Data Visualization for Weather Forecasting Using Power BI

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ABSTRACT:

Power BI has taken the world of business intelligence, data visualization and analytic s by storm. Power BI is an online service that enables searching data, transforming it, visualizing it, and sharing the developed reports and dashboards with other users in the same or different departments/organizations or even with the general public. As of February 2017, more than 200,000 organizations across 205 countries are using Power BI. Power BI is having a free option that has adequate features and functionality, it has become a serious contender for use as a business intelligence platform in small and medium organizations. One of the innovative features of Power BI is its Quick Insights feature (Michael Hart, 2017) that is built on a growing set of advanced analytical algorithms. After uploading a data set to Power BI, a click of a button can be used to invoke this feature that automatically builds many reports based on its analysis of the data, without any human intervention being required. This also helps reduce human errors in calculations and statistical techniques, which lead to un-verifiable research. Accepting
even Excel spreadsheets as input, Power BI is easy to use and ripe for adoption as a platform for Research Data Analysis. In this paper, an attempt has been made to show how easily a data set of research data can be transformed by Power BI into a set of analytical reports and dashboards, and whichcan be shared with ease.

Turn your data into a competitive advantage by using Power BI and Azure together to connect, combine, and analyze your entire data estate. Enable business analysts, IT professionals, and data scientists to collaborate seamlessly, providing a single version of data truth that delivers insights across your organization. "Now we have a single consolidated source of truth that everyone uses, and we can increasingly automate our analysis for a deeper dive into the intricacies of the data."

INTRODUCTION :

Power BI is an increasingly popular business intelligence and visualization tool from Microsoft that enables data analytic s and data visualization. Ron George initially designed Power BI in the summer of

2010. The initial release was available for public download the following year. Power BI Desktop, Power BI Service, Power BI Gateway, Power BI Report Server, and Power BI Mobile Apps are the key components of the platform.

In this article, we'll discuss the basics of Power BI Desktop and how to create a Power BI dashboard using Power BI Desktop. Then, we'll publish this dashboard on Power BI Service.

Power BI dashboards are single-page documents, often referred to as canvas, which illustrate a story through visualizations. A well-designed dashboard consists only of the highlights of a story. This is due to the fact that it is limited to one page. For more information, readers can view related reports. Power BI is the only service that offers dashboards.

A single page visualization with multiple charts and graphs to tell a story is called a Power BI dashboard. This one-page visualization in a dashboard is also known as a Canvas. The Power BI dashboard is a feature only available in Power BI Service. Since a Power BI dashboard is limited to one page, it only contains the highlights of a story. You cannot create a dashboard on Power BI Desktop.

RELATED WORK:

The RELATED, as the name says, will return the corresponding value from one table to another. It is similar to the lookup value function in MS Excel, VLOOKUP.However, before we apply this DAX function in Power BI, we need to create a data model relationship between the tables we refer to.Below is the syntax of the RELATED DAX function in Power BI.

We need to select the result column from the other table. It will fetch the details for us. If you are finding it difficult to understand this theoretical explanation, do not worry; below, we will give you practical examples in detail.

PROPOSED METHOD:

0.1 Installing The Power Bi Desktop: **Once the Power BI Desktop is downloaded, open the setup file and go to Next > I accept the terms in the LicenseAgreement > Choose the destination folder > Create a desktop shortcut > Install**
>Launch Microsoft Power BI Desktop > Finish.
Once installed, the Power BI home page will open up as follow
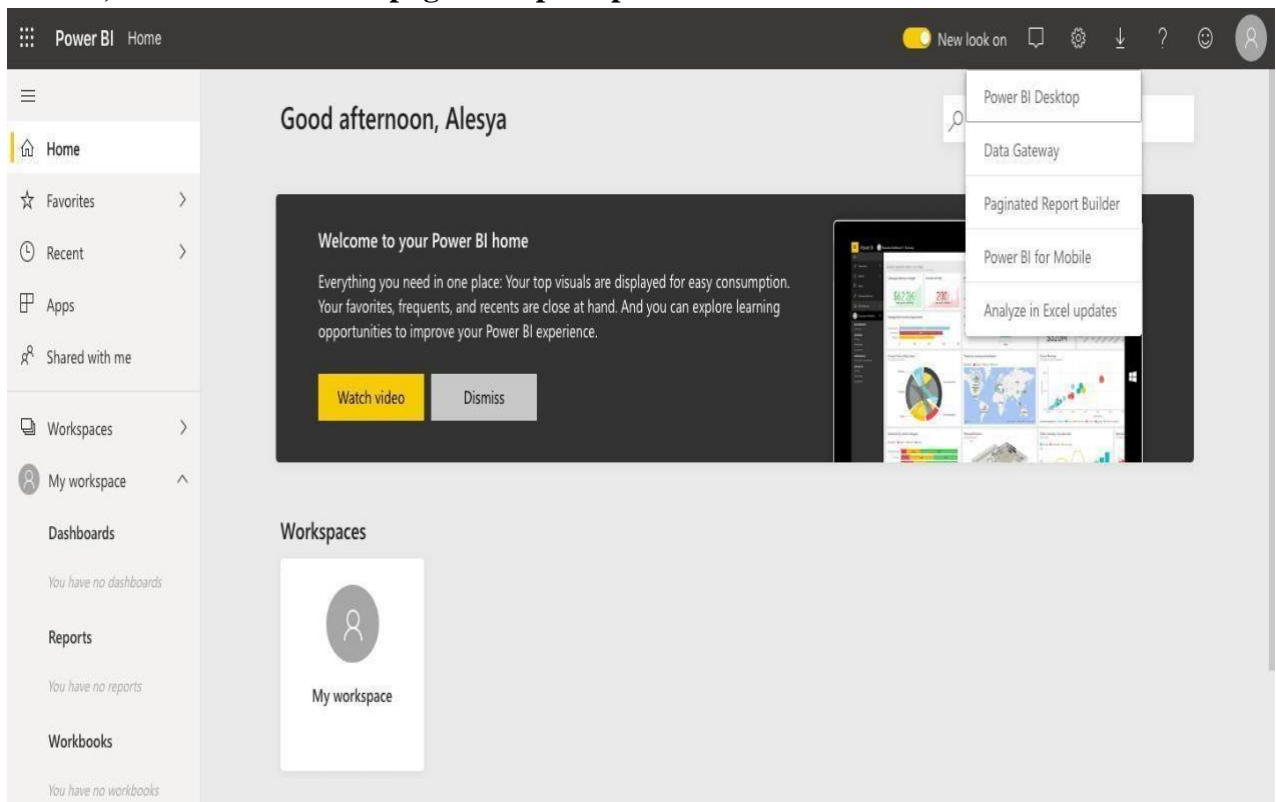
0.2 Importing Data to Power BI:

