



# Dashboards as Power Tools for Data Visualization and Analytics



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## Inspired by Aircrafts and Automobiles

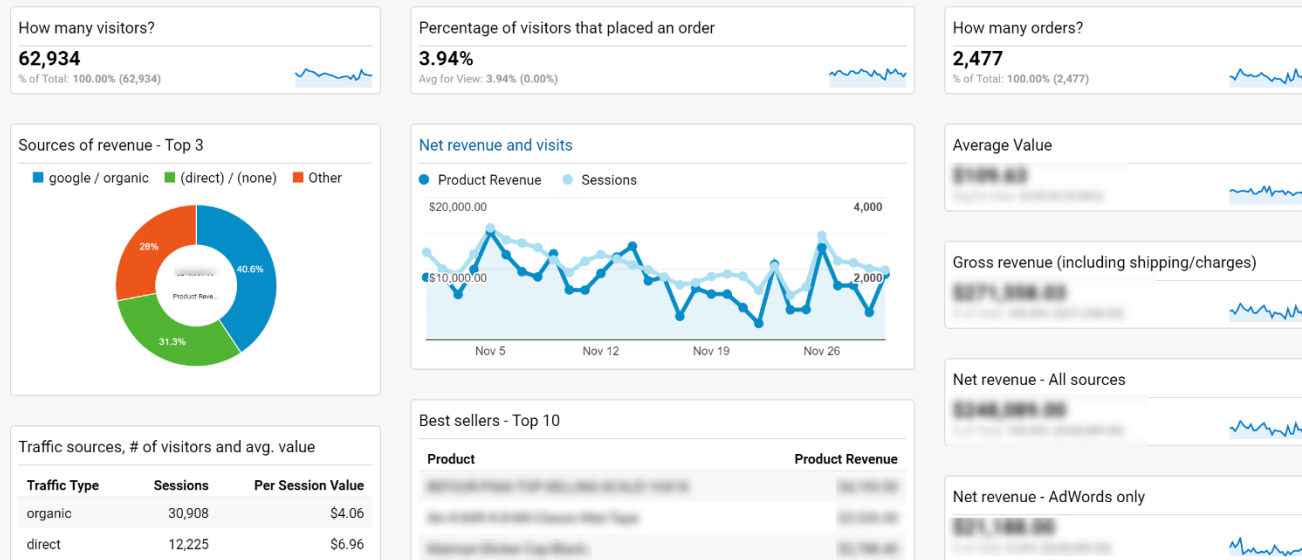
- Dashboards are supposed to monitor and drive a complex system
- Analysts like skilled pilots should be able to acquire information from dashboards to make decisions





# What are Dashboards in Information Technology?

- Dashboards are specialized software tools (mostly web applications) used to visualize data by combining a plethora of charts, graphs, and other charts together



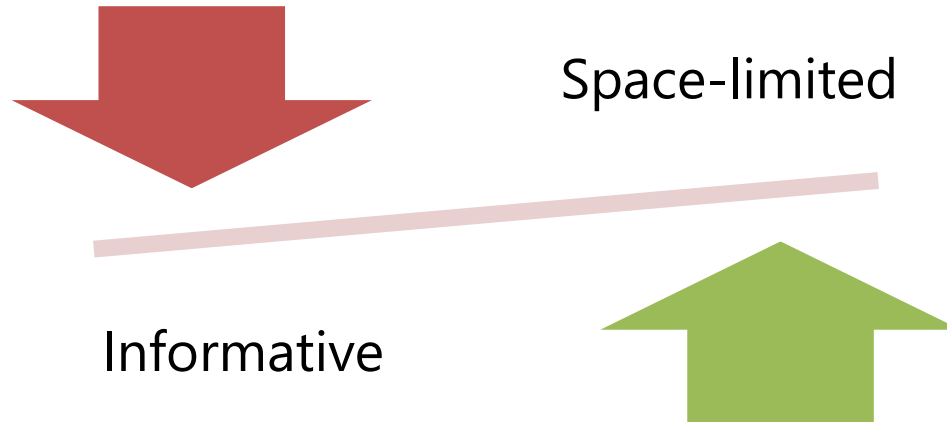
## Google Analytics dashboard example

<https://petryshen.medium.com/https-medium-com-petryshen-step-by-step-guide-to-cleaner-data-in-google-analytics-efb8bf22bdb9>



## What are Dashboard Design Principles?

- Used visualization charts should fit the best nature of data included in data sets displayed on a dashboard
- Used visualization charts should serve their purposes even in case if they are resized in order to be placed into small spaces on a dashboard





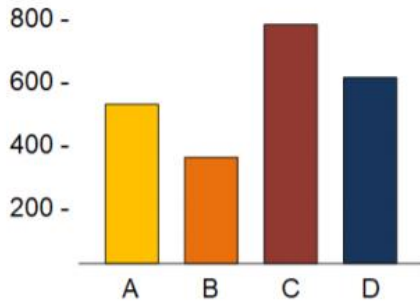
## What is a Good Dashboard Design?

