

Introduction to Power BI

Contents

Setup	3
1 Introduction to PowerBI	7
1.1 Overview of Power BI	7
1.2 The parts of Power BI	7
1.3 Use of Power BI and roles	7
1.4 Power BI Flow	8
1.5 Use Power BI:	8
1.6 Building blocks of Power BI:	8
1.7 Power BI Services:	11
2 Import dataset and modelling	13
2.1 Importing data into Power BI Desktop	13
2.2 Dealing with errors	15
2.3 ‘Applied steps’ in modelling data	16
3 Plotting	19
3.1 Visualizations Panel	19
3.2 Plot modifications	25
3.3 Explore Marketplace for other plot types	27
4 Saving and Exporting	31
4.1 Saving as pbix files	31
4.2 Exporting and publishing report	32
4.3 What’s next?	36

CONTENTS

5 Next steps	37
5.1 Deepen your understanding	37
5.2 Join the community	37

Setup



These are course notes for the “Introduction to Power BI” course given by the Monash Bioinformatics Platform¹ for the Monash Data Fluency² initiative. Our teaching style is based on the style of The Carpentries³.

- PDF version for printing⁴
- ZIP of data files used in this workshop⁵

During this workshop we will be using Power BI Desktop installed on your computer. There are several ways to download Power BI Desktop, depending on which system you use.

1. Windows

- Windows Store

The first option is to visit Windows Store to get the Power BI Desktop app⁶ and install it. Note that the system requirements is Windows 10 version 14393.0 or higher.

¹<https://www.monash.edu/researchinfrastructure/bioinformatics>

²<https://monashdatafluency.github.io/>

³<https://carpentries.org/>

⁴https://github.com/MonashDataFluency/Power_BI/raw/master/docs/powerbi-intro.pdf

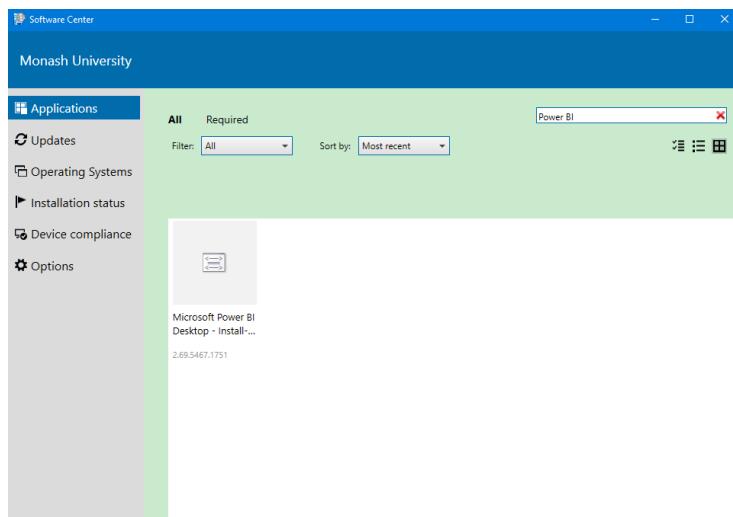
⁵<https://monashdatafluency.github.io/powerbi-intro/powerbi-files.zip>

⁶<https://www.microsoft.com/en-au/p/power-bi-desktop/9ntxr16hnw1t?activetab=pivot-overviewtab>

CONTENTS



If you are using a Monash machine, try searching “**Power BI**” in “Software Center⁷” and install it. For questions concerning installation on a Monash machine, you may contact eSolutions⁸ for help.



- **Power BI website**

You can also download Power BI Desktop from the Power BI website⁹ and install it as an application on your computer.

⁷<https://www.monash.edu/esolutions/software/install-software-on-monash-devices>

⁸<https://www.monash.edu/esolutions/contact>

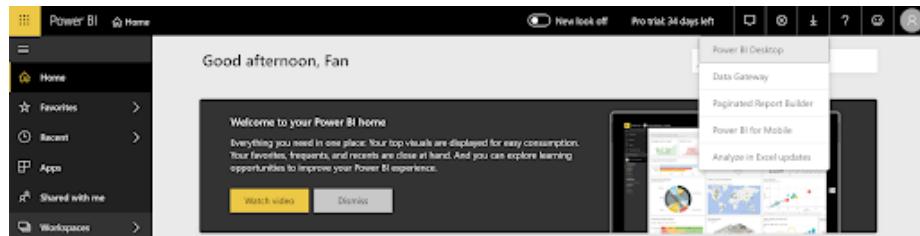
⁹<http://go.microsoft.com/fwlink/?LinkID=521662>

CONTENTS

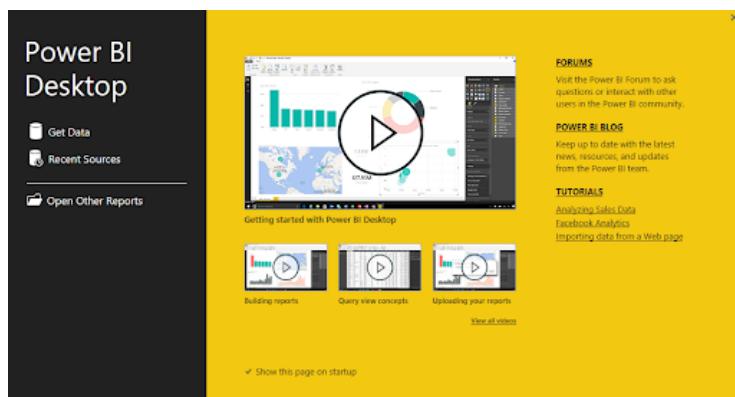


- **Power BI service**

Or if you prefer Power BI Service¹⁰, you can get it by clicking the “download” button in the upper right and selecting “**Power BI Desktop**”. To use Power BI service, you may need to sign in¹¹ your Microsoft account.



After the setup process, you will be able to see the following Start Screen.



¹⁰<https://app.powerbi.com/home>

¹¹<https://powerbi.microsoft.com/en-us/landing/signin/>

2. MacOS

Power BI Desktop is not available on Macs. However, you can run a Windows session on your Mac via BootCamp¹² or something similar. This is probably a longer term solution until Microsoft release a Mac version.

3. Linux

Currently it is not possible to install Power BI desktop on Linux. You can choose to install it on a Windows Virtual Machine like VirtualBox¹³ or something similar.

After installing Power BI Desktop, you can sign up for Power BI using your Monash account here¹⁴. By signing in the Power BI Desktop, you will be able to save your work and later publish it to the Power BI service.