The next step is to import data from any data source and visualize it in Power BI. To do so, press on **Home > Get Data >** Choose a data source **> Connect** as shown below.
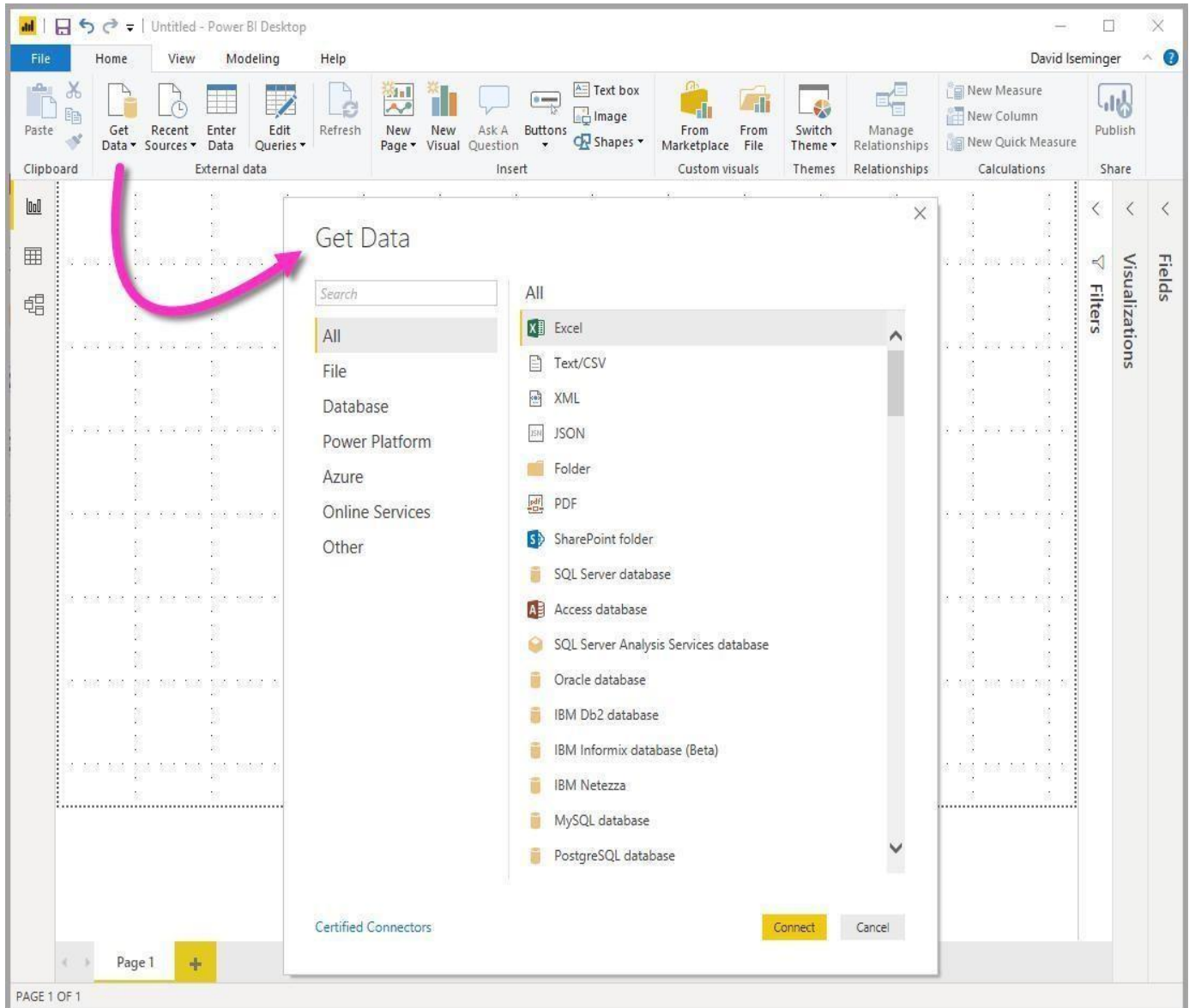
0.3 Formatting the Data in Power Bi:

Once you have imported your data,Power BI starts processing it and organic based on what it has found in the Navigator Window. Before loading the data, you have an optionto format it.
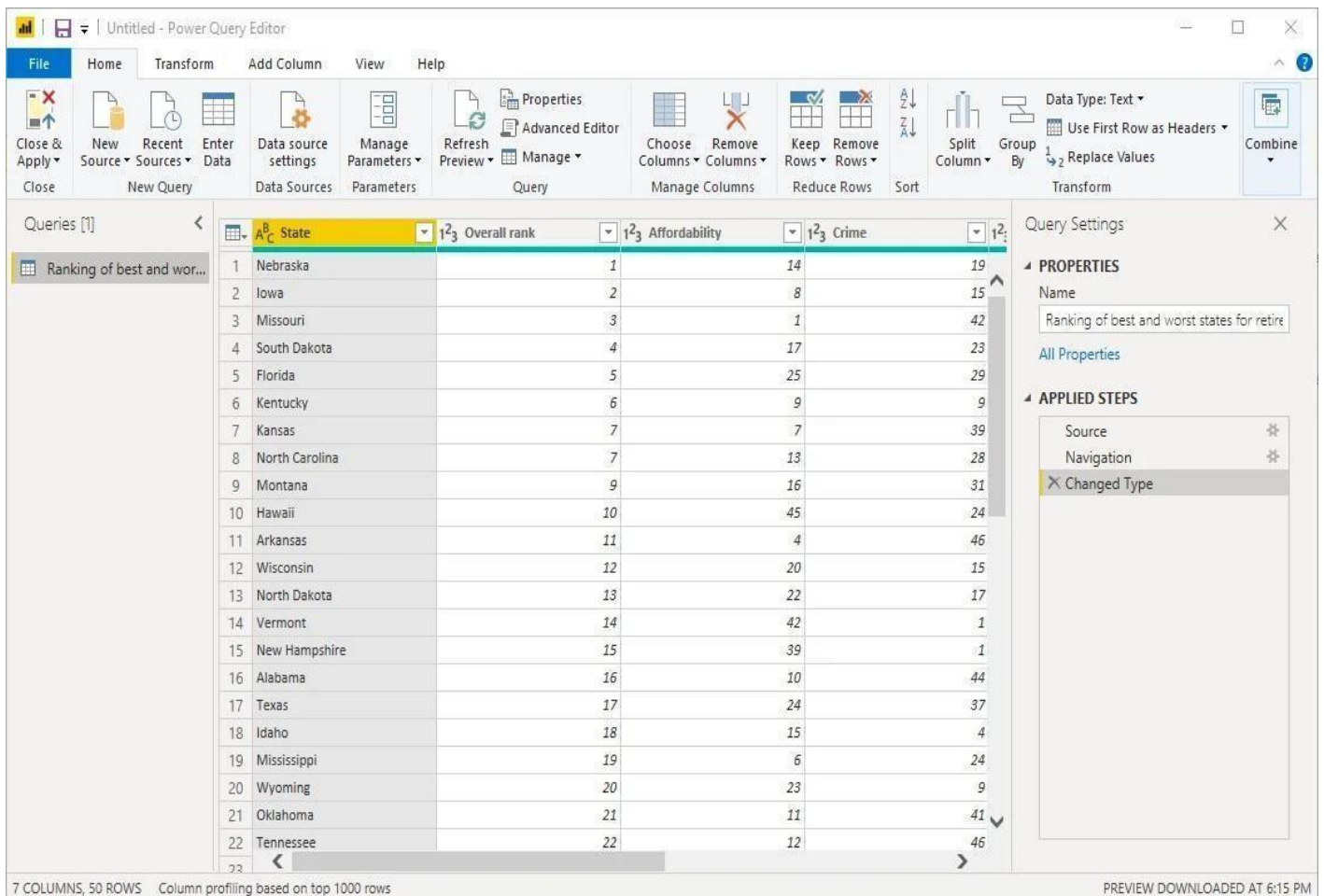
To do this, select the "Transform Data" available at the bottom of the page. In case youwant to load the data without any formatting, click on "Load". This is shown below.