- Dashboard design flaws are usually related to inappropriate data visualization charts and graphs chosen to be placed on dashboards
- Choosing wrong visualizations may mislead dashboard audience into focusing on the wrong things
- When selecting charts, it is required to understand the purpose of a chart, which is actually making it easy for users to identify patterns and compare values to each other
- Visualizations, which are attractive by sight may be completely inefficient for data analytics
- Charts should be easy to understand, there should not be unnecessary details or too much text that may overload the audience

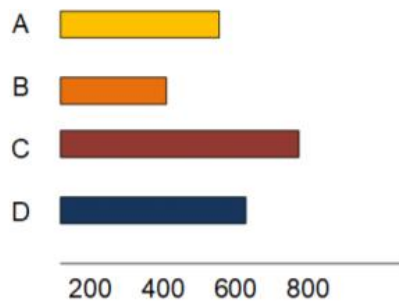


# Department of Software Engineering and Management Information Technology

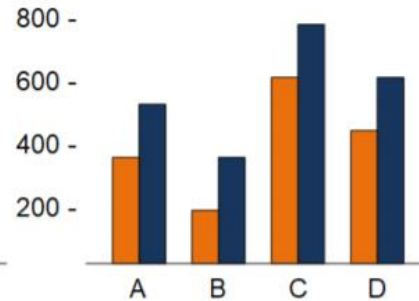
## Faculty of Computer Science and Software Engineering



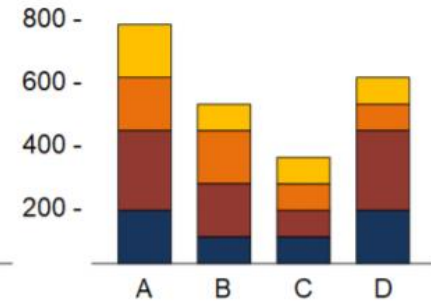
Vertical Bar Chart



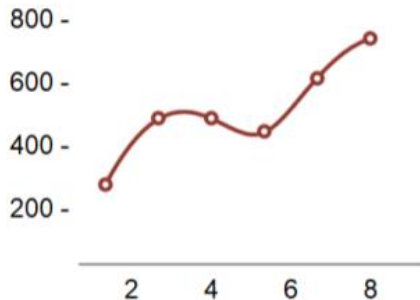
Horizontal Bar Chart



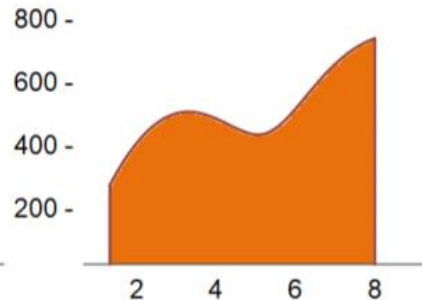
Grouped Bar Chart



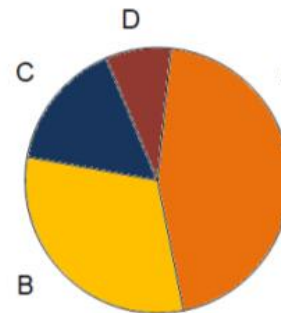
Stacked Bar Chart



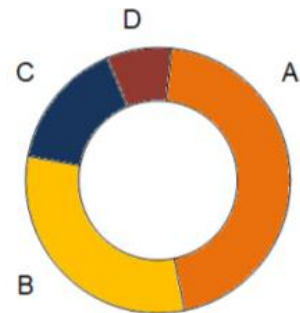
Line Chart



Area Chart



Pie Chart



Donut Chart



## Which Charts Should be Used?

- Since people judge values accurately on two-dimensional plane, bar charts, line charts, and pie charts are the best visualizations:
- **Bar charts (vertical, horizontal, grouped, and stacked)**  
Show comparison at different times, locations, and conditions
- **Line (area) charts**  
Display trends over time in amounts, sizes, rates, etc.
- **Pie (donut) charts**  
Show what parts make up a whole in order to compare relative sizes of these parts