Data

Please download the data file `gap-minder.csv` here¹⁵ for the course.

Source code

This book was created in R using the `rmarkdown` and `bookdown` packages.

- GitHub page¹⁶

Authors and copyright

This course is developed for the Monash Data Fluency Team.



This work is licensed under a CC BY-4: Creative Commons Attribution 4.0 International License¹⁷. The attribution is “Monash Bioinformatics Platform” if copying or modifying these notes.

Data files are derived from Gapminder, which has a CC BY-4 license. The attribution is “Free data from www.gapminder.org”. The data is given here in a form designed to teach various points about the R language. Refer to the Gapminder site¹⁸ for the original form of the data if using it for other uses.

¹²<https://support.apple.com/en-au/HT201468>

¹³<https://www.virtualbox.org/wiki/Downloads>

¹⁴https://signup.microsoft.com/signup?sku=a403ebcc-fae0-4ca2-8c8c-7a907fd6c235&email=&ru=https%3A%2F%2Fapp.powerbi.com%3Fpb_i_source%3Dweb%26redirectedFromSignup%3D1%26noSignUpCheck%3D1

¹⁵https://raw.githubusercontent.com/MonashDataFluency/Power_BI/master/powerbi-files/gap-minder.csv

¹⁶https://github.com/MonashDataFluency/Power_BI

¹⁷<http://creativecommons.org/licenses/by/4.0/>

¹⁸<https://www.gapminder.org>

Chapter 1

Introduction to PowerBI

1.1 Overview of Power BI

Microsoft Power BI is a collection of apps, software services and connectors that come together to turn the unrelated data into visually impressive and interactive insights. Power BI can work with the simplest of data sources like Microsoft Excel and the more complicated ones like a collection of cloud-based or on-premises hybrid Data warehouses. Power BI has the capabilities to easily connect to your data sources, visualise and share and publish your findings with anyone and everyone.

Power BI can be simple and fast enough to connect to an Excel workbook or a local database or it can be robust and enterprise-grade, ready for extensive modeling and real time analytics and also for custom development. Hence, it can be a personal report and vis tool but can also act as the analytics and decision engine behind group projects, divisions, or entire corporations.

1.2 The parts of Power BI

Power BI constitutes 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 apps that can be accessed from Windows phones and tablets, and are 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 a lot 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 the **Mobile 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 and then publish Power BI desktop reports to the Power BI Service.

In the upcoming modules we would be discussing about these three components - **Desktop**, **Service** and **Mobile** apps - in more detail.

1.4 Power BI Flow

In the most general way, 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.

Its not always the case that this flow happens, but more often or not it is. We will stick to this flow for this entire tutorial to help learn the different aspects of Power BI.

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.

As mentioned earlier, depending on the user role, the user might spend its most of the time in one of the three components than the other.

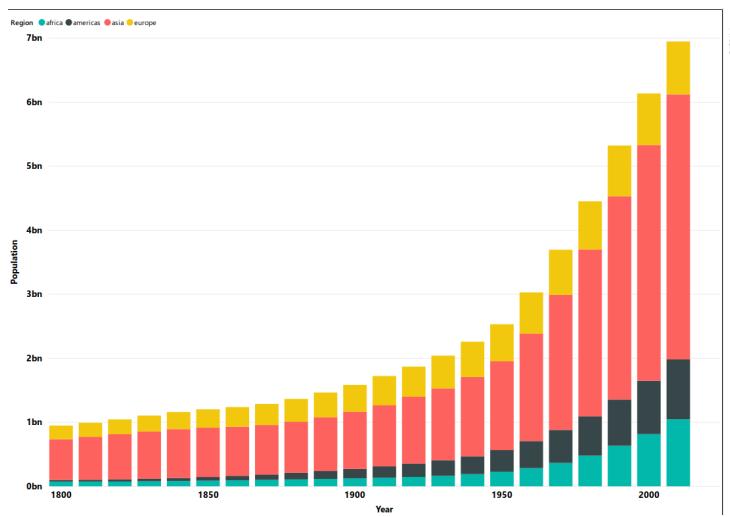
1.6 Building blocks of Power BI:

The basic building blocks in Power BI are: * Visualizations

- Datasets
- Reports
- Dashboards
- Tiles

1.6.1 Visualizations

A visualization is a representation of data in a visual format. It could be a line chart, a bar graph, a color coded map or anything interesting to present the data.



Visualizations can be simple as a number representing something significant or it could be quite complex like multiple stacked chart showing the proportion users participating in a survey. The prime idea of visualisation is to show the data in a way that it tells the story that's lying underneath it. Like its said, a picture says a thousand words.

1.6.2 Datasets:

A **dataset** is a collection of data that Power BI uses to create its visualizations. You can have a simple dataset that's based on a single table from a Microsoft Excel workbook, similar to what's shown in the following image.

name	year	population	gdp_per_cap	life_exp	region	oecd	g7	lat	long	income2012
Afghanistan	1800	3200000	603	28.21	asia	FALSE	TRUE	33	66	low
Albania	1800	410443	487	35.4	europe	FALSE	FALSE	41	20	upper_mid
Algeria	1800	2500000	115	28.82	africa	FALSE	TRUE	31	10	upper_mid
Angola	1800	26541597	141	30.0	africa	FALSE	TRUE	15	15	lower_low
Angola	1800	2507028	418	26.99	africa	FALSE	TRUE	12.5	18.5	lower_mid
Anguilla and Barbuda	1800	37000	757	33.54	americas	FALSE	TRUE	27.05	-41.8	high
Argentina	1800	5340000	1507	33.2	americas	FALSE	TRUE	-44	-44	upper_mid
Armenia	1800	413320	514	34	europe	FALSE	FALSE	40.25	-45	lower_mid
Australia	1800	351051	814	34.0	asia	TRUE	FALSE	-25	135	high
Austria	1800	820587	1847	34.4	europe	TRUE	FALSE	47.8333	13.8333	high
Azerbaijan	1800	879960	175	29.17	europe	FALSE	FALSE	40.5	47.5	upper_mid
Bahamas	1800	27750	1445	35.1	americas	FALSE	TRUE	25.04062	-77.37122	high
Bahrain	1800	64471	1229	36.0	asia	FALSE	TRUE	26.03333	26.03333	high
Bangladesh	1800	19377000	819	25.6	asia	FALSE	TRUE	24	90	lower_mid
Barbados	1800	81729	913	32.12	americas	FALSE	TRUE	18.16667	-29.53333	high
Belarus	1800	235000	808	36.2	europe	FALSE	FALSE	32	20	upper_mid
Belgium	1800	3131317	3411	40	europe	TRUE	FALSE	50.75	4.5	high
Belize	1800	25520	579	26.5	americas	FALSE	TRUE	17.49952	-28.2976	upper_mid
Benin	1800	636559	597	31	africa	FALSE	TRUE	9.5	2.25	low
Bhutan	1800	89989	629	28.8	asia	FALSE	TRUE	27.5	90.5	lower_mid

Dataset can also be a combination of many different sources, which can be filtered using Power BI and combine into one to use.