When you select Transform data, a summarized form of the table is shown. This is shownbelow.

0.4 Creating Visualizations for your Power BI Dashboards:

Once you have imported your data completely onto Power BI, creating the visualization elements is very easy. You can incorporate different visualization elements (similar to the ones discussed in the previous section) by simply clicking on any Bar, Pie, orDonut chart or any other data visualization methods and types under the Visualizations tab on the right side of the panel as shown below
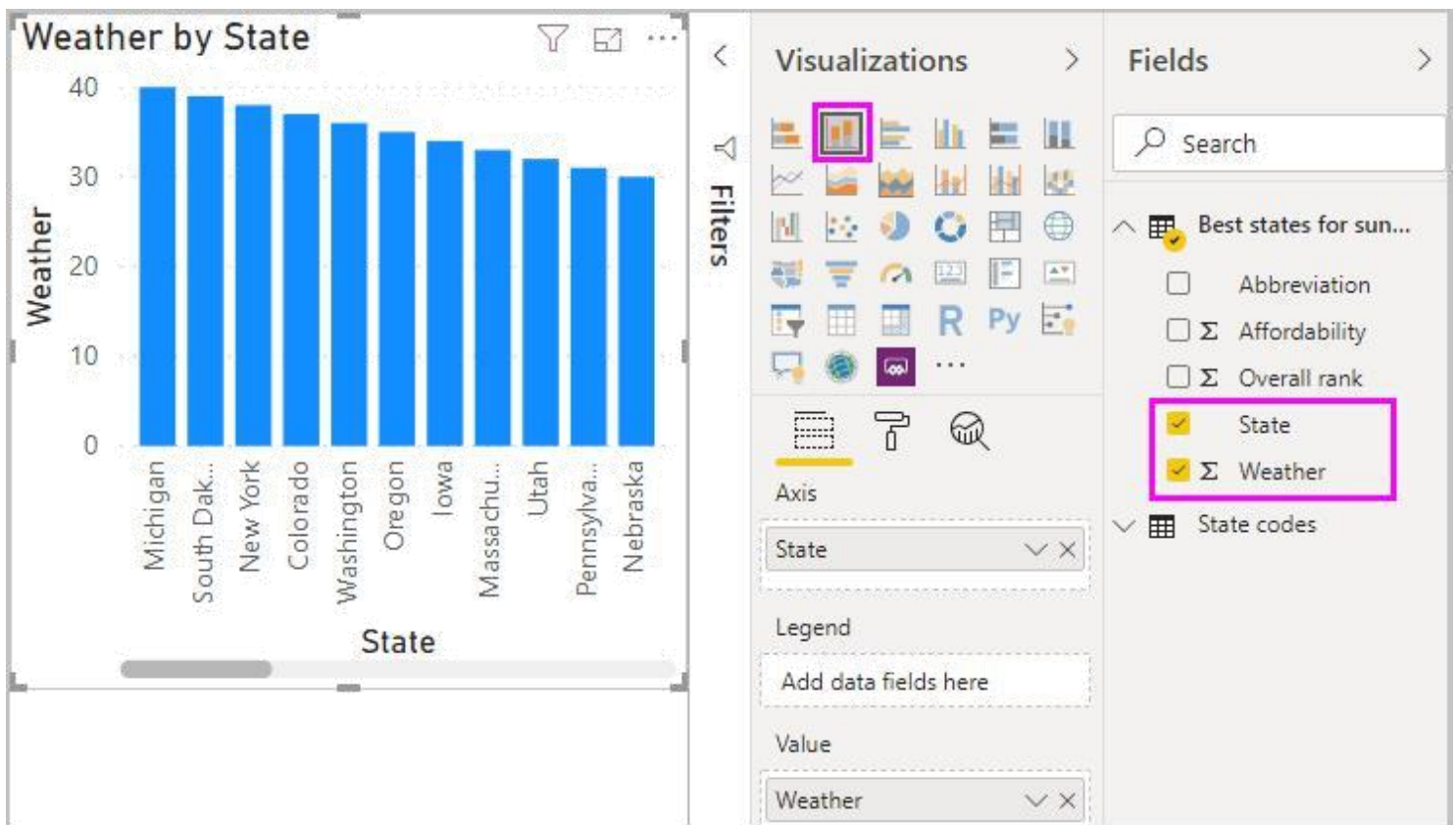
1.1 Power BI is a collection of apps, software services and connectors that come together to turn unrelated data into visually impressive and interactive insights. Power BI can work with simple data sources like Microsoft Excel and complicated ones like cloud-based or on-premises hybrid Data warehouses. Power BI has the capabilities to easily connect to your data sources, visualize and share and publish your findings with anyone and everyone. Power BI is simple and fast enough to connect to an Excel workbook or a local database. It can also be robust and enterprise-grade, ready for extensive modeling and real time analytics. This means it can be used in a variety of environments from a personal report and visualization tool to the analytics and decision engine behind group projects, divisions, or entire corporations. As Power BI is a Microsoft product and has built in connections to Excel, there are many functions that will be familiar to an Excel user.

