



Power BI

Introduction

Current role: Senior Data Analyst at Mitsui

Email: zoe.teets@gmail.com

Tools:

SQL (T-SQL)

Power BI

Azure

ACL Analytics & Highbond Robots

Recap

Agenda

- Business Intelligence & Visualizing Data
- Why Power BI?
- The Dashboard Process (the infinite loop of improvement)
- Power BI Terminology
- ETL -> Explore & Visualize -> Tell a Story
- Demo

Tenets of a good dashboard

A dashboard is real-time, a report is frozen in time

1. A good dashboard should be like a good joke - it should not need explanation.
 - a. Titles, subtitles, buttons with clear end-user instructions, color consistency
2. A good dashboard understands who the audience is.
 - a. What terminology do they use? What are they interested in? What is their data question?
3. A good dashboard provides unbiased insight into the relationship between two or more variables.

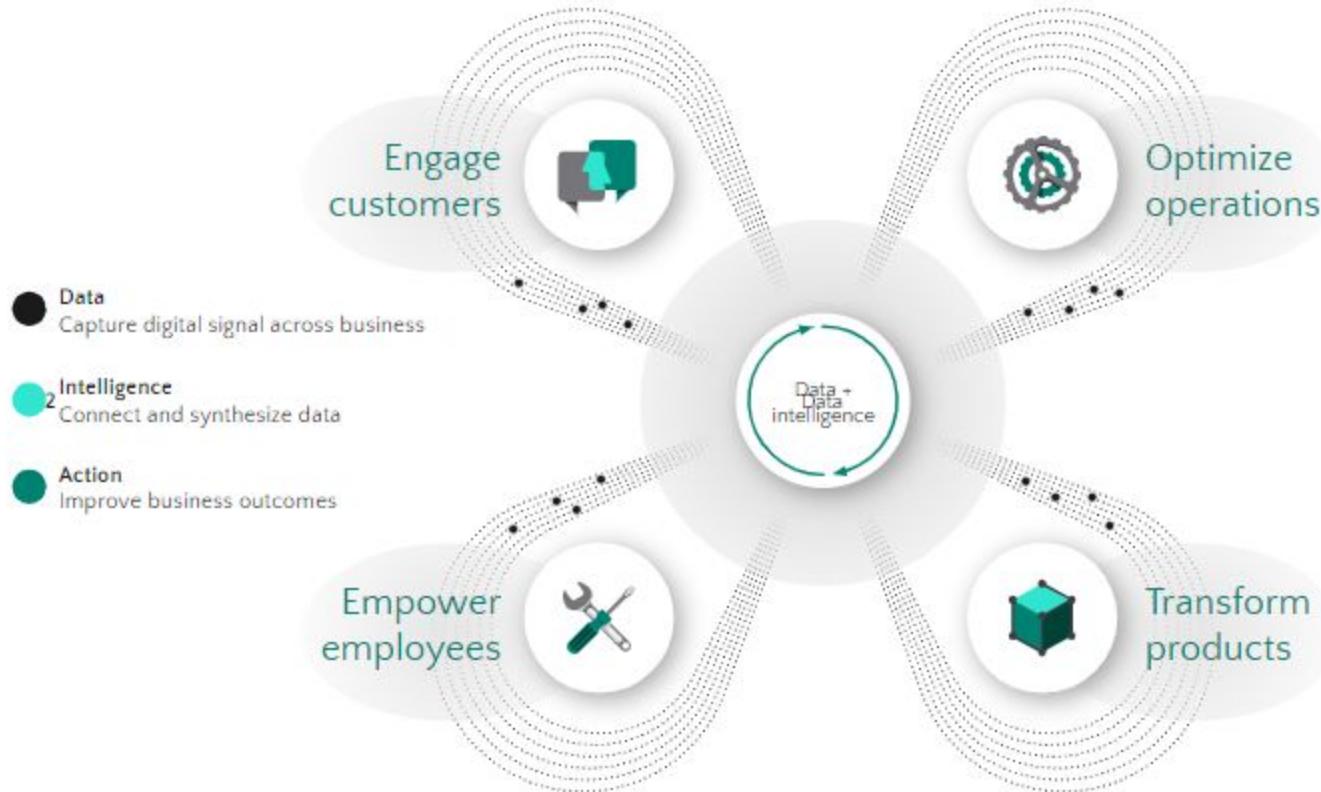
Business Intelligence

Business intelligence (BI) leverages software and services to transform data into actionable insights that inform an organization's strategic and tactical business decisions. BI tools access and analyze data sets and present analytical findings in reports, summaries, dashboards, graphs, charts and maps to provide users with detailed intelligence about the state of the business.

Source:

<https://www.cio.com/article/2439504/business-intelligence-definition-and-solutions.html>

DIGITAL FEEDBACK LOOP



Business Intelligence Example

Publix wants to open a new location. They need to rely on unbiased data to make a profitable decision. What do they need to know?

The need to visualize data

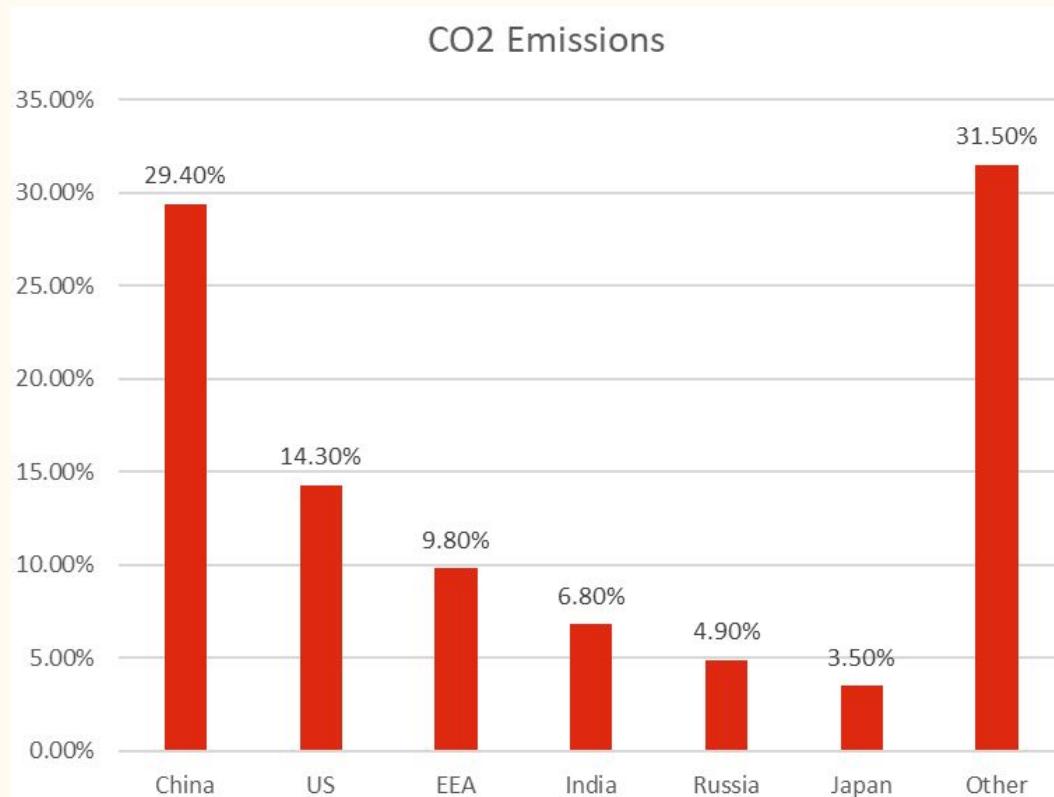
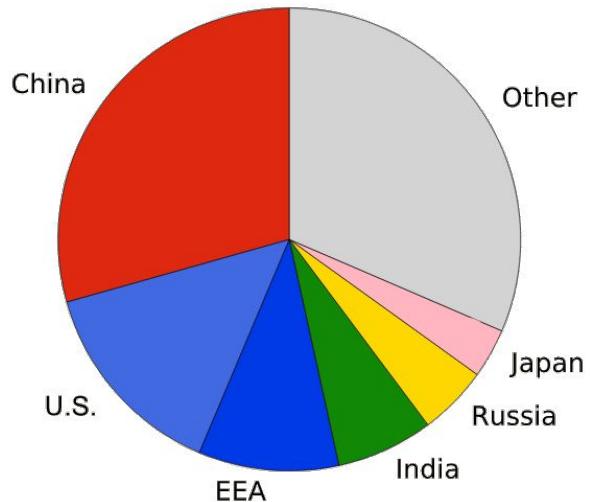
- Human brain processes images 60,000x faster than text.