## How Can I Build the Dashboard?

- Gartner's report "Magic Quadrants of Analytics and BI Platforms" defines three leaders in the domain of Business Intelligence software:



Figure 1. Magic Quadrant for Analytics and Business Intelligence Platforms



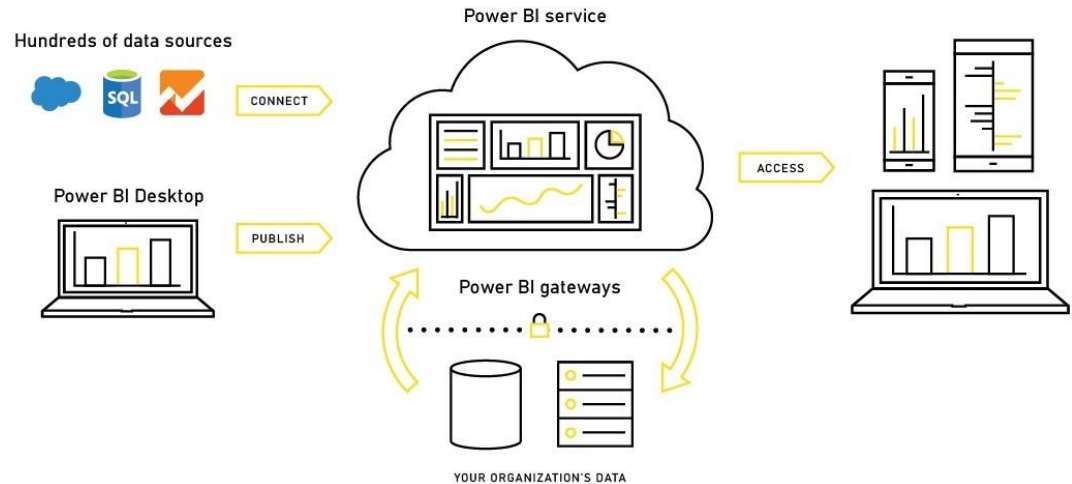
Source: Gartner (February 2018)





## Why Power BI is So Good?

- Various data sources can be connected to the system
- Developers can connect their own applications to the service
- Interactive dashboards are available on any device and display real-time data
- The service works on all platforms: cloud, desktop (**for FREE!!!**) and mobile





## Use Case: Cryptocurrency Markets Analytics

- **Data source**

<https://www.coingecko.com/en/api>



CoinGecko

- **Data visualization**

Current price

Market capitalization

Volume

Supply

Price change (24h)

Market capitalization change (24h)



Power BI





## Step 1. Dataset Preparation

- Go to the API (Application Programming Interface) web page

EN USD Help Login Sign Up Subscribe

CoinGecko Home Coins Exchanges DeFi NFT Portfolio Publications Resources Products Community Search

Coins: 7505 Exchanges: 475 Market Cap: \$1,619,702,652,796 4.2% 24h Vol: \$322,817,382,656 Dominance: BTC 42.9% ETH 17.5% ETH Gas: 72 gwei

### The world's most comprehensive cryptocurrency API

Get Started

Free	Reliable	Comprehensive
Because we believe data should be democratized	Solid team of cryptocurrency specialists working hard to bring top notch cryptocurrency data	All the info you'll ever need at your fingertips
<ul style="list-style-type: none"><li>✓ 100% Free crypto API</li><li>✓ No keys required</li></ul>	<ul style="list-style-type: none"><li>✓ In operation since early 2014</li><li>✓ Generous rate limits with up to 100 requests/minute</li></ul>	<ul style="list-style-type: none"><li>✓ Track over 7,000 coins such as bitcoin, litecoin, ethereum, and more from more than 400 exchanges and growing</li></ul>

<https://www.coingecko.com/en/api>



## Step 1. Dataset Preparation

- Scroll down to find “/coins/markets” endpoint, enter “usd” as the “vs\_currency” parameter

coins

**GET** /coins/list List all supported coins id, name and symbol (no pagination required)

**GET** /coins/markets List all supported coins price, market cap, volume, and market related data

Use this to obtain all the coins market data (price, market cap, volume)