1.2 Parts of Power BI

Power BI consists of a Microsoft Windows desktop application called Power BI Desktop, an online SaaS (Software as a Service) called Power BI Service and a mobile Power BI app that can be accessed from Windows phones and tablets, and also available on Apple iOS and Google Android devices. These three elements— Desktop, the Service, and Mobile apps - are the backbone of the Power BI system and lets users create, share and consume the actionable insights in the most effective way.
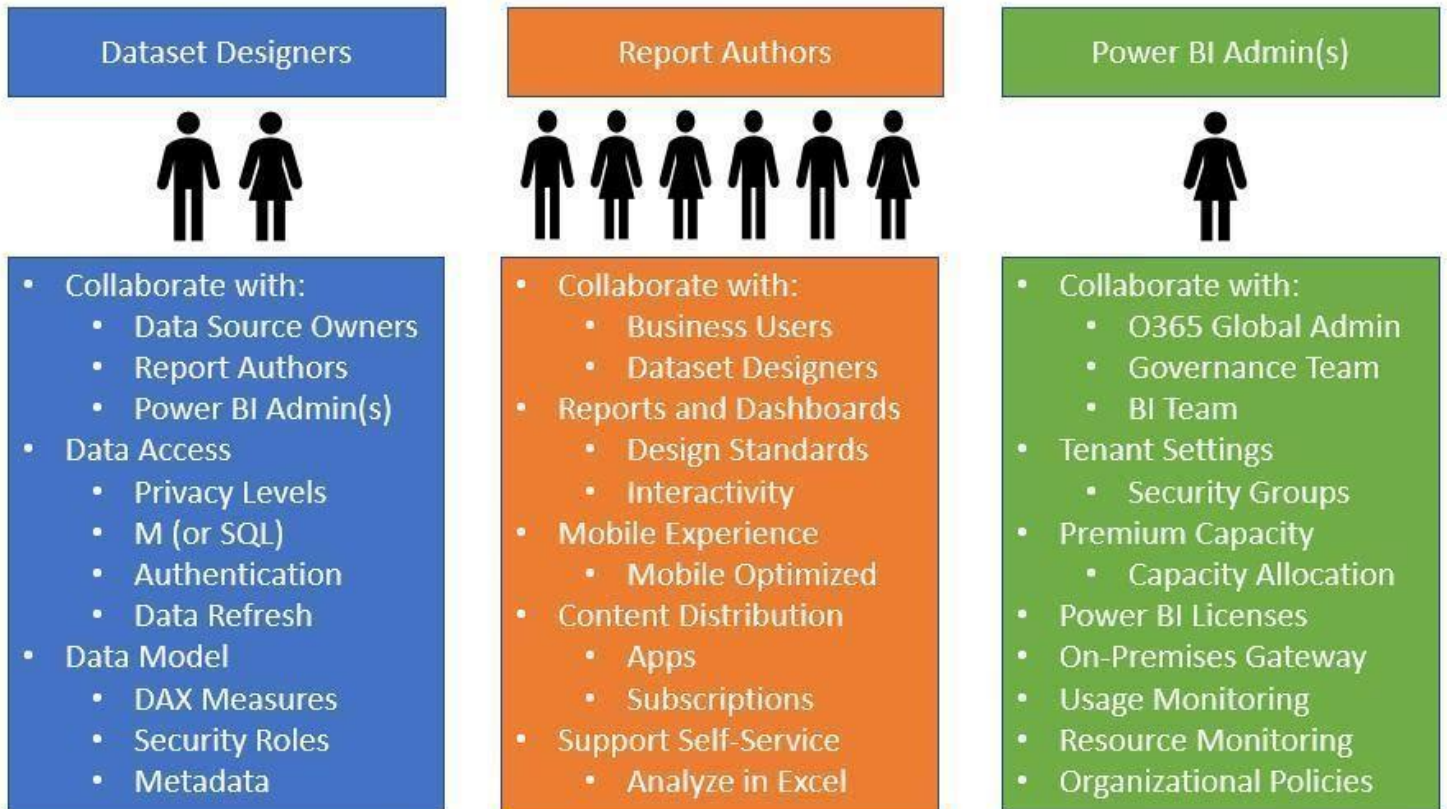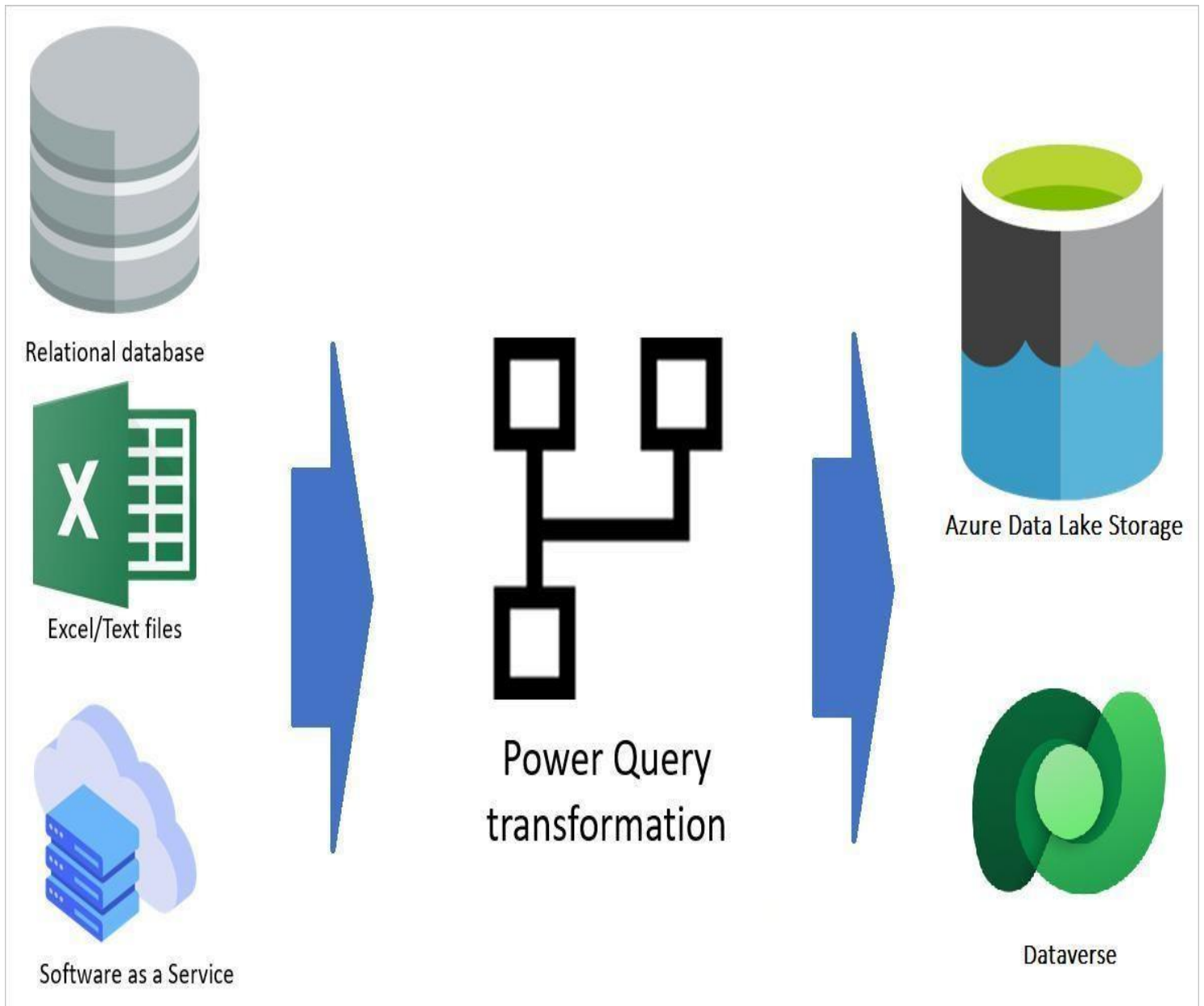
1.3 Use of Power BI and roles