-Persuasion and the Role of Visual Presentation Support: The UM/3M Study, 1986

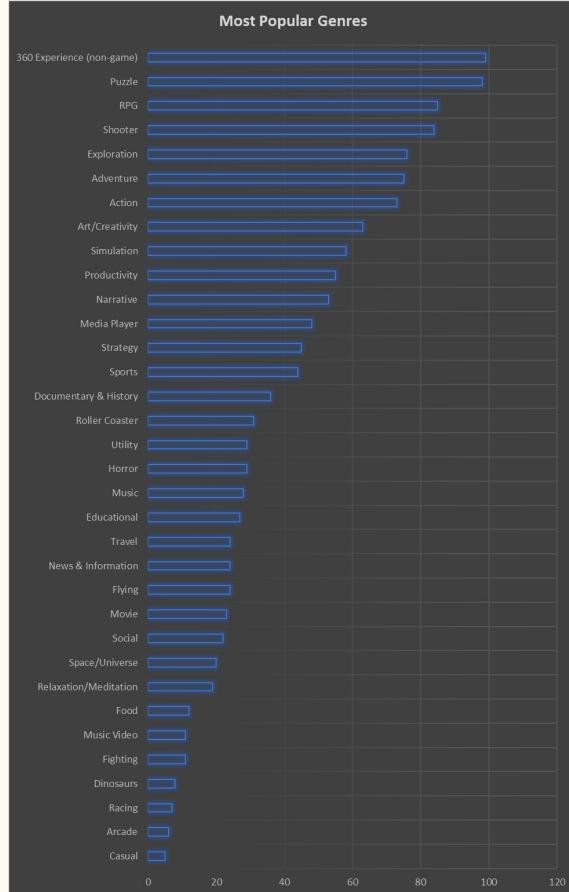
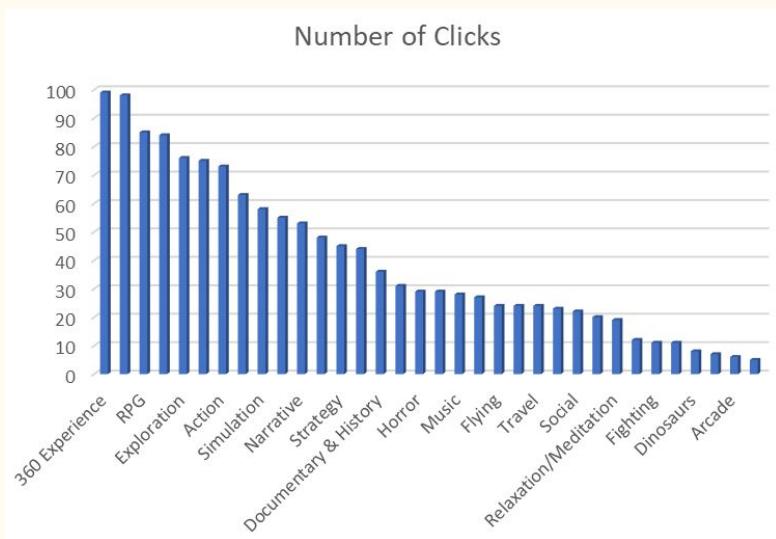
- 90 percent of the information transmitted to the brain is visual.

-MIT News, January 16, 2014

Which one is better?



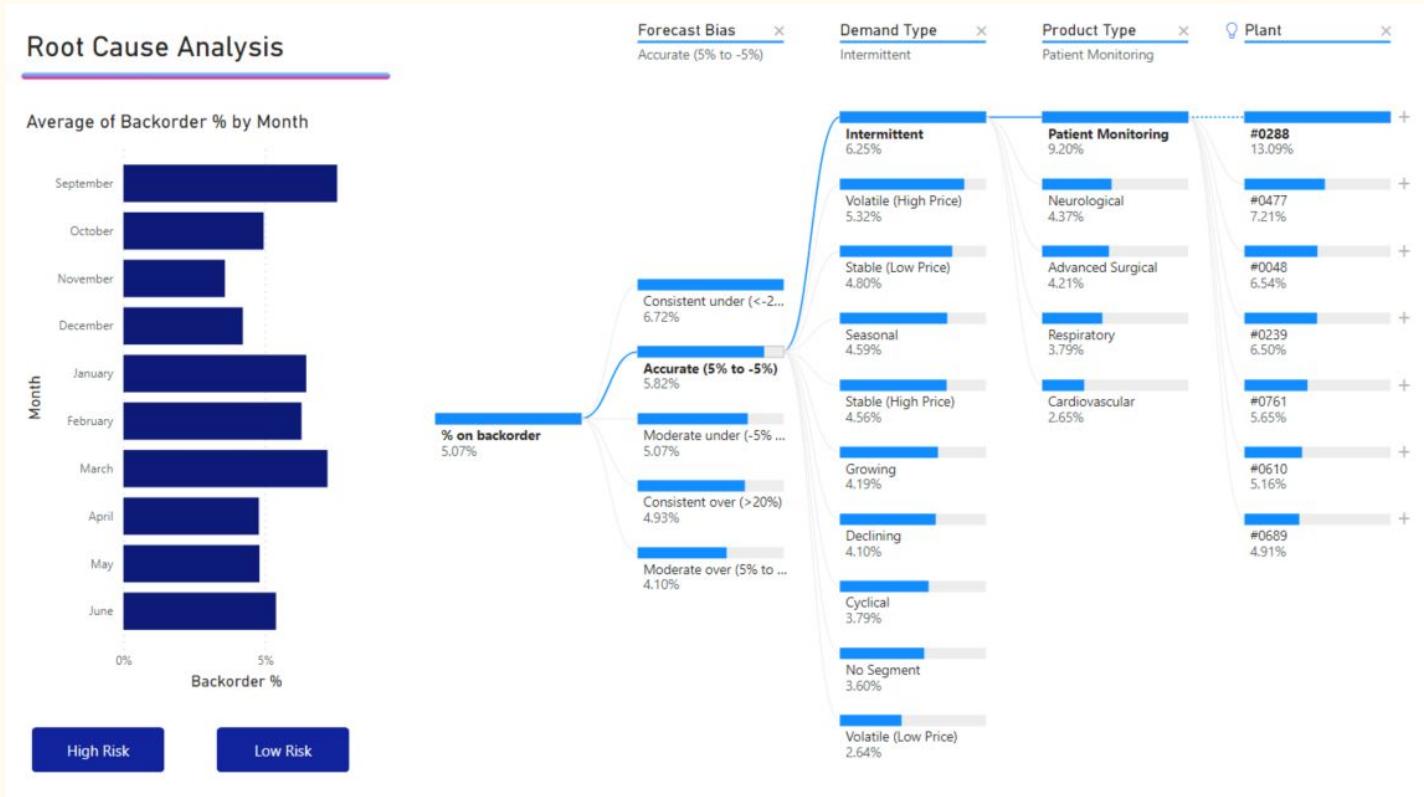
Which one is better?



