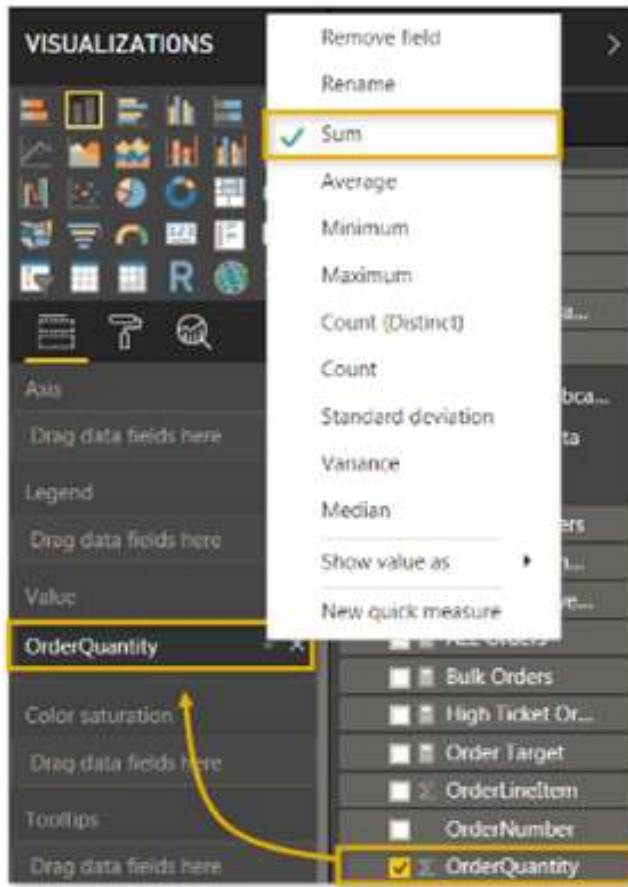
- Measures are evaluated based on filter context, which means they recalculate when the fields or filters around them change (like when new row or column labels are pulled into a matrix or when new filters are applied to a report)

Measures

• قم باستخدام Measures وليس الأعمدة الحسابية عندما تكون المعلومة غير ملائمة للسكن داخل صفوف الجدول، أو بمعنى آخر عندما ترغب في جمع أو إعطاء متوسط، وغيرها من العمليات الجمعية الشاملة

- Use measures (vs. calculated columns) when a single row can't give you the answer (in other words, when you need to aggregate)

Implicit Vs Explicit Measures



- هو إضافة حقل حسابي إلى منطقة القيم ليتم حسابه
- Implicit measures are created when you drag raw numerical fields (like “Order Quantity seulav eht otni (“notiagergga eht tceles yllaunam dna lausiv a fo enap (cte ,xaM/niM ,egarevA ,muS) edom
- هو إنشاء عملية حسابية متغيرة بتغير المعطيات
- Explicit measures are created by actually entering DAX functions
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Understanding Filter Context

ProductName	Total Orders	Return Rate
Water Bottle - 30 oz.	1184	1.96 %
Road Tire Tube	829	1.67 %
AWC Logo Cap	803	0.93 %
Patch Kit/8 Patches	798	1.57 %
Sport-100 Helmet, Red	755	2.79 %
Touring Tire Tube	702	1.35 %
Sport-100 Helmet, Blue	666	3.15 %
Sport-100 Helmet, Black	626	3.67 %
Road Bottle Cage	560	1.58 %
Mountain Tire Tube	554	1.95 %
Mountain Bottle Cage	539	1.38 %
Touring Tire	427	1.16 %
LL Road Tire	421	2.02 %
Fender Set - Mountain	378	1.82 %
ML Road Tire	297	1.72 %
ML Mountain Tire	266	1.94 %
HL Mountain Tire	206	3.40 %
Mountain-200 Silver, 46	199	1.11 %
Mountain-200 Black, 46	195	3.06 %
LL Mountain Tire	195	2.09 %
Mountain-200 Silver, 38	189	2.65 %
Bike Wash - Dissolvent	187	2.38 %
Mountain-200 Black, 42	182	3.85 %
Mountain-200 Black, 38	180	3.33 %
Long-Sleeve Logo Jersey, M	161	4.35 %
HL Road Tire	158	5.06 %
Mountain-200 Silver, 42	157	1.28 %
Hydration Pack - 20 oz.	147	4.08 %
Long-Sleeve Logo Jersey, L	147	2.72 %
Long-Sleeve Logo Jersey, S	130	2.31 %
Total	7,380	2.17 %