The use of Power BI could depend on the role that you are in. For example: if you are the stakeholder of a project, then you might want to use Power BI.Service or theMobile app to have a glance at how the business is performing. But on the other hand, if you are a developer, you would be using Power BI Desktop extensively to publish Power BI desktop reports to the Power BI Service. In the upcoming modules we would be discussing these three components - Desktop, Service and Mobile apps - in more detail.

Dataset Designers

- Collaborate with:
  - Data Source Owners
  - Report Authors
  - Power BI Admin(s)
- Data Access
  - Privacy Levels
  - M (or SQL)
  - Authentication
  - Data Refresh
- Data Model
  - DAX Measures
  - Security Roles
  - Metadata

Report Authors

- Collaborate with:
  - Business Users
  - Dataset Designers
- Reports and Dashboards
  - Design Standards
  - Interactivity
- Mobile Experience
  - Mobile Optimized
- Content Distribution
  - Apps
  - Subscriptions
- Support Self-Service
  - Analyze in Excel

Power BI Admin(s)

- Collaborate with:
  - O365 Global Admin
  - Governance Team
  - BI Team
- Tenant Settings
  - Security Groups
- Premium Capacity
  - Capacity Allocation
- Power BI Licenses
- On-Premises Gateway
- Usage Monitoring
- Resource Monitoring
- Organizational Policies

1.4 Power BI flow

Generally, the flow starts at the Power BI Desktop, where a report is created. This created report can be published to the Power BI Service and finally shared so that the users can use it from the Mobile apps. This is the most common approach for sharing reports. There are other approaches but we will stick to this flow for this entire tutorial to help learn the different aspects of Power BI.

Relational database

Excel/Text files

Software as a Service

Power Query transformation

Azure Data Lake Storage

Dataverse

1.5 Use Power BI

The common flow of activity in Power BI looks like this: 1. Bring data into Power BI Desktop, and create a report. 2. Publish to the Power BI service, where you can create new visualizations or build dashboards. 3. Share dashboards with others, especially people who are on the go. 4. View and interact with shared dashboards and reports in Power BI Mobile apps. Depending on the user role, the user might spend most of the time in one of the three components than the other.
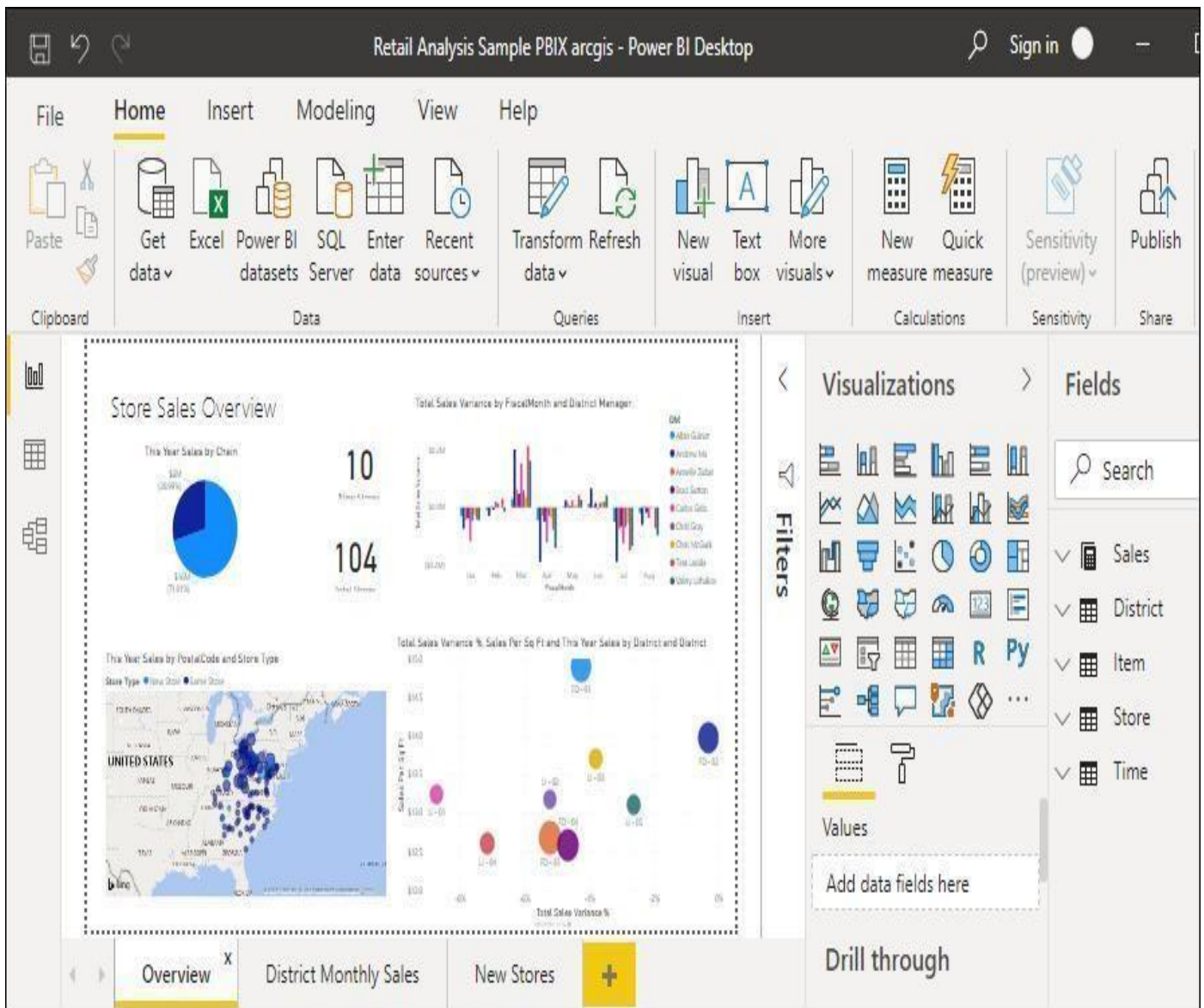
2.Importing Data set and Modeling