Which one is better?



Decomposition Tree

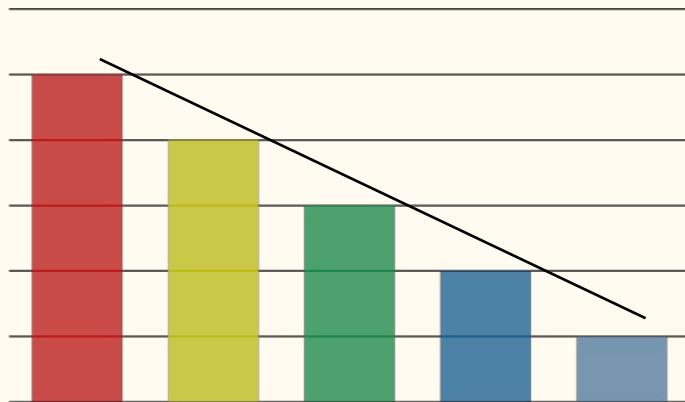
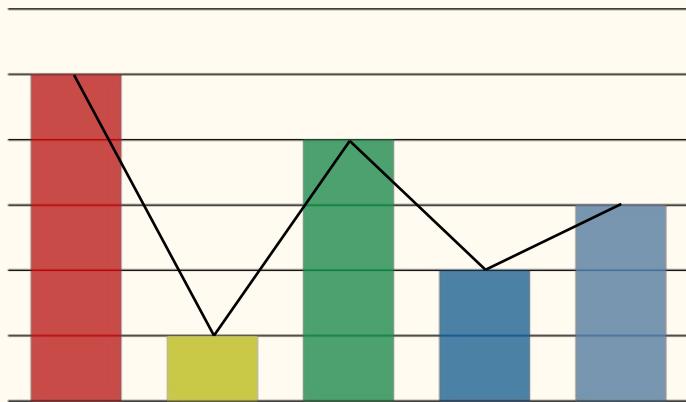


The Gestalt Principles

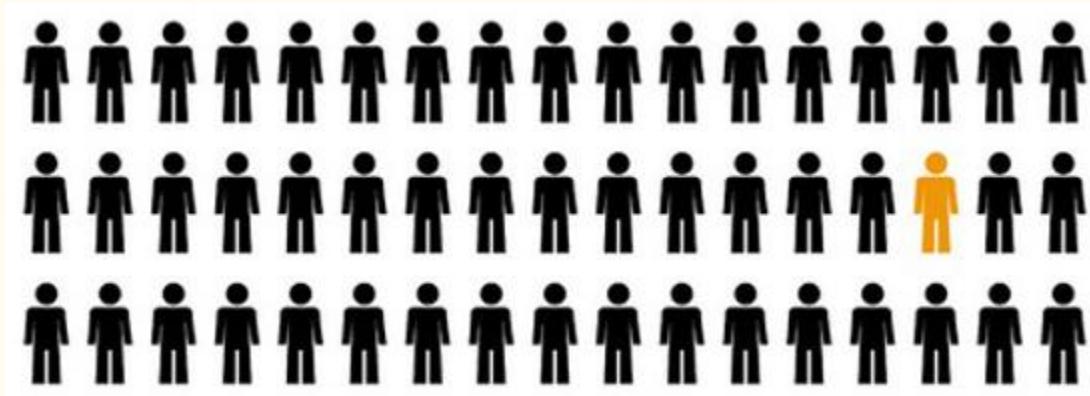
Gestalt

- Introduced by Christian von Ehrenfels
- Psychological term meaning unified whole
 - The whole is different (not greater) than the sum
- Gestalt Effect –
 - Ability of the mind to generate whole images from a collection of parts

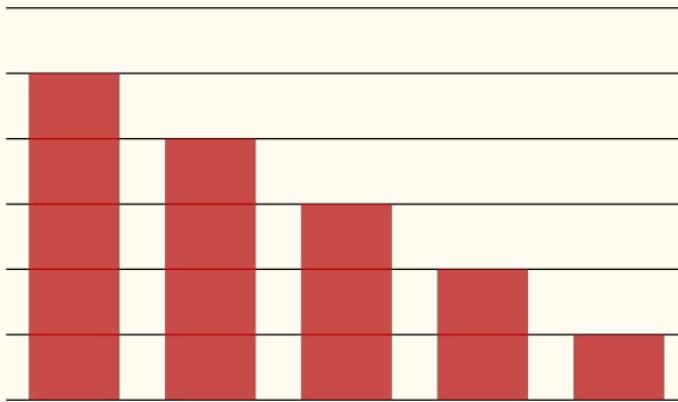
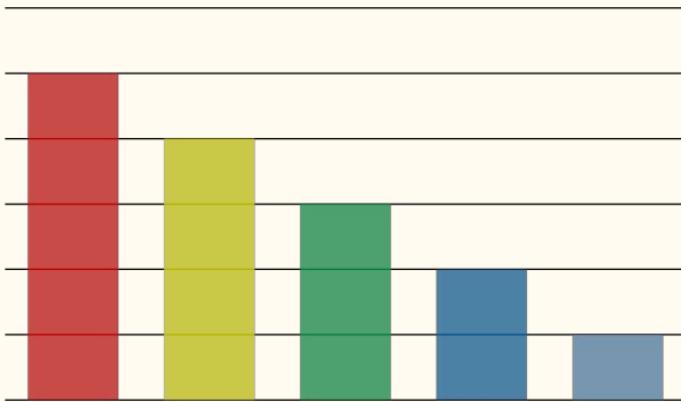
Law of Continuity