CHAPTER 1. INTRODUCTION TO POWERBI

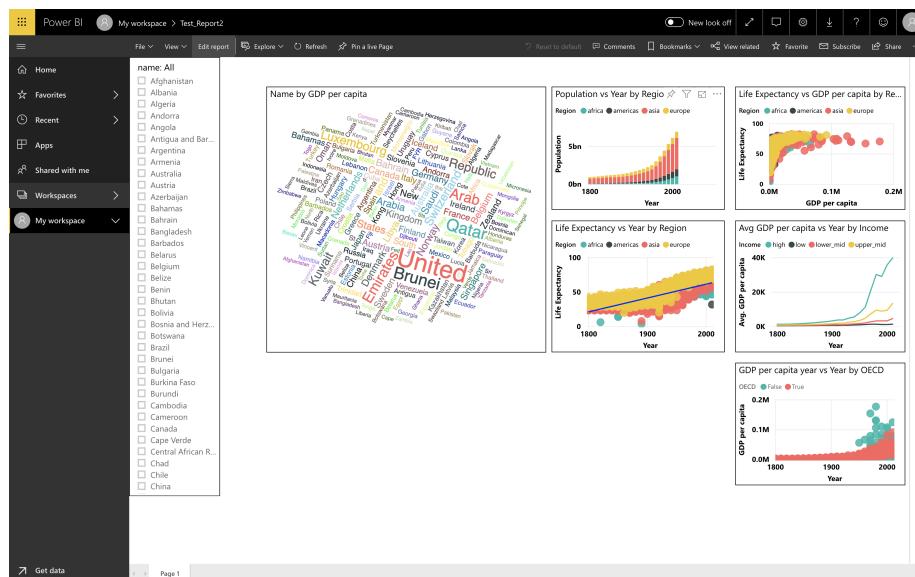
For eg: One of the data could be the countries and its central location in the form of Latitude and Longitude and other data could be the demographics of the countries like, population, GDP etc. Power BI can combine these two data and make one dataset out of it to be used for visualizations.

An important feature of Power BI is the ability of it to connect to various data sources using its connectors. Whether the data you want is in Excel or a Microsoft SQL Server database, in Azure or Oracle, or in a service like Facebook, Salesforce, or MailChimp, Power BI has built-in data connectors that let you easily connect to that data, filter it if necessary, and bring it into your dataset.

After you have a dataset, you can begin creating visualizations that show different portions of it in different ways, and gain insights based on what you see. That's where reports come in.

1.6.3 Reports:

In Power BI, a **report** is a collection of visualizations that appear together on one or more pages. A report in Power BI is a collection of items that are related to each other. The following image shows a report that you would be creating by the end of the session. You can also create reports in the Power BI service.



Reports let us create many visualizations and possibly on multiple pages based on the way the developer wants to tell the story.

1.6.4 Dashboards:

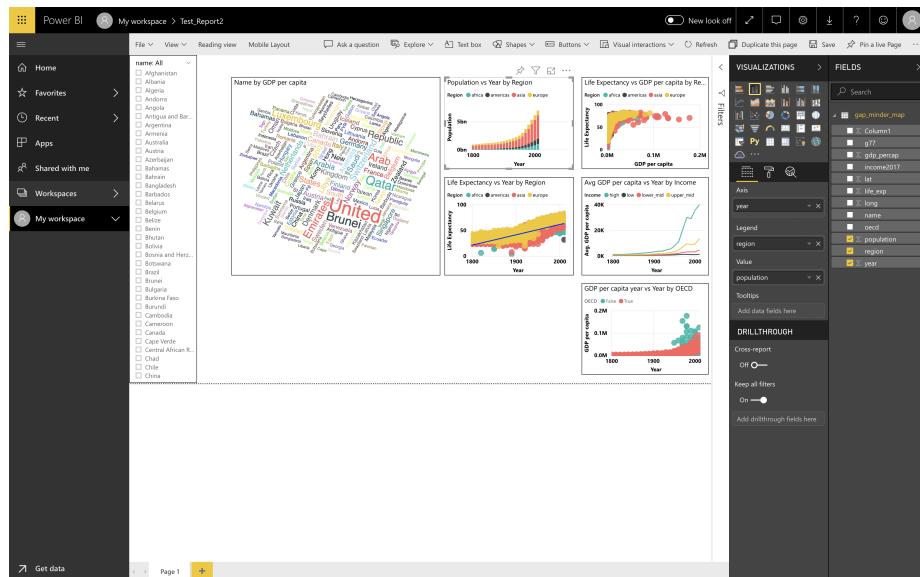
A Power BI dashboard is a collection of visuals from a single page that you can share with others. Often, it's a selected group of visuals that provide quick insight into the data or story you're trying to present.

A dashboard must fit on a single page, often called a canvas (the canvas is the blank backdrop in Power BI Desktop or the service, where you put visualizations). Think of it like the canvas that an artist or painter uses—a workspace where you create, combine, and rework interesting and compelling visuals. You can share dashboards with other users or groups, who can then interact with your dashboards when they're in the Power BI service or on their mobile device.

1.7 Power BI Services:

1.7.1 Overview of Power BI Desktop

Power BI Desktop is a free application for PCs that lets you gather, transform, and visualize your data. In this module, you'll learn how to find and collect data from different sources and how to clean or transform it. You'll also learn tricks to make data-gathering easier. Power BI Desktop and the Power BI Service work together. You can create your reports and dashboards in Power BI Desktop, and then publish them to the Power BI Service for others to consume.



1. **Ribbon** - Displays common tasks that are associated with reports and visualizations.
2. **Report view, or canvas** - Where visualizations are created and arranged. You can switch between **Report**, **Data**, and **Model** views by selecting the icons in the left column.
3. **Pages tab** - Located along the bottom of the page, this area is where you would select or add a report page.
4. **Visualizations pane** - Where you can change visualizations, customize colors or axes, apply filters, drag fields, and more.