Parameters

Name	Description
<b>vs_currency</b> * required string (query)	The target currency of market data (usd, eur, jpy, etc.) <input type="text" value="usd"/>
ids string (query)	The ids of the coin, comma separated cryptocurrency symbols (base). refers to /coins/list. When left empty, returns numbers the coins observing the params <b>limit</b> and <b>start</b> <input type="text" value="ids - The ids of the coin, comma separated cryptocurren"/>

<https://www.coingecko.com/en/api>



## Step 1. Dataset Preparation

- Click "Execute" and get the "Request URL" string

Execute

Clear

Responses

Response content type

application/json



Curl

```
curl -X GET "https://api.coingecko.com/api/v3/coins/markets?vs_currency=usd&order=market_cap_desc&per_page=100&page=1&sparkline=false" -H "accept: application/json"
```

Request URL

```
https://api.coingecko.com/api/v3/coins/markets?vs_currency=usd&order=market_cap_desc&per_page=100&page=1&sparkline=false
```

<https://www.coingecko.com/en/api>

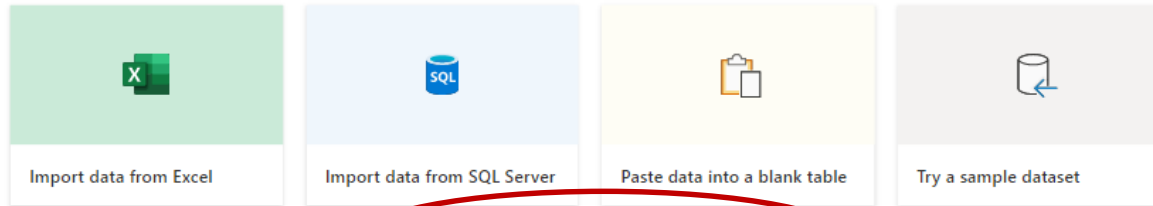


## Step 2. Dataset Loading

- Download and install Power BI Desktop, run the application, and choose "Get data ..."

### Add data to your report

Once loaded, your data will appear in the Fields pane.

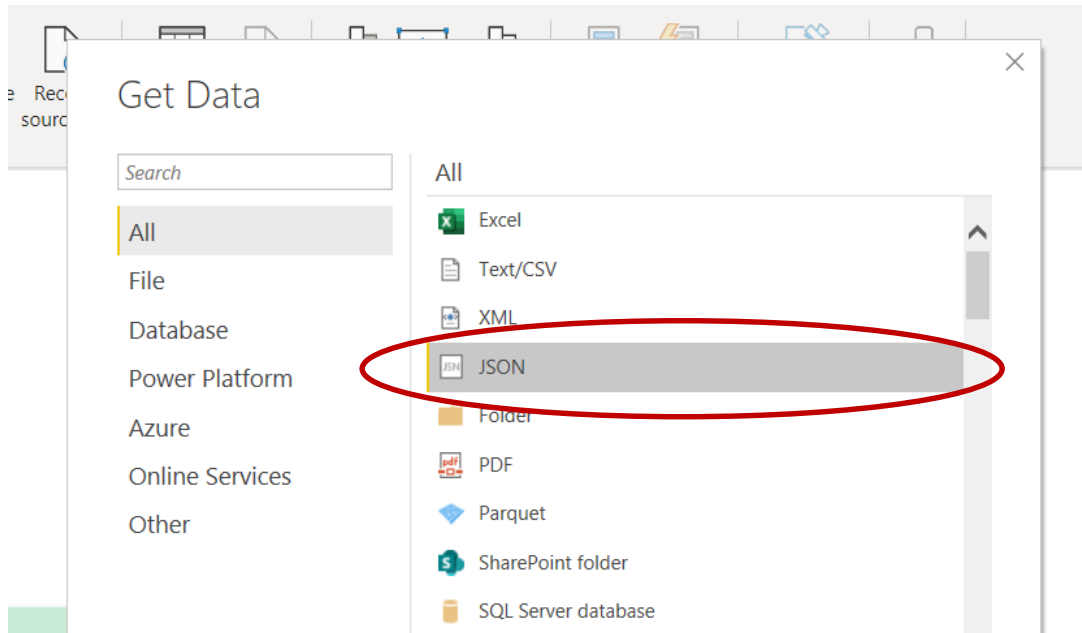


[Get data from another source →](#)