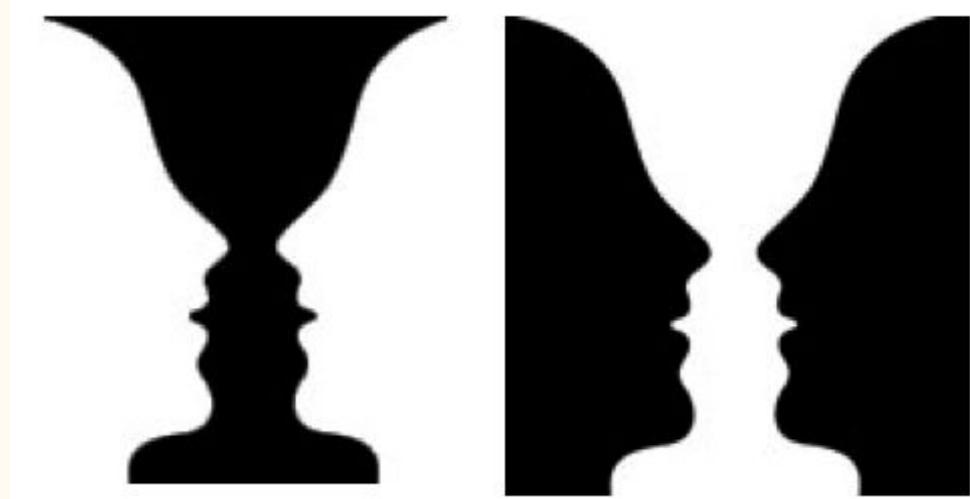
Law of Similarity



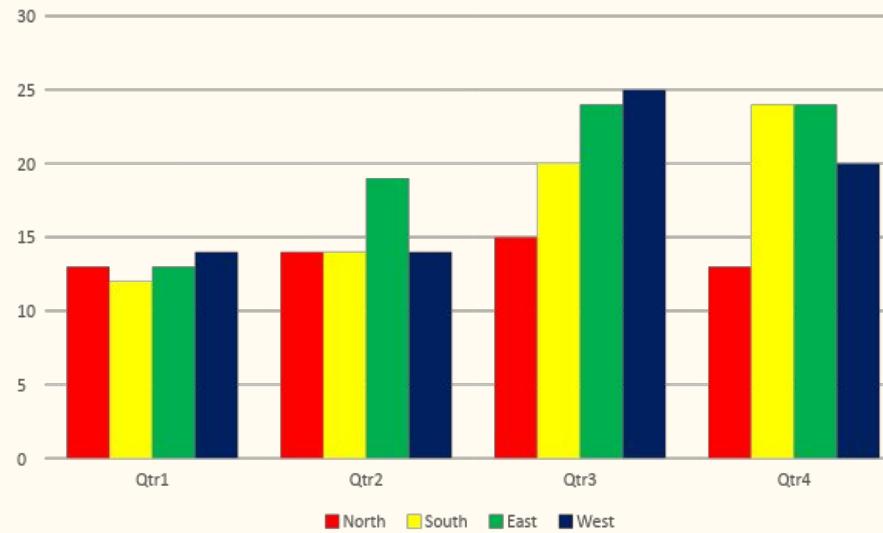
Law of Similarity



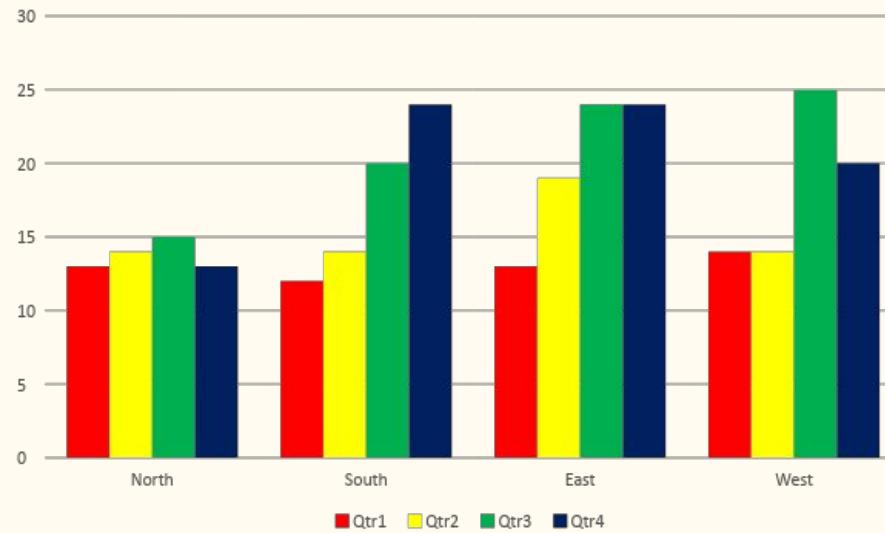
Law of Focal Point



Law of Proximity



Law of Proximity



Color and Visual Resources

- Gestalt Psychology – http://en.wikipedia.org/wiki/Gestalt_psychology
- Color Matters – <http://www.colormatters.com>
- Color palette generator – Colors - The super fast color palettes generator!
- Coblis – <http://www.color-blindness.com/coblis-color-blindness-simulator/>
- Data Visualization Catalogue – <https://datavizcatalogue.com/search.html>

Why Power BI?



Largest Global Footprint



China GB 18030

43
Languages

34
Primary and backup
datacenters worldwide

National Clouds
US Government
China
Germany





**JOIN OUR THRIVING
COMMUNITY**

850k Active Community
Members

100k+ Users in-person at Microsoft
sponsored events

USER VOICE: **103,431** Users **16,432** Ideas Submitted **3,162** Active Ideas



**ENGAGE WITH A
USER GROUP**

PowerBIUG
POWER BI USER GROUP

222

Independent Power BI User
Groups World Wide

49,685

User Groups Members
in over 60 countries

Join your local PUG today!
pbiusergroup.com

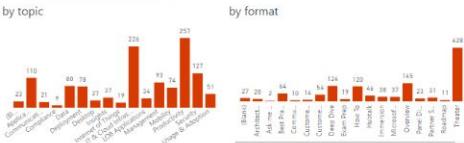
Explore and share your data stories

Data Stories Gallery - Microsoft Ignite Session Browser

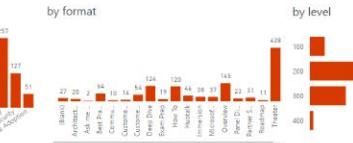
Microsoft Ignite

Session Browser

by topic



by format



tyGraph

by level



Location

- Select All
- (Blank)
- A1
- A32
- A39
- A311 - A312
- A313 - A314
- A315 - A316
- A402 - A403
- A404 - A405
- A411 - A412

1,266 Sessions

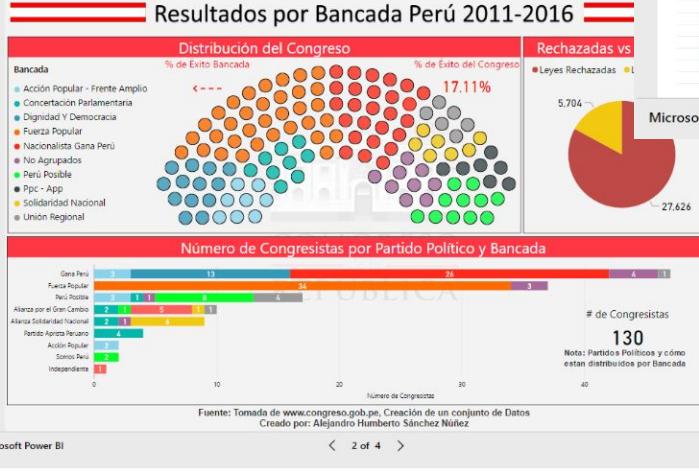
1019 Speakers

Data Stories Gallery : Analysis of the Congress of the Republic of Peru

Day	Start	Session Code	Duration	Level	Title
Sunday	9/25/2016 9:00:00 AM	PRB01	480	300	Build an Office
Sunday	9/25/2016 9:00:00 AM	PRB01	480	300	Build an Office
Sunday	9/25/2016 9:00:00 AM	PRB02	480	200	Build cross-star
Sunday	9/25/2016 9:00:00 AM	PRB02	480	200	Build cross-star
Sunday	9/25/2016 9:00:00 AM	PRB03	480	200	Get started with
Sunday	9/25/2016 9:00:00 AM	PRB04	480	200	Dashboard in a
Sunday	9/25/2016 9:00:00 AM	PRB05	480	200	DEV Immersion
Sunday	9/25/2016 9:00:00 AM	PRB05	480	200	DEV Immersion
Sunday	9/25/2016 9:00:00 AM	PRB06	480	200	DevOps Hatchet
Sunday	9/25/2016 9:00:00 AM	PRB07	480	200	Get Microsoft's

Select All (Blank) Sunday

Microsoft Power BI



Ion Kleopas
Winner

87.713%
Winner Score

25,063
Views

493
Participants

2,392
Submissions

CORTANA INTELLIGENCE COMPETITION
Women's Health Risk Assessment
[Visit Competition page for more details](#)

\$5,000 prizes in total
Ended 10/1/2016, 7:59:59 AM (GMT Daylight Time)

Summary
Based on the World Health Organization (WHO) report in 2011, about 820,000 women and men aged 15-24 were newly infected with HIV in developing countries. Among these newly infected, more than 60% were women.