Product name =
Touring Tire tube

Remove all Filters
and just Give me
the Total Orders

Remember that measures are evaluated based on filter context, which means that they recalculate whenever the fields or filters around them change

Step - by - Step measure Calculation

CategoryName	Total Returns
Accessories	1,115
Bikes	342
Clothing	267

How exactly is this measure calculated?

- **REMEMBER:** This all happens *instantly* behind the scenes, every time the filter context changes

STEP 1
Filter context is detected & applied

CategoryName	Total Returns
Accessories	1,115
Bikes	342
Clothing	267

Product[CategoryName] = "Accessories"

Product Table	
Accessories	

STEP 2

Filters flow "downstream" to all related tables

Product Table	
Accessories	

AW_Sales_Data	
Accessories	

AW>Returns_Data	
Accessories	

STEP 3

Measure formula evaluates against the filtered table

Total Returns = COUNTROWS(AW>Returns_Data)

Count of rows in the AW>Returns_Data table, filtered down to only rows where the product category is "Accessories" = **1,115**

DAX Syntax

MEASURE NAME

- **Note:** Measures are always surrounded in brackets (i.e. **[Total Quantity]**) when referenced in formulas, so spaces are OK

Referenced
TABLE NAME

Referenced
COLUMN NAME

Total Quantity: =SUM(Transactions[quantity])

FUNCTION NAME

- Calculated columns don't always use functions, but measures do:
 - In a **Calculated Column**, =Transactions[quantity] returns the value from the quantity column in each row (since it evaluates one row at a time)
 - In a **Measure**, =Transactions[quantity] will return an **error** since Power BI doesn't know how to translate that as a single value (you need some sort of aggregation)

Note: This is a "fully qualified" column, since it's preceded by the table name -- table names with spaces must be surrounded by **single quotes**:

- Without a space: **Transactions[quantity]**
- With a space: **'Transactions Table'[quantity]**



PRO TIP:

For **column** references, use the fully qualified name (i.e. **Table[Column]**)
For **measure** references, just use the measure name (i.e. **[Measure]**)

DAX Operations

Arithmetic Operator	Meaning	Example
+	Addition	2 + 7
-	Subtraction	5 - 3
*	Multiplication	2 * 6
/	Division	4 / 2
^	Exponent	2 ^ 5

Comparison Operator	Meaning	Example
=	Equal to	[City]="Boston"
>	Greater than	[Quantity]>10
<	Less than	[Quantity]<10
>=	Greater than or equal to	[Unit_Price]>=2.5
<=	Less than or equal to	[Unit_Price]<=2.5
<>	Not equal to	[Country]<>"Mexico"

Pay attention to these!

Text/Logical Operator	Meaning	Example
&	Concatenates two values to produce one text string	[City] & " " & [State]
&&	Create an AND condition between two logical expressions	(([State]="MA") && ([Quantity]>10))
(double pipe)	Create an OR condition between two logical expressions	(([State]="MA") ([State]="CT"))
IN	Creates a logical OR condition based on a given list (using curly brackets)	'Store Lookup'[State] IN { "MA", "CT", "NY" }

Basic Date & Time Functions

DAY/MONTH/ YEAR()	Returns the day of the month (1-31), month of the year (1-12), or year of a given date	= DAY/MONTH/YEAR (Date)
HOUR/MINUTE/ SECOND()	Returns the hour (0-23), minute (0-59), or second (0-59) of a given datetime value	= HOUR/MINUTE/SECOND (Datetime)
TODAY/NOW()	Returns the current date or exact time	= TODAY/NOW ()
WEEKDAY/ WEEKNUM()	Returns a weekday number from 1 (Sunday) to 7 (Saturday), or the week # of the year	= WEEKDAY/WEEKNUM (Date, [ReturnType])
EOMONTH()	Returns the date of the last day of the month, +/- a specified number of months	= EOMONTH (StartDate, Months)
DATEDIFF()	Returns the difference between two dates, based on a selected interval	= DATEDIFF (Date1, Date2, Interval)