5. **Fields pane** - Where query elements and filters can be dragged onto the **Report** view or dragged to the **Filters** area of the Visualizations pane.

Chapter 2

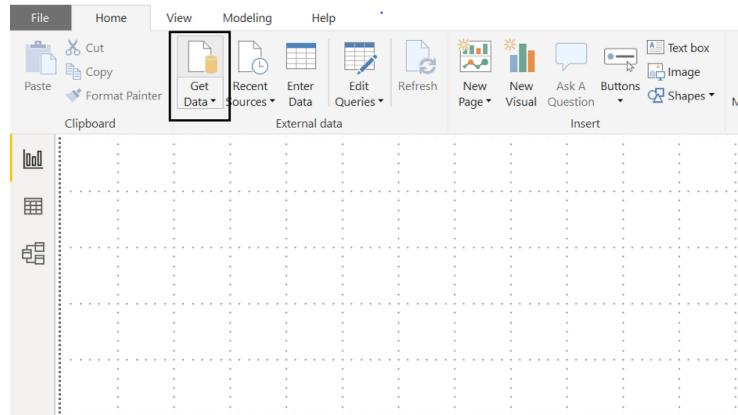
Import dataset and modelling

Power BI can connect to a whole range of data sources, right from Excel sheets, 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 `gap_minder_map.csv` file.

2.1 Importing data into Power BI Desktop

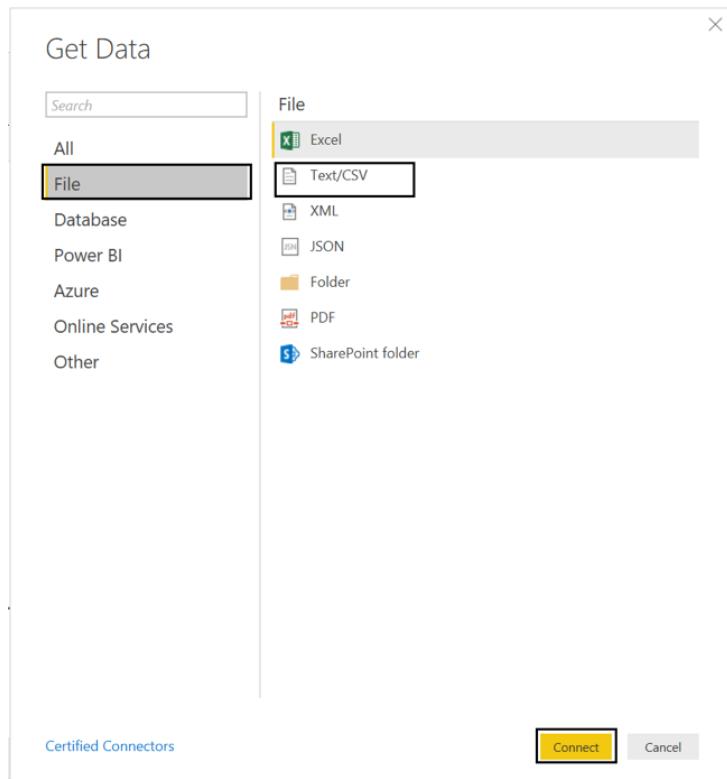
Power BI Desktop has a “**Get Data**” button from the ribbon on the “**Home**” tab. In Power BI, there are all sorts of different data sources available. Select a source to establish a connection. Depending on your selection, you will be asked to find the source on your computer or network, or be prompted to sign in to a service to authenticate your request.

As our first step to import the dataset/file into Power BI, we click on the Get Data icon on the ribbon of Home tab.



CHAPTER 2. IMPORT DATASET AND MODELLING

Once we select this, we go ahead and select the “CSV option” under the “file” subheading.



Then browse the file and select the necessary CSV file. Press on “Connect” to have a quick preview of the file. Once we click on “load”, Power BI will successfully import the file. Any errors will then pop up ready to be analysed and fixed.

index	name	year	population	gdp_per_cap	life_exp	region
1	Afghanistan	1800	3100000	609	18.21	asia
2	Albania	1800	4104040	667	15.4	europe
3	Algeria	1800	25023200	715	28.82	africa
4	Andorra	1800	2854	1197	NA	europe
5	Angola	1800	15670200	618	26.98	africa
6	Antigua and Barbuda	1800	370000	757	33.54	americas
7	Argentina	1800	3540000	1507	33.2	americas
8	Armenia	1800	4133000	114	34	europe
9	Aruba	1800	890000	114	34.09	asia
10	Austria	1800	3205047	1847	34.4	europe
11	Azerbaijan	1800	879902	775	29.17	europe
12	Bahamas	1800	27200	1445	35.18	americas
13	Bahrain	1800	66400	1235	30.3	asia
14	Bangladesh	1800	18277300	875	25.5	asia
15	Barbados	1800	81729	913	32.12	americas
16	Belarus	1800	2355000	600	36.2	europe
17	Belgium	1800	3118177	2411	40	europe
18	Belize	1800	23240	779	24.5	americas
19	Benin	1800	600000	597	21	africa
20	Bhutan	1800	89890	629	28.8	asia
21	Bolivia	1800	1100000	854	33	americas
22	Bosnia and Herzegovina	1800	851800	669	35.1	europe
23	Botswana	1800	1210000	397	33.6	africa
24	Brazil	1800	3639630	1108	32	americas
25	Brunel	1800	2118	1512	29.2	asia
26	Bulgaria	1800	1993200	1088	35.8	europe
27	Burkina Faso	1800	1605421	480	29.2	africa
28	Burundi	1800	899000	418	31.5	africa
29	Cambodia	1800	2090000	903	35	asia
30						

Clicking on “**View errors**” will enable us to check the detected errors right away. Alternatively, you close the pop up and click “**Edit queries**” to check for any errors. This will query and list the errors in the data.

2.2 Dealing with errors

2.2.1 Check for “controlled” errors

Once queried, we can see the controlled errors in the data. These errors can be analysed by clicking on them. Every error has a brief description to it saying what might’ve gone wrong.

2.2.2 Change datatype of column

One of the most common errors is the detection of the datatype of a particular column. While loading the data, Power BI guesses the column type based on the data it sees. If needed the datatypes of the columns can be changed to something relevant. Double click on the “datatype” icon on top of the column, select the “datatype” and click on “Replace current step”.

Any changes to the data needs to be done under the “Data file” listed under “**Other Queries**”. 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.