Developing countries face serious reproductive health problems such as sexually transmitted infections (STIs), unintended pregnancies, and complications from childhood. Emphasize prevention and provision of information about STIs and other reproductive tract infections (RTIs) was listed as one of the top priorities for policymakers, researchers, and health care providers.

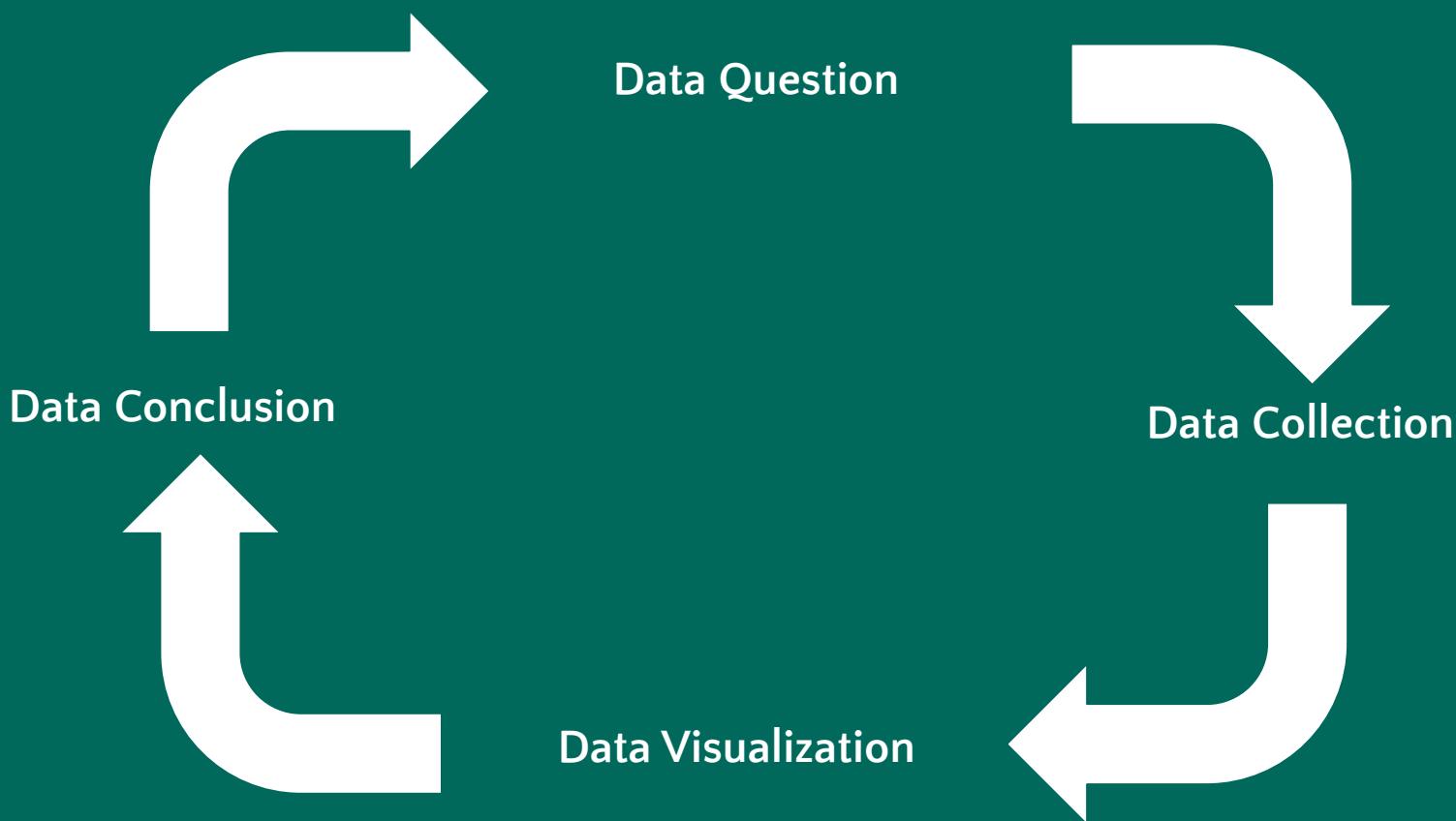
To help achieve the goal of improving women's reproductive health outcomes in underdeveloped regions, this competition calls for optimized machine learning solutions so that a patient can be accurately categorized into different health risk segments and subgroups.

Please see [this video](#) and [this blog post](#).