Basic Logical Functions

)IF/AND/OR(

IF()

Checks if a given condition is met, and returns one value if the condition is TRUE, and another if the condition is FALSE

=IF(LogicalTest, ResultIfTrue, [ResultIfFalse])

IFERROR()

Evaluates an expression and returns a specified value if the expression returns an error, otherwise returns the expression itself

=IFERROR(Value, ValueIfError)

AND()

Checks whether both arguments are TRUE, and returns TRUE if both arguments are TRUE, otherwise returns FALSE

=AND(Logical1, Logical2)

OR()

Checks whether one of the arguments is TRUE to return TRUE, and returns FALSE if both arguments are FALSE

=OR(Logical1, Logical2)

Note: Use the **&&** and **||** operators if you want to include more than two conditions!

Text Functions

LEN()	Returns the number of characters in a string	= LEN (Text)	<i>Note: Use the & operator as a shortcut, or to combine more than two strings!</i>
CONCATENATE()	Joins two text strings into one	= CONCATENATE (Text1, Text2)	
LEFT/MID/ RIGHT()	Returns a number of characters from the start/middle/end of a text string	= LEFT/RIGHT (Text, [NumChars]) = MID (Text, StartPosition, NumChars)	
UPPER/LOWER/ PROPER()	Converts letters in a string to upper/lower/proper case	= UPPER/LOWER/PROPER (Text)	



المحاضرة الأولى

تحليل بيانات متقدم باستخدام Power BI

أجندة المحاضرة

Lecture Agenda

- إضافة أعمدة حسابية جديدة للوصول إلى تفاصيل أكثر دقة

Add Calculated Columns

- استخدام ال Measures لبيانات أكثر عمقاً

Add Measure For Deeper Analysis

أجندة المحاضرة Lecture Agenda

- استخدام ال Data Analysis Expressions

Using Data Analysis Expressions

- تحليل القيم الرقمية

Analyze Numbers by using Math Functions

أجندة المحاضرة Lecture Agenda

- تحليل الأداء وإنشاء المقارنات

Analyze Performance by using Logical Functions

- تعديل النصوص

Edit Text by using Text Functions

- استخدام معادلة Related, ALL, FILTER, Calculate, SUMX في العمليات الحسابية المختلفة

Using Different Formulas in Different Calculations

Related

RELATED()

Returns related values in each row of a table based on relationships with other tables

=RELATED(ColumnName)



The column that contains the values you want to retrieve

Examples:

- `Product_Lookup[ProductName]`
- `Territory_Lookup[Country]`

Basic Math & State Functions

SUM()

Evaluates the sum of a column

=**SUM**(ColumnName)

AVERAGE()

Returns the average (arithmetic mean) of all the numbers in a column

=**AVERAGE**(ColumnName)

MAX()

Returns the largest value in a column or between two scalar expressions

=**MAX**(ColumnName) or =**MAX**(Scalar1, [Scalar2])

MIN()

Returns the smallest value in a column or between two scalar expressions

=**MIN**(ColumnName) or =**MIN**(Scalar1, [Scalar2])

DIVIDE()

Performs division and returns the alternate result (or blank) if div/0

=**DIVIDE**(Numerator, Denominator, [AlternateResult])

COUNT, COUNTA, DISTINCTCOUNT & COUNTROWS

COUNT()

Counts the number of cells in a column that contain numbers

=**COUNT**(ColumnName)

COUNTA()

Counts the number of non-empty cells in a column (numerical and non-numerical)

=**COUNTA**(ColumnName)

DISTINCTCOUNT()

Counts the number of distinct or unique values in a column

=**DISTINCTCOUNT**(ColumnName)

COUNTROWS()

Counts the number of rows in the specified table, or a table defined by an expression

=**COUNTROWS**(Table)

Calculate

CALCULATE()

Evaluates a given expression or formula under a set of defined filters

=**CALCULATE**(Expression, [Filter1], [Filter2],...)