Once all the required changes are done, we can close and apply going back to the main Power BI Desktop interface.

Make sure you see all the column names in the data on the bottom right corner.

2.2.3 Replacing null values

Data can have missing values for a number of reasons. This missing data is represented as `null` in the data. A lot of times it is important to deal with such values and fix or remove them.

In the “**Data**” section on the left sidebar, data can be viewed. By applying a filter to a particular column, the null values can be analysed. To replace any null values, we can go back to the “**Query Editor**” and use the “Replace values” option.

Replacing missing values is not always a direct operation. Most of the times, the missing values must be carefully analyzed and values need to be computed based on several factors. This computational procedure can be programmed with DAX. Let us cancel this particular step in the “Applied steps” by clicking on the red crossmark right next to “**Replaced Value**”.

2.2.4 Challenge 1: Replace missing values

Solution:

2.3 ‘Applied steps’ in modelling data

2.3.1 Renaming columns

Columns from raw data can be difficult to read or meaningless. Renaming the columns in your query to a meaningful name will make it easier for you and your audience to understand your data. This will often save you trouble in the future when it comes to working and presenting the data.

There are two ways to rename the columns in Power BI. Right-clicking on the header of the column gives you a menu of functions that you can do to the column. Select “**Rename**” to rename the column. You can also click on the column and then click on the “**Transform**” tab, from here you are presented a variety of transformation functions for the column. From here you can click on “**Rename**”.

Example: - Right-click on the “**name**” column header, click on “**Rename**” and rename the column to “**Country**”.

- Click on the header for “**life_exp**”. Click on the “**Transform**” tab and click rename. Rename the column to “**Life expectancy**”.

2.3.2 Add and remove column

2.3.2.1 Removing columns

Often when dealing with raw data you will find columns that are meaningless or unsuitable for your analysis. You can remove these columns in Query to

eliminate clutter and streamline the data set making it easier to work with.

There are two ways to remove columns in Power BI. Like in renaming a column, you can right-click the header, which will present a menu with the option to “**Remove**”. You can also click on the column, click on the “**Home**” tab and then click “**Remove Columns**”.

Example: You may not need the g77 and oecd information. - Right-click on the g77 column header, click on “**Remove**”

- Left-click on oecd column header, click on “**Home**” tab, click “**Remove Column**”

2.3.2.2 Adding columns

Just as you would remove unsuitable data from your queries, you may need to add new columns to your data. There are a variety of options in Power BI to add different columns. Click on the “**Add Column**” tab to see the ways you can add a column.

Example: - Add or subtract a year to the `year` column to fix any widespread issues.

- Click on `gdp_percap`, click on the “**Add Column**” tab, click duplicate to create a separate column to run calculations on.

2.3.3 Challenge 2:

perform simple mathematical operation and add this as a new column Let's say you want to calculate total Gross Domestic Products (GDP) per country. Total GDP = Population x GDP per capita. Working with the new `gdp_percap` column you created in the previous example, create a new column with Total GDP per country.

2.3.4 Navigating ‘applied steps’ and undoing

It is important to know what sort of transformations the data has gone through to understand the current state of your data. These steps are listed on the “**Applied Steps**” section on the “**Query Editor**”. Sometimes these steps might need to be moved up or down their order based on the required application. These steps can also be removed by clicking on the red crossmark next to the step. This will undo the action it performs and takes back the data to the previous stage.

2.3.5 Refresh data ready for analysis

Always refresh your data when you are ready to do your analysis and visualisation. Clicking the Refresh option will refresh the data and rerun all your queries. This

CHAPTER 2. IMPORT DATASET AND MODELLING

will show any issues or errors with your data or your queries and ensure that all the data is up to date and ready for analysis.

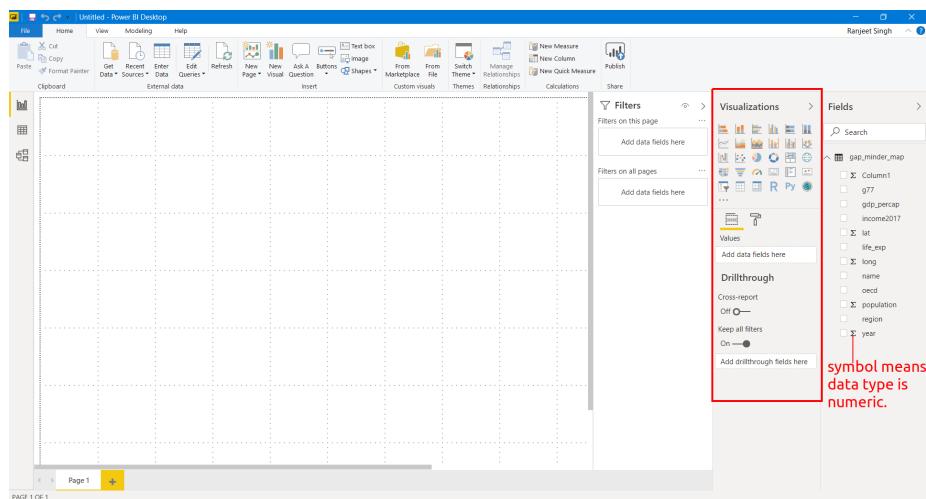
Chapter 3

Plotting

In the previous chapter, we saw how to import data into Power BI. We also did some basic pre-processing of data like cleaning the data, changing the type of data, dealing with NaN values. In this section, we are going to work with our already processed data.

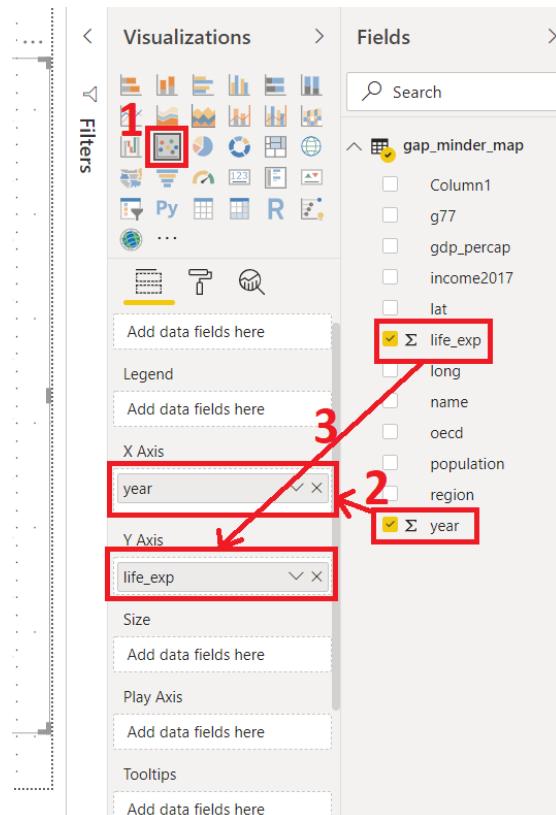
3.1 Visualizations Panel

We touched upon the different panels present in the Power BI interface. Now, we will explore the different 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 chart, Pie chart, etc. You can also import a custom visual from a file or the market-place if you click on ... icon. We will explore that in the later section.