WHR Competition Power BI Companion by DevScope

In the Data Stories Gallery

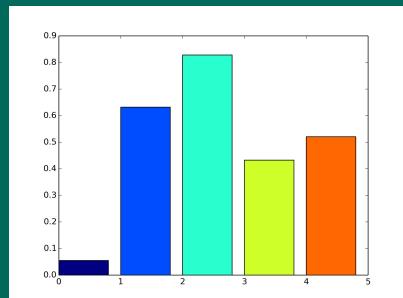
The Dashboard Process

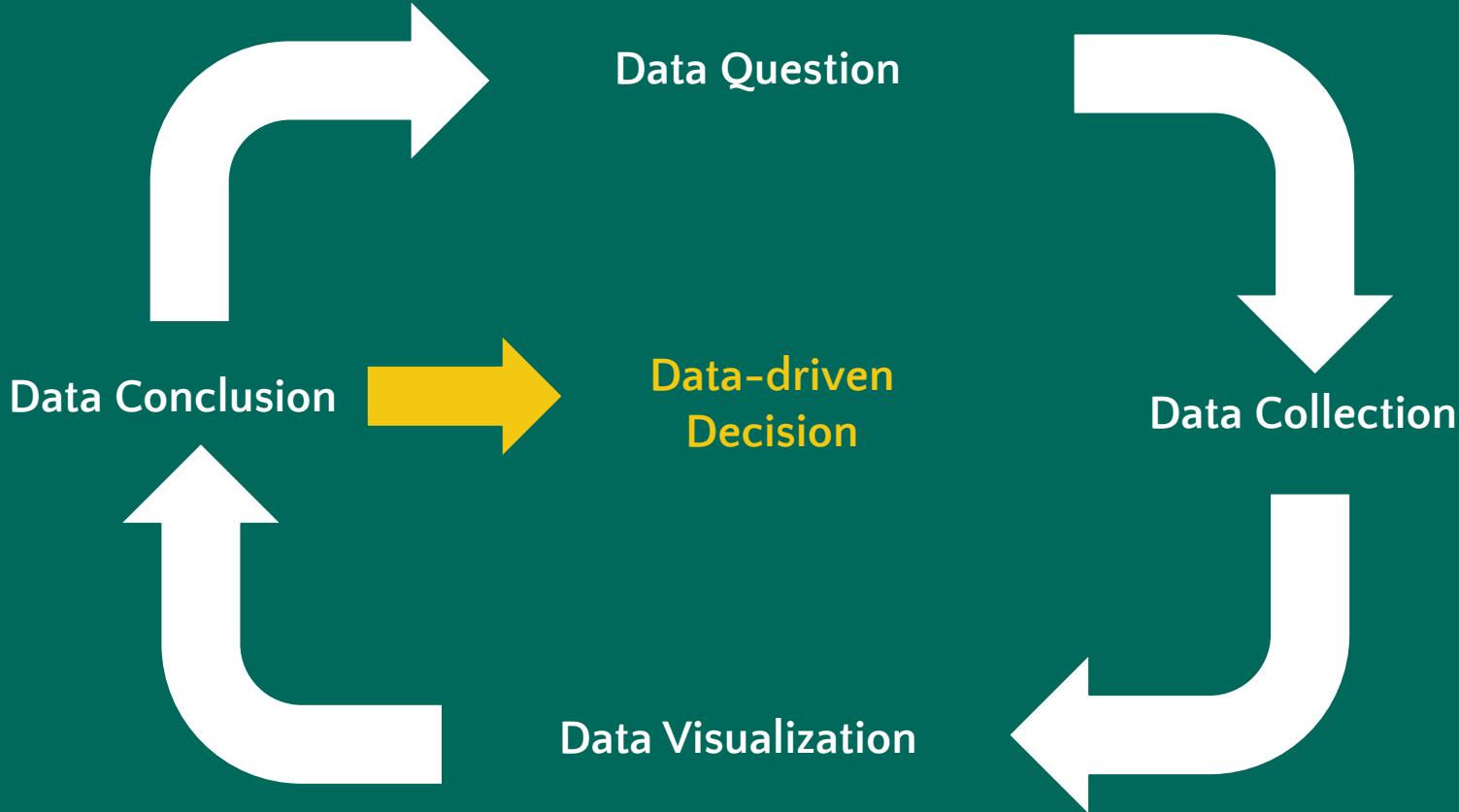


Data Conclusion

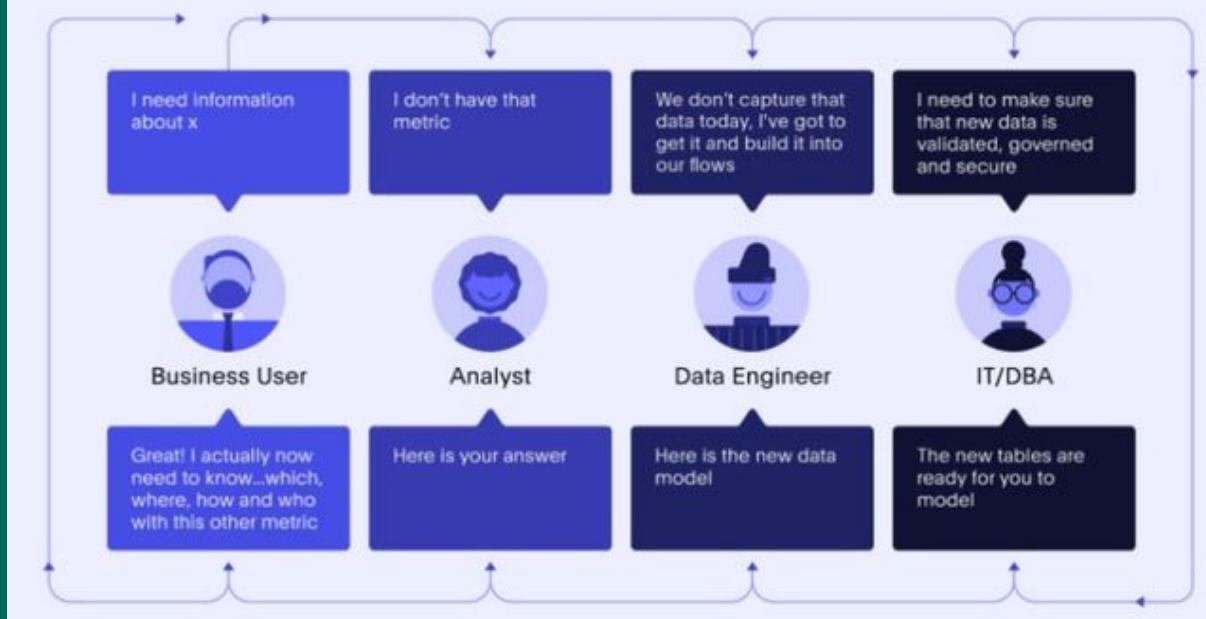
What product
has the highest
profit margin?

`SELECT profit_margin
FROM product_pricing
GROUP BY product`





The infinite loop of dashboard insanity



Power BI Terminology

Facts

Dimensions

Dimensions

Descriptive/ Qualitative Information

- Color
- Country
- Region
- State
- City
- Person
- Gender
- Age
- Dates

Facts

Quantitative Information

- Expressed in numbers and can be counted and aggregated easily

Scenario 1

How many shoes were sold in Tennessee in 2017?

Scenario 1

How many shoes were sold in Tennessee in 2017?

Dimension

Fact

Scenario 2

How many kids under the age of 10 bought red Nikes in the USA in 2018?

Scenario 2

How many kids under the age of 10 bought red Nikes in the USA in 2018?

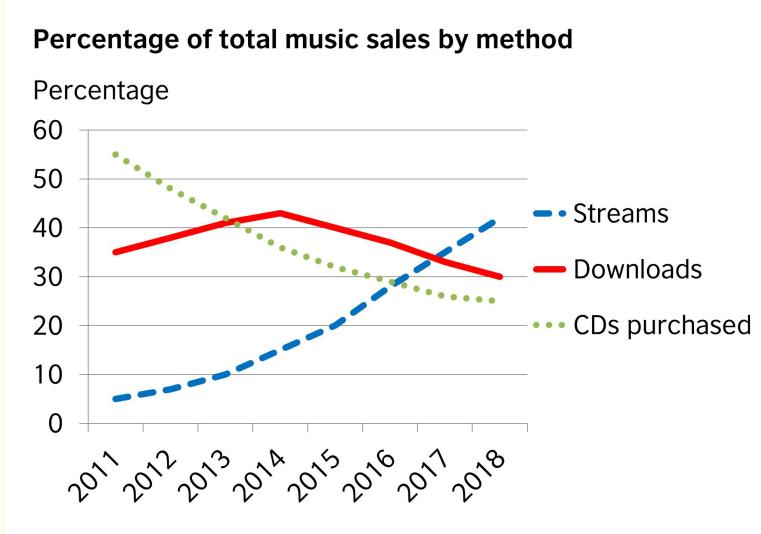
Dimension

Fact

How to create visualizations
using facts & dimensions

Facts & Dimensions

Fact



Dimension

SELECT FACT
FROM TABLE
GROUP BY DIMENSION

How to do basic ETL (Extract, Transform, and Load)

Extract: How to connect to a data source

Data sources



SaaS solutions
e.g. *Marketo, Salesforce, GitHub, Google Analytics*



Organizational
Corporate data sources or external data services



On-premises Data



Azure services
Azure SQL, Stream Analytics...