Name of an existing measure, or a DAX formula for a valid measure

Examples:

- [Total Orders]
- SUM>Returns_Data[ReturnQuantity])

List of simple Boolean (True/False) filter expressions
(**note:** these require simple, fixed values; you cannot create filters based on measures)

Examples:

- Territory_Lookup[Country] = "USA"
- Calendar[Year] > 1998

CALCULATE works just like SUMIF or COUNTIF in Excel, except it can evaluate measures based on ANY sort of calculation (not just a sum, count, etc); it may help to think of it like "CALCULATEIF"

يعمل CALCULATE تماماً مثل SUMIF أو COUNTIF في Excel ، إلا أنه يمكنه تقييم المقاييس استناداً إلى أي نوع من الحسابات (وليس مجرد مجموع، أو عدد، أو ما إلى ذلك)، فقد يكون من المفيد التفكير في الأمر مثل CALCULATEIF."

Calculate

  Bike Returns = `CALCULATE([Total Returns], Products[CategoryName] = "Bikes")` 

CategoryName	Total Returns	Bike Returns
Accessories	1,115	342
Bikes	342	342
Clothing	267	342
Components		342
Total	1,724	342

Here we've defined a new measure named "**Bike Returns**", which evaluates the "**Total Returns**" measure when the *CategoryName* in the **Products** table equals "**Bikes**"



STEP 1

Filter context is detected & applied

CategoryName	Total Returns	Bike Returns
Accessories	1,115	342
Bikes	342	342
Clothing	267	342
Components		342
Total	1,724	342

Products[CategoryName] = "Accessories"

Product Table	
Accessories	

CALCULATE

Filters modified by CALCULATE

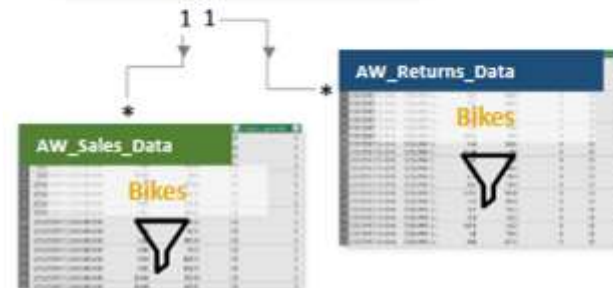
[CategoryName] = "Bikes"

Product Table	
Bikes	

STEP 2

Filters flow "downstream" to all related tables

Product Table	
Bikes	



STEP 3

Measure formula evaluates against the filtered table

Total Returns = COUNTROWS(AW>Returns_Data)

Count of rows in the AW>Returns_Data table, filtered down to only rows where the product category is "Bikes" = 342

ALL

ALL()

Returns all rows in a table, or all values in a column, ignoring any filters that have been applied

=**ALL**(**Table or ColumnName**, [ColumnName1], [ColumnName2],...)

The table or column that you want to clear filters on

Examples:

- Transactions
- Products[ProductCategory]

List of columns that you want to clear filters on (optional)

Notes:

- If your first parameter is a table, you can't specify additional columns
- All columns must include the table name, and come from the same table

Examples:

- Customer_Lookup[CustomerCity], Customer_Lookup[CustomerCountry]
- Products[ProductName]

ما تم شرحه بالكورس

- إضافة أعمدة حسابية جديدة للوصول إلى تفاصيل أكثر دقة

Add Calculated Columns

- استخدام ال Measures لبيانات أكثر عمقاً

Add Measure For Deeper Analysis

- استخدام ال Data Analysis Expressions

Using Data Analysis Expressions

ما تم شرحه بالكورس

- إضافة الرسومات البيانية مختلفة الأشكال والأنواع
Draw different types of Charts and Graphs
- إنشاء الفلاتر للوصول إلى مستوى المعلومات المطلوب
Create and Apply Data Filters
- عرض المقاييس الرئيسية باستخدام الـ Cards and KPIs Visuals
Show Key Metrics by using Cards

ما تم شرحه بالكورس

- عرض البيانات طبقاً للخرائط الجغرافية

Visualizing Geospatial Data With Maps

- إنشاء Trends and Area charts

Creating Trends, Trend Lines and Area Charts

- إنشاء وإدارة ال Roles داخل Power BI

Managing & Viewing Roles in Power BI Desktop

شكراً لكم