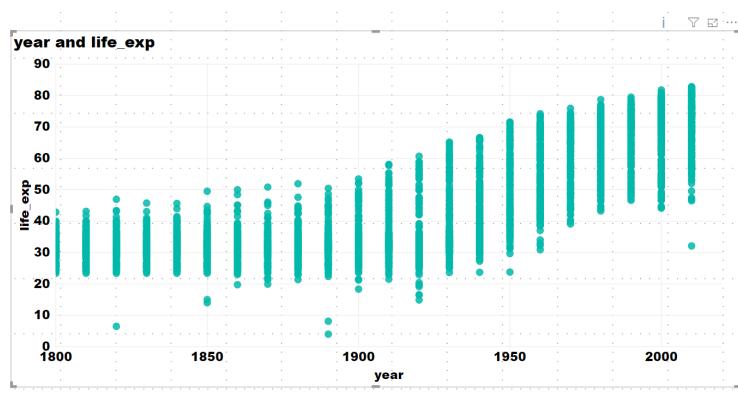


3.1.1 Scatter chart

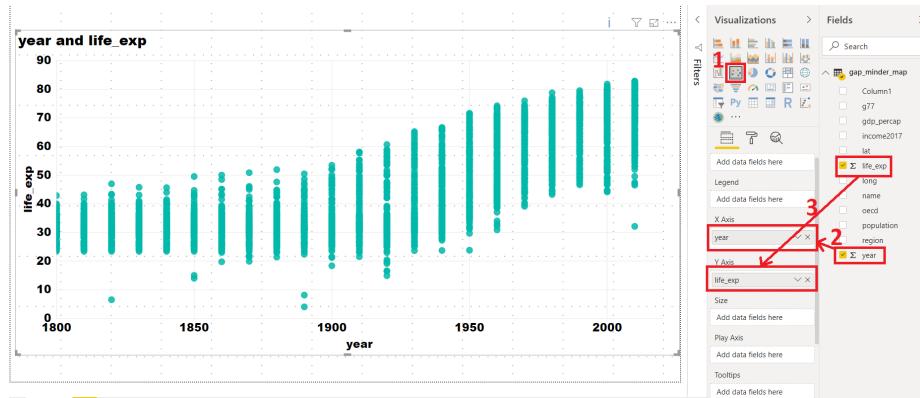
Let's create our first chart- Scatter plot. The first step to plot any kind of plot in Power BI is to select the plot template/type from the visualization panel. So, we click on the scatter chart icon in the visualization panel and drag the columns to the respective -Axis field as shown in the below figure.



We want to see how life expectancy (life_exp) varies with time (year) in years. After dragging the columns to their respective fields, we get our first scatter plot. An overall increasing trend can be seen after year 1900.



The final interface will look like the image below. The plot will be at the left of the visualization panel.



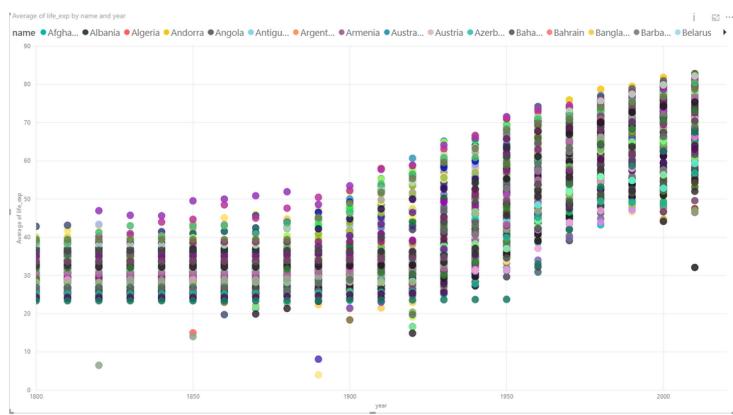
Wasn't that quick and easy??!! In general, this will be the procedure to create any type of plot the Power BI i.e., Select the chart type from the visualization section, drag data to the -Axis fields.

The above scatter plot isn't informative. The only information we get is the general trend of life expectancy, which increases after year 1900. Let's play with our scatter plot to make it more informative:

x-Axis: year

y-Axis: life_exp. Right-click on drop-down button and select "Don't summarize" option.

Legend: By name. Drag name column and place it in legend field.



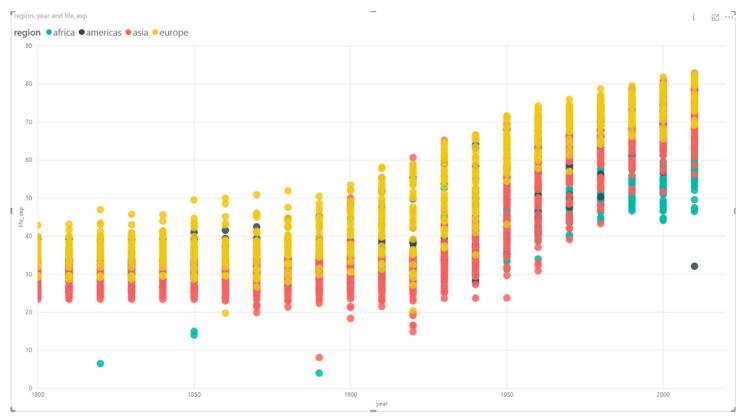
Here, we have colored each dot by the country. This plot shows the trend of life expectancy for **each country** with years. Since there are so many countries in our data, this plot looks messy, unclear and our plot legend “explodes”.

Can we do better?

Let's see.

Use following parameters to create your chart:

```
x-Axis: year
y-Axis: life_exp. Right-click on drop-down button and de-select "Don't summarize" option
Legend: By region
```



Here, we color each data point by the region in which the countries lie. The `summarize` option summarizes the life expectancy (`life_exp`) for each region.