Excel files



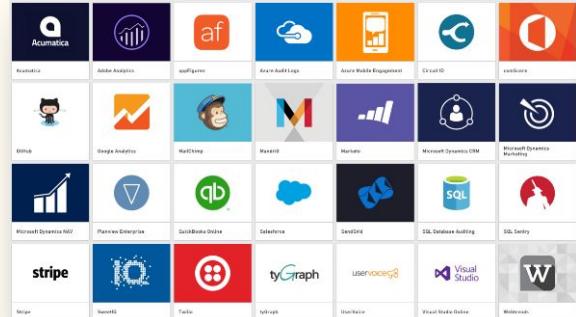
Power BI Desktop files
Data from files, databases, Azure, and other sources

Connect to 80+ data sources, both on-premises and cloud

- Data from Applications
 - SaaS services that you already use
- Data from your organization
 - Content published by others in your org (Datasets and Dataflows)
- Big data and more
 - Azure data services, e.g. HDI, ASA, AML etc.
 - On-premises data sources, e.g. Oracle & SSAS
- Data from files
 - Import data from Text, CSV, Excel and Power BI Desktop files

Access all your DATA

The screenshot shows the 'Get Data' interface in Power BI. It has sections for 'Discover content' and 'Create new content'. Under 'Discover content', there are four cards: 'My organization' (discover apps published by others), 'Services' (choose from online services), 'Files' (bring in your reports, workbooks, or data from Excel, Power BI Desktop, or CSV files), and 'Databases' (use Power BI Desktop to connect to data in Azure SQL, Database, and more). Each card has a 'Get' button. Below these are links for 'Samples', 'Partner Showcase', 'Organizational Content Packs', and 'Service Content Packs'.



financial report tutorial - Power BI Desktop

File Home Insert Modeling View Help

Paste Cut Copy Format painter Clipboard

Get data workbook hub Server data Enter Dataverse Recent sources

Common data sources

- Excel workbook
- Power BI datasets
- Dataflows
- Dataverse
- SQL Server
- Analysis Services
- Text/CSV
- Web
- OData feed
- Blank query
- Power BI Template Apps

Select or drag

More...



SQL Server database

Server ⓘ

Database (optional)

Data Connectivity mode ⓘ

Import

DirectQuery

▲ Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

```
Select  
Profit  
,Discounts  
,Month  
From financials
```

Include relationship columns

Navigate using full hierarchy

Enable SQL Server Failover support

OK

Cancel

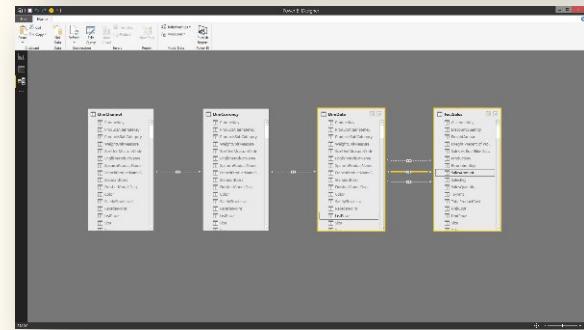
Transform: Clean your data

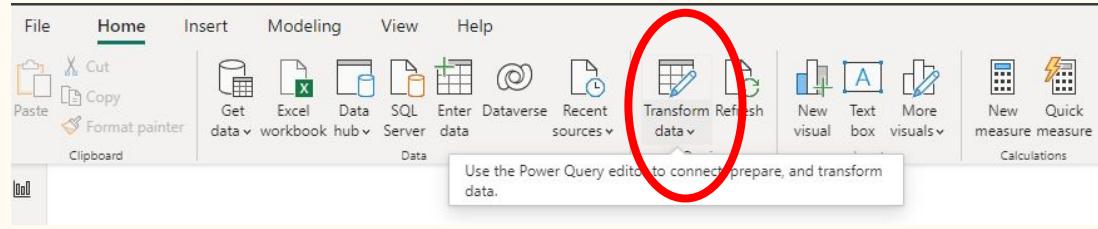
Clean and mash-up your DATA



- Consolidate data from a broad range of sources
 - Merge or append queries to combine data from multiple queries into a single query
- Transform data to fit your needs using intuitive UI
 - Select data for inclusion
 - Cleanse data and remove errors
- Define calculations to generate new fields for use in reports
- Develop advanced analytics using a combination of measures and relationships
 - Uncover correlations, highlight exceptions and understand business outcomes

ProductID	Date	Zip	Units	Revenue	Country	
1	1/15/1999	76108	1	797.9475	United States	
2	837	1/15/1999	33436	813.6975	United States	
3	837	1/15/1999	76531	1	813.6975	United States
4	838	1/15/1999	29526	934.4475	United States	
5	838	1/15/1999	32584	1	944.9425	United States
6	838	1/15/1999	33947	1	944.9425	United States





The screenshot shows the Power Query Editor window with the following details:

- File**: Opened file: cosmetics_report_powerBI
- Home**: Selected tab
- Transform**: Active tab
- Add Column**, **View**, **Tools**, **Help**: Other tabs
- Queries [4]**: Skincare, Perfume, Makeup, Tools
- Current Step**: #Table.TransformColumnTypes(#"Promoted Headers", {{"id", Int64.Type}, {"brand", type text}, {"category", type text}, {"name", type text}, {"size", type text}, {"rating", type number}})
- Data Preview**: Shows 12 rows of data with columns: id, brand, category, name, size, rating.
- Properties**: Name: Skincare
- Applied Steps**: Promoted Headers, Changed Type
- Query Settings**: Preview downloaded at 12:42 PM

id	brand	category	name	size	rating
2270927	Algenist	Moisturizers	GENIUS Sleeping Collagen	2 oz / 60 mL	12 rating
1582477	Algenist	Moisturizers	GENIUS Ultimate Anti-Aging Cream	no size	
1328855	Algenist	Eye Creams & Treatments	Complete Eye Renewal Balm	0.5 oz / 15 mL	
1420223	Algenist	Face Sunscreen	SUBUME DEFENSE Ultra Lightweight UV Defense Fluid SPF 50	no size	
1644376	Algenist	Eye Creams & Treatments	GENIUS Ultimate Anti-Aging Eye Cream	0.5 oz / 15 mL	
2211753	Algenist	Face Masks	ALIVE Prebiotic Balancing Mask	1.7 oz / 50 mL	
1328822	Algenist	Moisturizers	Regenerative Anti-Aging Moisturizer	no size	
1357847	Algenist	Moisturizers	Overnight Restorative Cream	2 oz / 60 mL	
1649771	Algenist	Face Wash & Cleansers	GENIUS Ultimate Anti-Aging Melting Cleanser	5 oz / 150 mL	
1772821	Algenist	Eye Creams & Treatments	POWER Advanced Wrinkle Fighter 560 [®] Eye Serum	0.5 oz / 15 mL	
2282408	Algenist	Moisturizers	GENIUS Collagen Calming Relief	1.35 oz / 40 mL	
1345748	Algenist	Face Oils	Advanced Anti-Aging Repairing Oil	1 oz / 30 mL	

Load: Close & Apply

cosmetics_report_powerBI - Power BI Desktop

File Home Insert Modeling View Help

cosmetics_report_powerBI - Power Query Editor

File Home Transform Add Column View Tools Help

Cut Copy Paste Clipboar... New Recent Enter Data Data source settings Manage Parameters Refresh Preview Advanced Editor Choose Re Columns Manage Col... Close & Apply Close New Query Data Sources Parameters Query Manage Col... Close

Queries [4]

Skincare Perfume Makeup Tools

= Table.TransformColumnTypes(#"Promoted Headers", {{"id", Int64.Type}, {"brand", Any.Type}, {"category", Any.Type}})