Power BI can connect to a whole range of data sources from Excel sheets and local databases to several Cloud services. Currently, over 60 different cloud services have specific connectors to help you connect with generic sources through XML, CSV, text, and ODBC. Let us start connecting to one of the data sources. For today we will be working on the gap_minder_map.csv file.
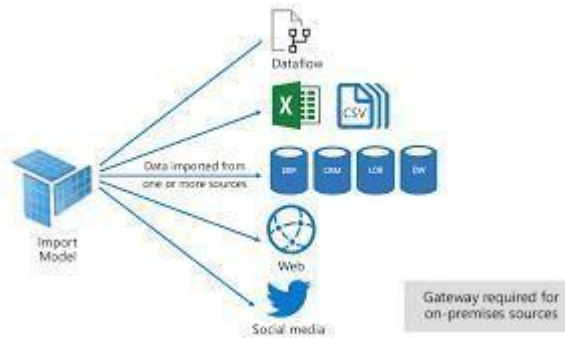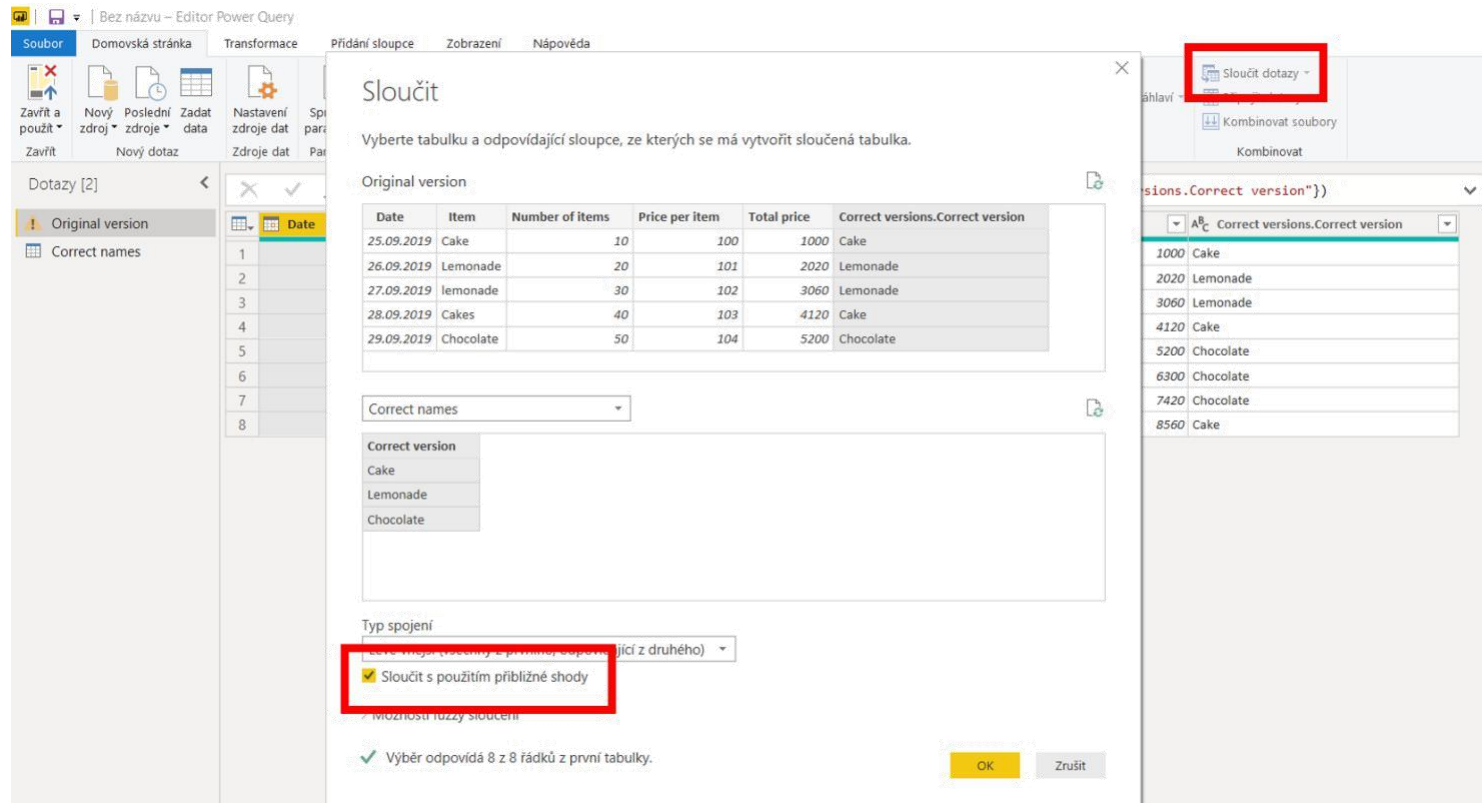