## Step 2. Dataset Loading

- Choose the JSON data source in the "Get Data" window

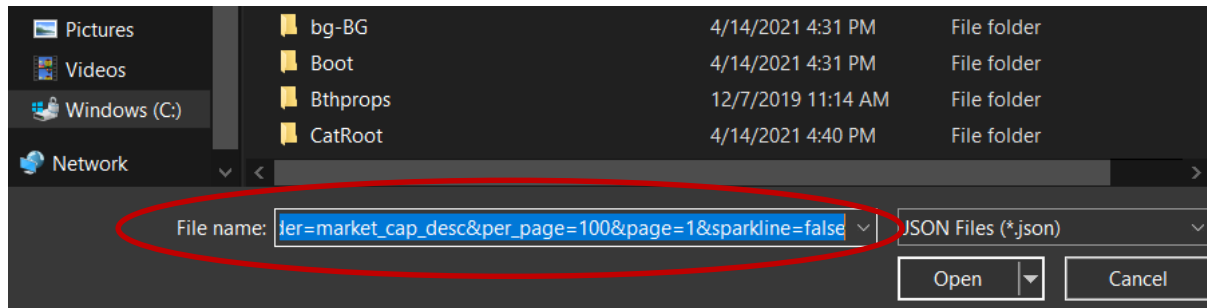




## Step 2. Dataset Loading

- Input the requested URL (from CoinGecko API) into the "File name" field and click "Open"

[https://api.coingecko.com/api/v3/coins/markets?vs\\_currency=usd&order=market\\_cap\\_desc&per\\_page=100&page=1&sparkline=false](https://api.coingecko.com/api/v3/coins/markets?vs_currency=usd&order=market_cap_desc&per_page=100&page=1&sparkline=false)







## Step 2. Dataset Loading

- Loaded dataset will be shown in "Power Query Editor" window, click "Close & Apply"

The screenshot displays the Power Query Editor window with a table of cryptocurrency data. The table has columns for 'id', 'symbol', 'name', and 'image'. The 'Close & Apply' button in the top-left corner of the ribbon is circled in red. The right-hand pane shows the 'Query Settings' for the 'markets[1]' query, including 'PROPERTIES' and 'APPLIED STEPS'.

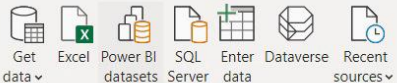
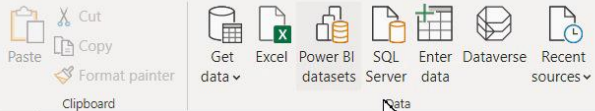
id	symbol	name	image	
1	bitcoin	btc	Bitcoin	https://assets.coingecko.com/coins/images/1/large/bitcoin.png?1547...
2	ethereum	eth	Ethereum	https://assets.coingecko.com/coins/images/279/large/ethereum.png?...
3	tether	usdt	Tether	https://assets.coingecko.com/coins/images/325/large/Tether-logo.png...
4	binancecoin	bnb	Binance Coin	https://assets.coingecko.com/coins/images/825/large/binance-coin-lo...
5	cardano	ada	Cardano	https://assets.coingecko.com/coins/images/975/large/cardano.png?1...
6	ripple	xrp	XRP	https://assets.coingecko.com/coins/images/44/large/xrp-symbol-whit...
7	dogecoin	doge	Dogecoin	https://assets.coingecko.com/coins/images/5/large/dogecoin.png?15...
8	polkadot	dot	Polkadot	https://assets.coingecko.com/coins/images/12171/large/aIGBjFU_40...
9	usd-coin	usdc	USD Coin	https://assets.coingecko.com/coins/images/6319/large/USD_Coin_co...
10	internet-computer	icp	Internet Computer	https://assets.coingecko.com/coins/images/14495/large/Internet_Co...
11	bitcoin-cash	bch	Bitcoin Cash	https://assets.coingecko.com/coins/images/780/large/bitcoin-cash-cir...
12	uniswap	uni	Uniswap	https://assets.coingecko.com/coins/images/12504/large/uniswap-unl...
13	matic-network	matic	Polygon	https://assets.coingecko.com/coins/images/4713/large/matic__poly...
14	chainlink	link	Chainlink	https://assets.coingecko.com/coins/images/877/large/chainlink-new-l...
15	litecoin	ltc	Litecoin	https://assets.coingecko.com/coins/images/2/large/litecoin.png?1547...
16	stellar	xlm	Stellar	https://assets.coingecko.com/coins/images/100/large/Stellar_symbol...
17	ethereum-classic	etc	Ethereum Classic	https://assets.coingecko.com/coins/images/453/large/ethereum-class...
18	solana	sol	Solana	https://assets.coingecko.com/coins/images/4128/large/coinmarketca...
19	vechain	vet	VeChain	https://assets.coingecko.com/coins/images/1167/large/VeChain-Logo...
20	binance-usd	busd	Binance USD	https://assets.coingecko.com/coins/images/9576/large/BUSD.png?15...
21	theta-token	theta	Theta Network	https://assets.coingecko.com/coins/images/2538/large/theta-token-l...
22				