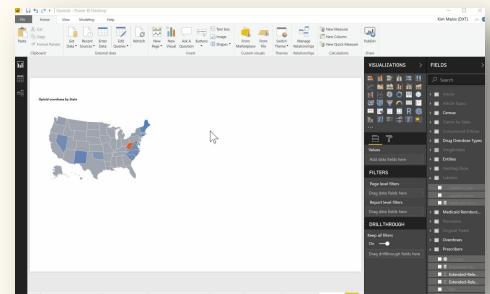
	A ^B id	A ^B brand	A ^B category
● Valid	100%	100%	100%
● Error	0%	0%	0%
● Empty	0%	0%	0%

How to tell a story with data

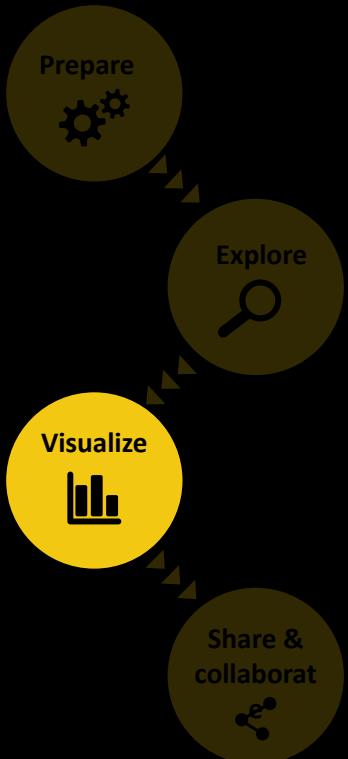
Explore your DATA



- Explore data in a variety of ways and across multiple visualizations using drag and drop canvas
- Dig deeper into your reports
 - Drill-down in your hierarchical data
 - Filter, sort, hover over and highlight data
- Leverage Quick Insights to find insights in your data
- Ask questions of your data in natural language with Q&A
 - Type questions in plain language
 - Q&A intelligently filters, sorts, aggregates, groups and displays data based on the question



Visualize your DATA



- Visualize data in a variety of ways
- Growing number of visualization types
 - Donuts, basic area, waterfall, filled maps, tree maps, funnel, gauges combo charts and more
 - Custom visuals available from Power BI Visuals Marketplace
 - Tools to develop, test, package new custom visuals
- Visualizations on report page are connected – select value in one visualization to change other visualizations
- Full screen pop out mode for report visuals to show additional details



A screenshot of the Power BI Visuals Marketplace. It shows a search bar, a category section with 'Advanced Analytics' selected, and a grid of visualization cards. Each card includes a preview image, a title, a brief description, and an 'Add' button. Examples include a Histogram Chart, a Time series decomposition chart, Association rules, and a KPI Column by MAQ Software.

Bring your story to life with DATA



- Save Power BI Desktop report files and easily publish them to powerbi.com
- Access dashboards using native mobile apps for Windows, iOS and Android
- Share as appropriate with other Power BI users in your organization
- Package your reports in apps for easy consumption and control
- Easily embed interactive Power BI visualizations in blog posts, websites, through emails or social media With **Power BI Publish to web**



EXECUTIVE SALES

\$2,297,201

SALES

\$286,397

PROFIT

37,873

QUANTITY

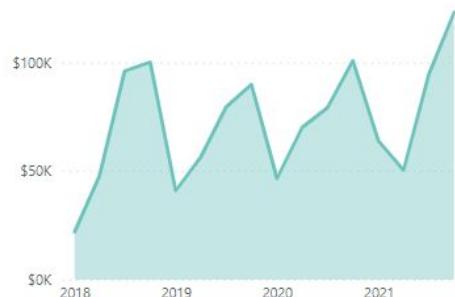
15.6%

AVG. DISCOUNT

CONSUMER

\$1,161,401

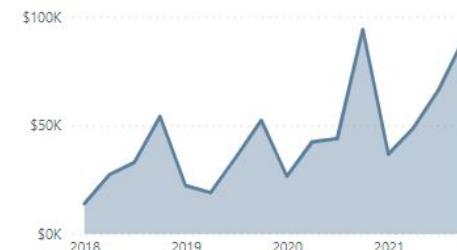
SALES



CORPORATE

\$706,146

SALES



HOME OFFICE

\$429,653

SALES





The Queen's Gambit



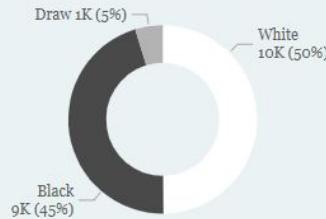
20,058
Total Games

15,635
Total Players

13.8
Avg. Game Time (Mins)

5.2
Avg. Extra Time (Mins)

Winner % by Color



Victory Status by Color



Top 10 Openings

Sicilian Defense	1,299	1,203	2,632
French Defense	653	689	1,412
Queen's Pawn Game	602	570	1,233
Italian Game	451	483	981
King's Pawn Game	441	440	917
Queen's Gambit	512	912	
Ruy Lopez	451	858	
English Opening	720		
Scandinavian Defense	716		
Philidor Defense	691		

Top 10 Opening Codes

A00	570	398	1,007
C00	389	417	844
D00	360	341	739
B01	332	358	716
C41	267	396	691
C20	355	299	675
A40	261	338	618
B00	218	365	611
B20	320	223	567
C50	268	240	538

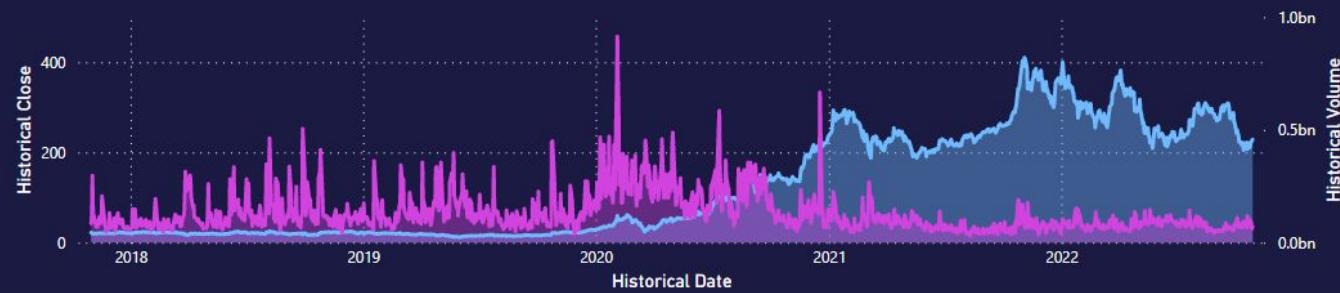
Initial Moves Split



Report By: Udit Kumar Chatterjee

Historical Close and Historical Volume by Historical Date

● Historical Close ● Historical Volume



Historical Date

10/31/2017 10/28/2022



Historical High by Historical Date

Historical High

0

2018

2019

2020

2021

2022

Historical Date

0 100 200 300 400

Resources:

- <https://guyinacube.com/>



- <https://www.sqlbi.com/>
- <https://docs.microsoft.com/en-us/power-bi/>
- <https://docs.microsoft.com/en-us/learn/patterns/data-analytics-microsoft/>
- <https://community.powerbi.com/>
- Transforming a flat file to a star schema: [\(78\) Data Modeling \(Star Schema ⭐\) in Power BI – Creating Dimension Tables - YouTube](https://www.youtube.com/watch?v=78DataModelingStarSchema)







Auto detect
table
relationships

@powerbi_memes

Me after a hard
day's work, loading
and editing 10 data
tables and clicking
close and apply



Demo time