2.1 Importing data into Power BI Desktop

Power BI Desktop has a Get Data button from the ribbon on the Home tab. In PowerBI, there are all sorts of different data sources available. Select a source to establisha connection. Depending on your selection, you will be asked to find the source on your computer or network, or be prompted to sign in to a service to authenticateyour request. As our first step to import the dataset/file into Power BI, we click onthe Get Data icon on the ribbon of Home tab.
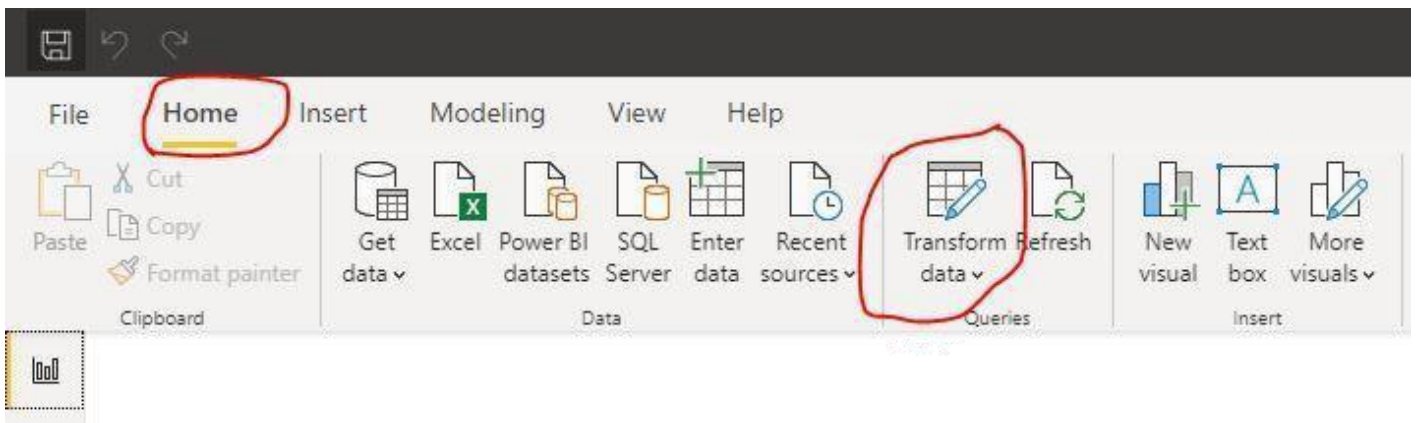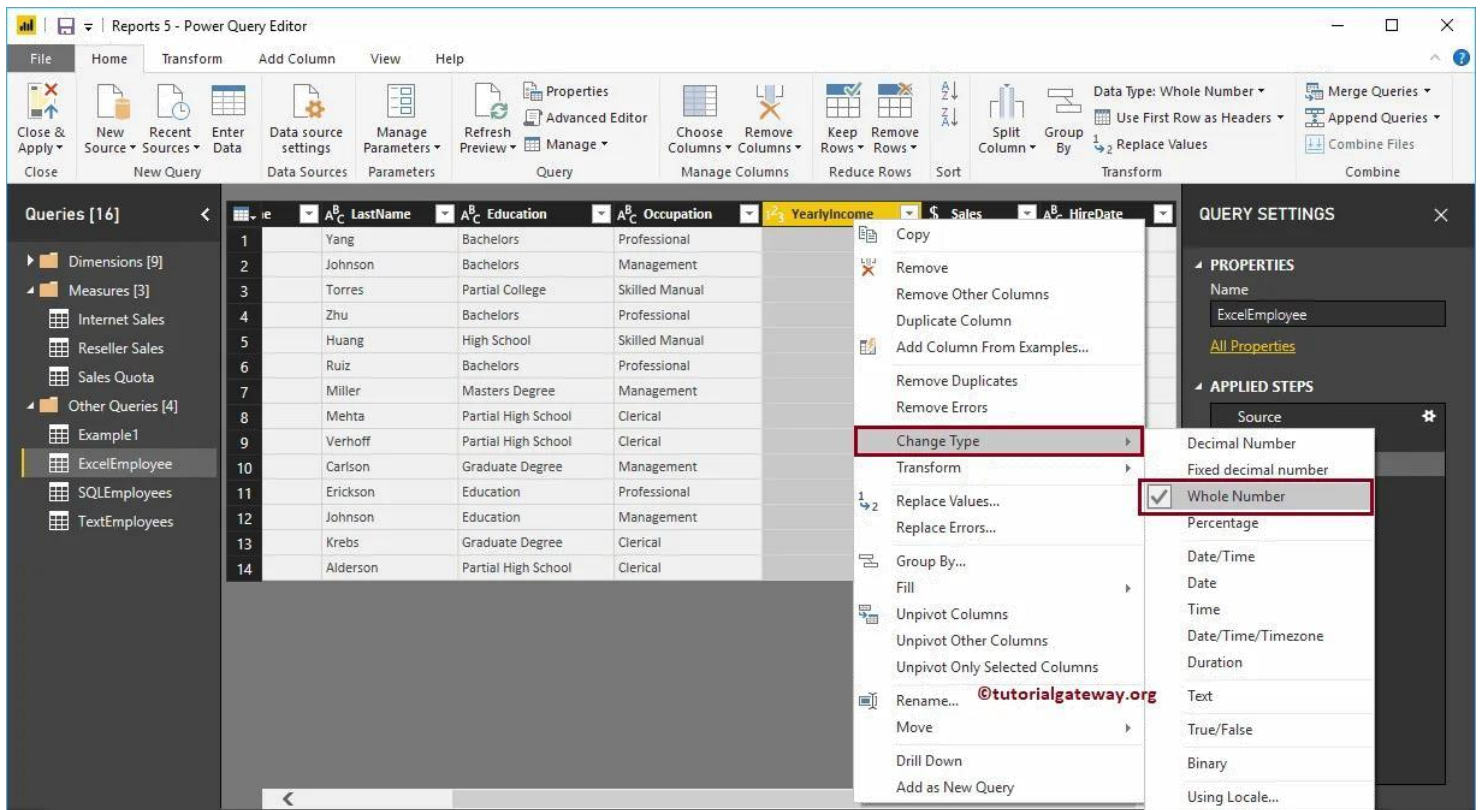
3.Dealing with errors

3.1 Checking for automatically detected errors

Once queried, any detected errors will be displayed. Clicking on these errors will provide a brief description on what might have gone wrong. There will be some errors showing up in your data, click on the errors to see what has caused the issue. 2.2.2 Changing data type of column One of the most common errors is the detection of the datatype of a particular column. While loading the data, Power BI automatically assigns a column type based on the first lines of data. This can cause errors or other problems if the automated data type is not suited for that column. You may need to change data types of the columns to a relevant type for your data model. Any changes to the data needs to be done under the Data file listed under Other Queries. The life_exp column is displayed as text data. This is a problem as we may want to do numerical calculations with this data. We should change this to a numerical data type. • Select the gap-minder file. • Right click ontop of the column and select Change type. • Change to Decimal Number.