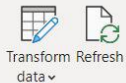
## Step 3. Data Visualization

- Let's say we need to compare market cap of cryptocurrencies

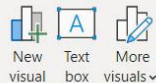
File Home Insert Modeling View Help



Data



Queries



Insert



Calculations



Sensitivity



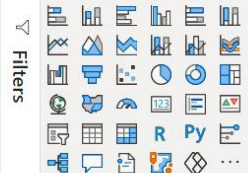
Share

## Build visuals with your data

Select or drag fields from the Fields pane onto the report canvas.



### Visualizations



Filters

Values

Add data fields here

### Drill through

Cross-report

Off

Keep all filters

On

Add drill-through fields here

### Fields

Search

markets[1]





## Step 3. Data Visualization

- Use more efficient and informative visualization approach

File Home Insert Modeling View Help

Clipboard: Paste, Cut, Copy, Format painter

Data: Get data, Excel, Power BI datasets, SQL Server, Enter data, Dataverse, Recent sources

Queries: Transform data, Refresh data

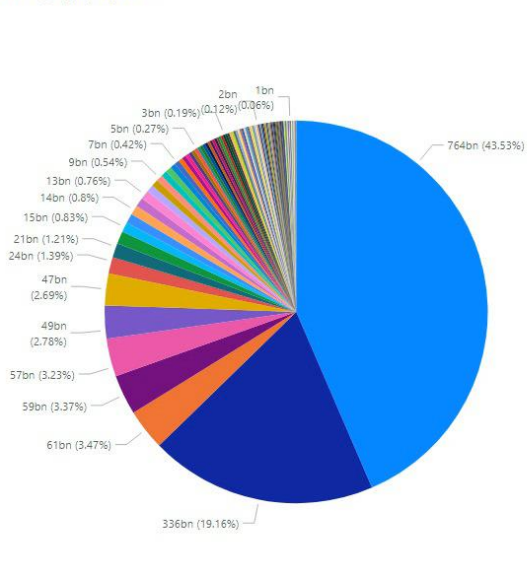
Insert: New visual, Text box, More visuals

Calculations: New measure, Quick measure

Sensitivity: Sensitivity (preview)

Share: Publish

market\_cap by symbol



symbol

- btc
- eth
- usdt
- bnb
- ada
- xrp
- doge
- dot
- usdc
- icp
- bch
- uni
- matic
- link
- ltc
- xlm
- etc
- sol
- vet
- busd
- theta
- wbtc
- eos
- trx

Visualizations: [Icons for various chart types]

Filters: [Filters icon]

Fields: Search [ ]

- atl
- atl\_change\_percentage
- atl\_date
- circulating\_supply
- current\_price
- fully\_diluted\_valuation
- high\_24h
- id
- image
- last\_updated
- low\_24h
- market\_cap
- market\_cap\_change\_24h
- market\_cap\_change\_percentage\_24h
- market\_cap\_rank
- max\_supply
- name
- price\_change\_24h
- price\_change\_percentage\_24h
- roi
- symbol
- total\_supply
- total\_volume

Drill through: Off

Values: Add data fields here

Drill through fields: Add drill-through fields here



## Step 3. Data Visualization

- Comparison vs. “parts of a whole”

File Home Insert Modeling View Help Format Data / Drill

Clipboard: Paste, Cut, Copy, Format painter

Data: Get data, Excel, Power BI datasets, SQL Server, Enter data, Dataverse, Recent sources