3.2 Changing data type of column:

One of the most common errors is the detection of the datatype of a particular column. While loading the data, Power BI automatically assigns a column type based on the first lines of data. This can cause errors or other problems if the automated datatype is not suited for that column. You may need to change data types of the columns to a relevanttype for your data model. Any changes to the data needs to be done under the Data file listed under Other Queries. The life_exp column is displayed as text data. This is a problem as we may want to do numerical calculations with this data. We should change this to a numerical data type.

• Select the gap-minder file.

• Right click on top of the column and select Change type.

• Change to Decimal Number

You can replace a current step in the query with Replace current step or add a new step to the query with Add new step.

 • Click Add new step.

Once necessary changes are made, it is important to refresh and check if the change was applied. We can do this by clicking on the Refresh Preview button on the ribbon. You will notice that this has created errors due to several cells containing N/A.

Plotting
3.3 Visualization Panel

We touched upon the different panels present in the Power BI interface. We will now explore thedifferent panels dedicated to creating and formatting charts in detail. One of the panels is the Visualization panel highlighted in the Red box. It contains various types of charts that you can create to visualize your data. Some of the available chart types are - Stacked bar chart, Line chart,Area chart, Scatter plot, Pie chart, etc. You can also import a custom visual from a file or the marketplace if you click on the . . . icon. We will explore that in the later section.
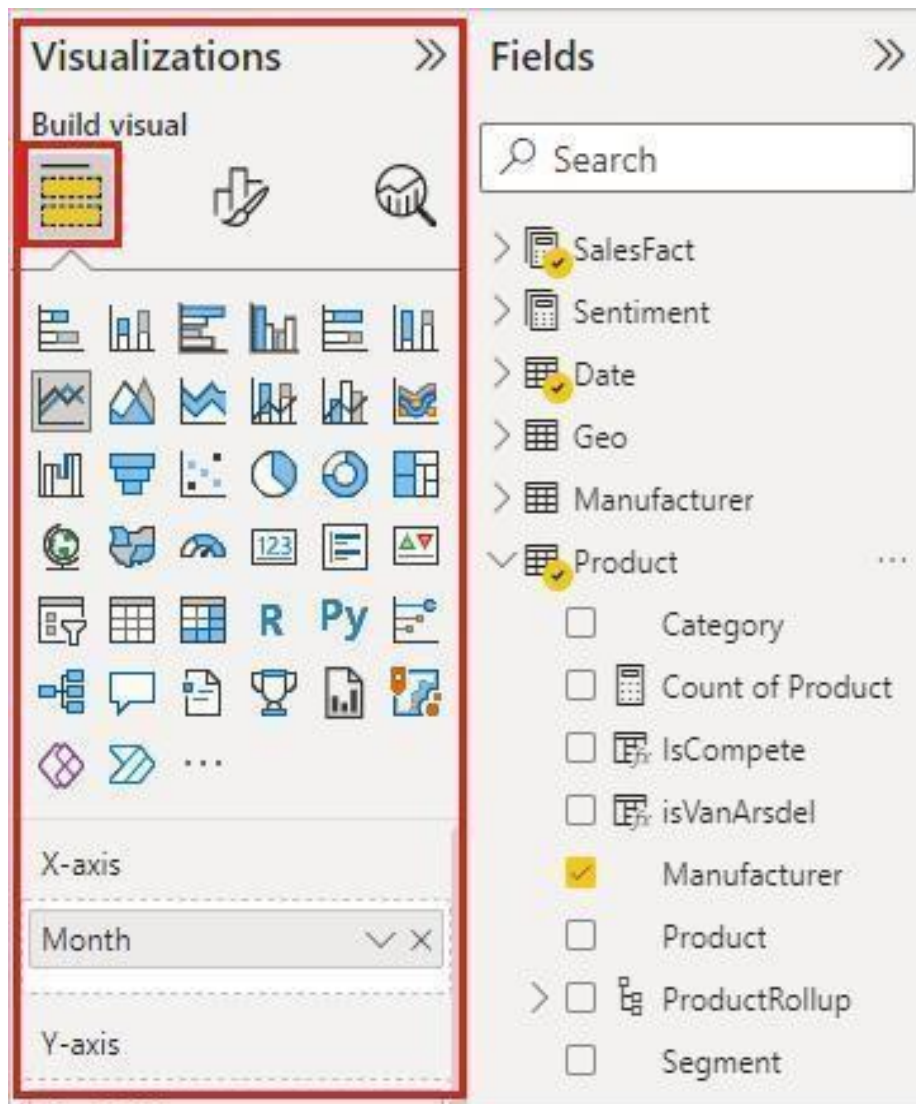
4.Exporting and publishing report

Now we want to create a report of our analysis and share it with others. We use Power BI topublish the report on the Power BI server. To do this, go to File > Publish > Publish toPower BI.

After clicking on Publish to Power BI, you will be prompted to select a destination on the Power BI server where you want to publish your report. The default setting is My workspace. You can create different workspace dedicated to different projects on the server. Let's use the default option, andclick Select.It takes about 2-3 min to finalize the report and you will see the following success message on your screen.

SUMMARY AND FUTURE WORK :

The Art of Visualization – is a way of clarifying what it is you want to manifest in your life/business/, bringing it into clear, concise and sharp focus. Learn how to create stunning visualizations, improve your company's performance, and develop practical decision-making skills. The ever-increasing computational capacity has enabled us to acquire, process and analyze larger data-sets and information. However, the human memory and attention required to use this data is more limited and has remained relatively constant.

Data visualization can enable us to compress data and encode them in ways to aid perceptual, cognitive and emotional capacity required to comprehend, retain and make decisions using this data. Microsoft Power BI offers a suite of tools to analyze your data and extract business insights from it through building interactivedashboards.

→ Power BI is a collection of processes, architectures, and technologies thattransforms raw data into meaningful and informative content that helps to drive profitable business actions.

→ It supports fact-based and logical decision-making by analyzing historicaldata rather than assumptions.

REFERENCES:

Google: www.google.com

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