Queries: Transform data, Refresh data

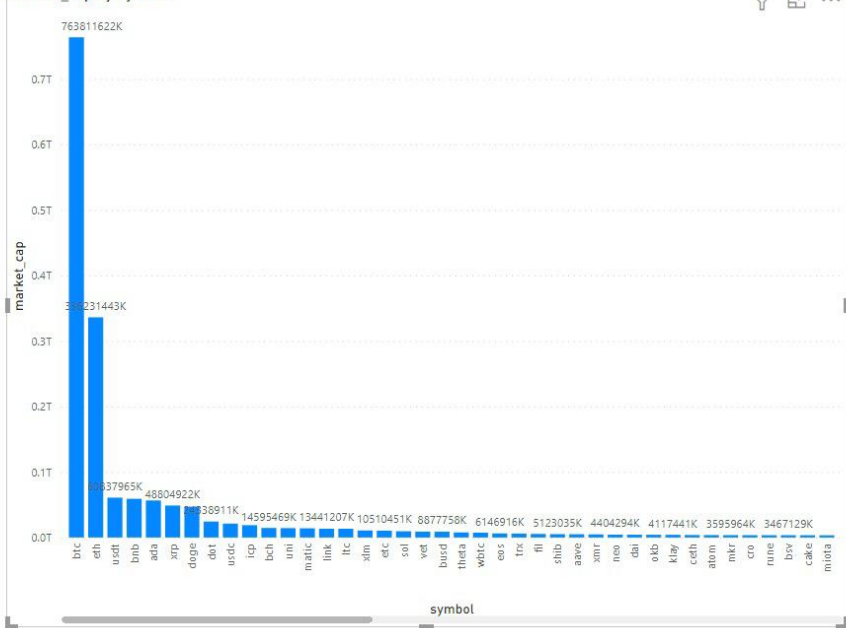
Insert: New visual, Text box, More visuals

Calculations: New measure, Quick measure

Sensitivity: Sensitivity (preview)

Share: Publish

market\_cap by symbol



Visualizations: [Chart icons]

Fields: Search [ ]

- [ ] ∑ atl
- [ ] ∑ atl\_change\_percentage
- [ ] ∑ atl\_date
- [ ] ∑ circulating\_supply
- [ ] ∑ current\_price
- [ ] ∑ fully\_diluted\_valuation
- [ ] ∑ high\_24h
- [ ] id
- [ ] image
- [ ] ∑ last\_updated
- [ ] ∑ low\_24h
- [x] ∑ market\_cap
- [ ] ∑ market\_cap\_change\_24h
- [ ] ∑ market\_cap\_change\_percentage\_24h
- [ ] ∑ market\_cap\_rank
- [ ] ∑ max\_supply
- [ ] ∑ name
- [ ] ∑ price\_change\_24h
- [ ] ∑ price\_change\_percentage\_24h
- [ ] roi
- [x] symbol
- [ ] ∑ total\_supply
- [ ] ∑ total\_volume

Filters: [ ]

General: [ ]

X axis: On [ ]

Y axis: On [ ]

Zoom sli...: Off [ ]

Data colors: [ ]

Data lab...: On [ ]

Color: [ ]

Display units: Thousands [ ]

Value decimal places: [ ]

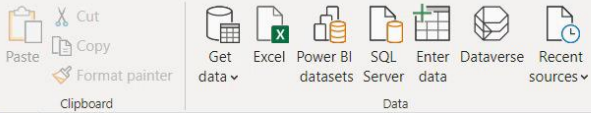


## Step 3. Data Visualization

- Finalizing the dashboard



File Home Insert Modeling View Help

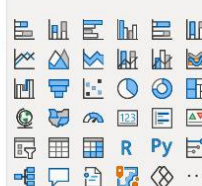


market\_cap by symbol



Filters

Visualizations



Values

Add data fields here

Drill through

Cross-report

Off

Keep all filters

On

Add drill-through fields here

Fields

Search

- atl
- atl\_change\_percentage
- atl\_date
- circulating\_supply
- current\_price
- fully\_diluted\_valuation
- high\_24h
- id
- image
- last\_updated
- low\_24h
- market\_cap
- market\_cap\_change\_24h
- market\_cap\_change\_percentage\_24h
- market\_cap\_rank
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- name
- price\_change\_24h
- price\_change\_percentage\_24h
- roi
- symbol
- total\_supply
- total\_volume





**Department of Software Engineering and Management Information Technology  
Faculty of Computer Science and Software Engineering**

**THANK YOU FOR YOUR ATTENTION!  
ANY QUESTIONS?**