PowerBI automatically summarizes the numerical data. Always be careful with that.

Activity: In the same chart, try the following: Size: By population Report what follows.

3.1.2 Challenge 1:

####Scatter plot: Keep the summarize option ON. Create a chart with the following options:

x-Axis: year

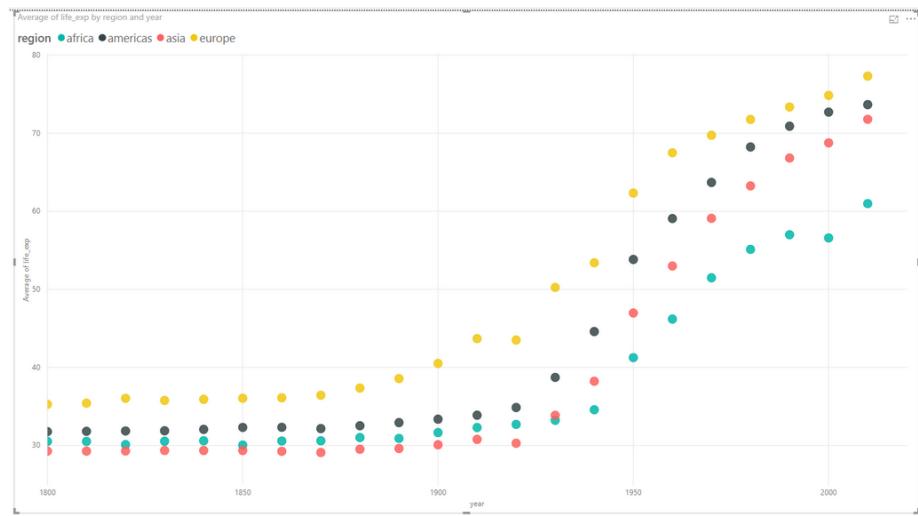
y-Axis: life_exp

Legend: By region

Explain the chart.

Click on the dropdown menu and select “Average” and explain the difference.

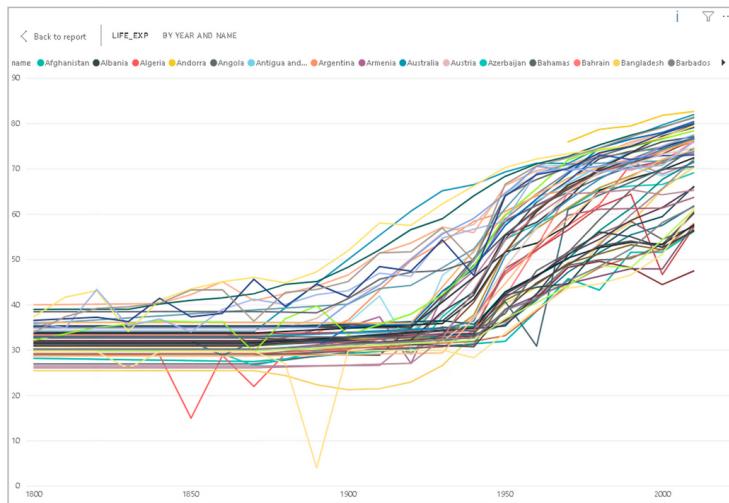
Solution1: Computes the sum of life_Exp in all countries in a given region, and plots it. Computes the average of life_Exp in all countries in a given region, and plots it.



3.1.3 Line Chart

Let's select a line chart from the visualization panel. Drag and drop following columns:

Axis: Year
 Values: Life_exp
 Legend: By name

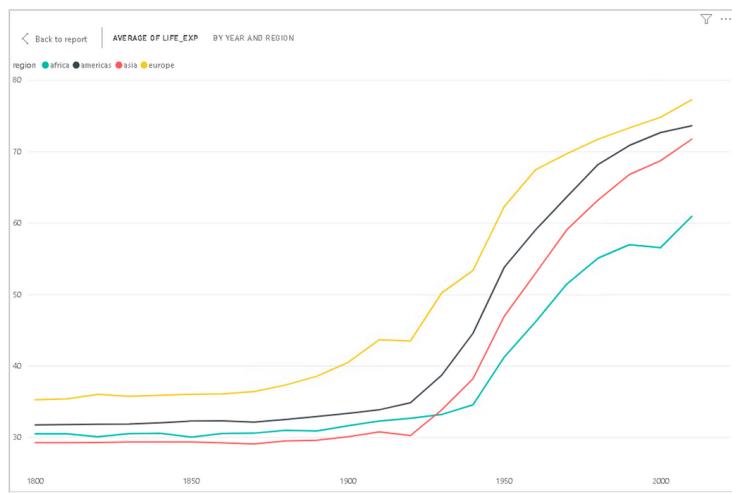


We get differently colored lines for each country. Let's try by `region`. What do we get?

Axis: Year

Values: Average of Life_exp. Select "Average"

Legend: By region



Power BI computes average of Life expectancy for countries in each regions and show 4 average lines corresponding to 4 regions.

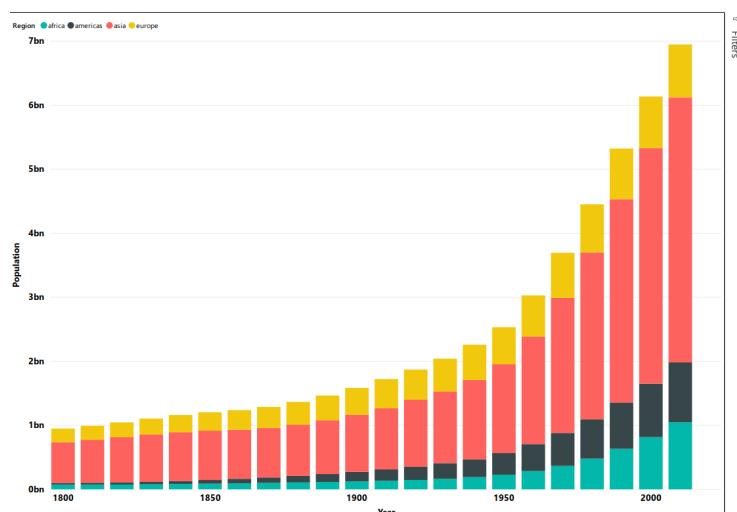
3.1.4 Bar Plots

Select the bar chart from the Visualization panel and drag the following columns:

Axis: Year

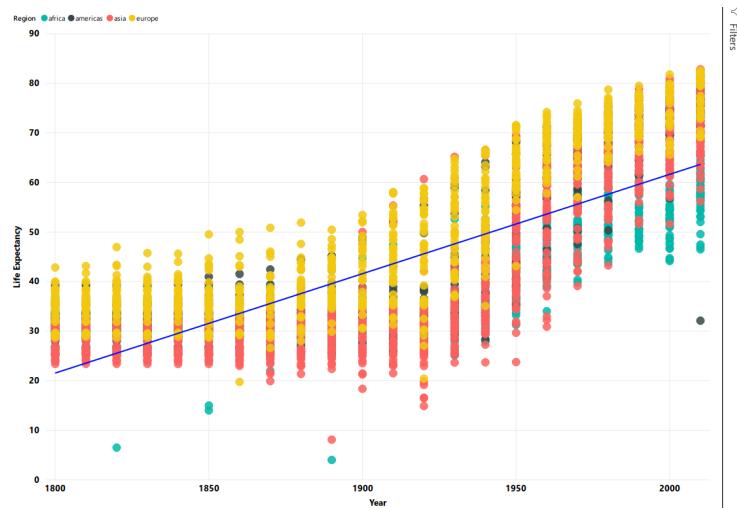
Values: Population

Legend: By region



This bar plot shows population variation over time (in years) for all 4 regions.

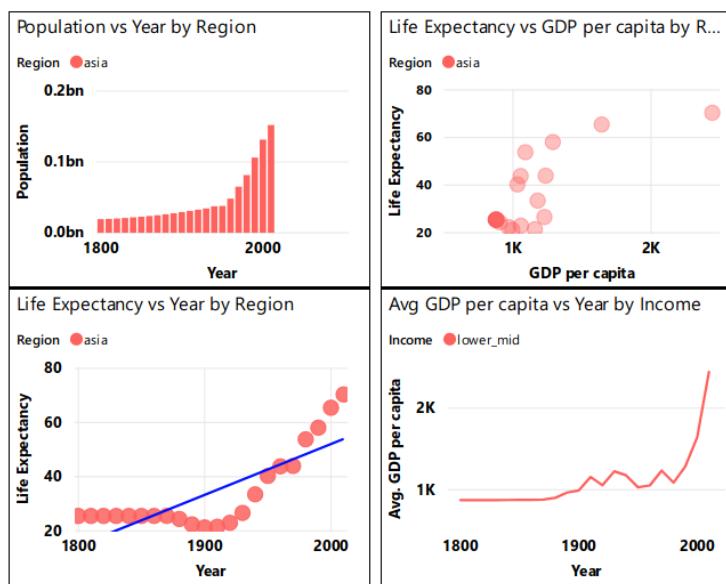
3.1.5 Trends in scatter plot



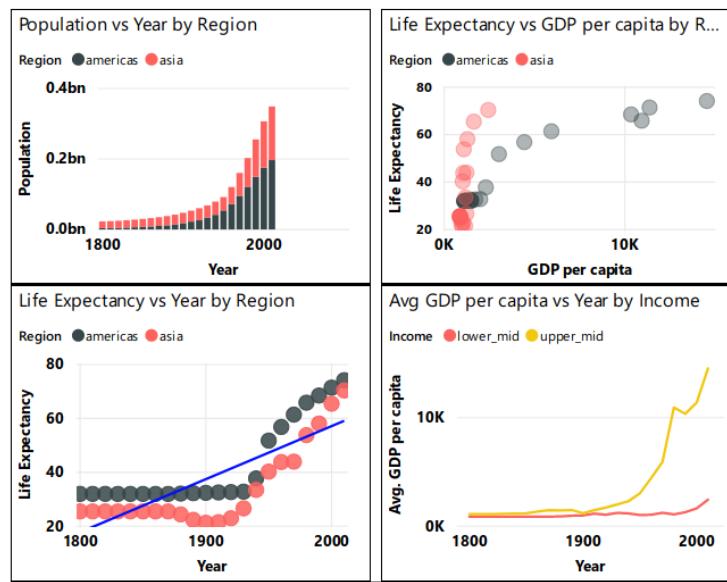
3.2 Plot modifications

Filter data
Beautify plots: Font- Segoe(Bold)
Font size: 12
Font color: Black
Slicer: By year
By country (challenge)

For Bangladesh



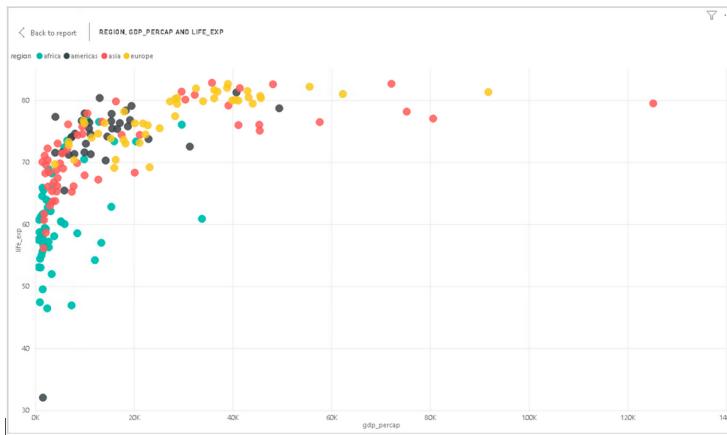
For Bangladesh and Brazil



3.2.1 Challenge 3: Scatter Plot

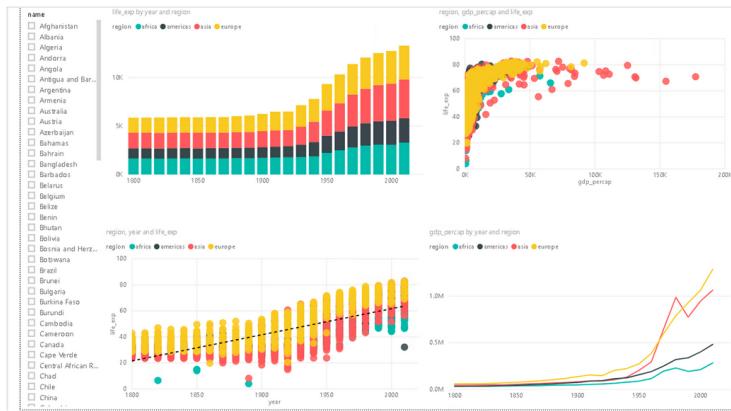
A: Create a scatter-plot of this with:

```
gdp_percap as x.  
life_exp as y.  
population as the size.  
region as the label.
```



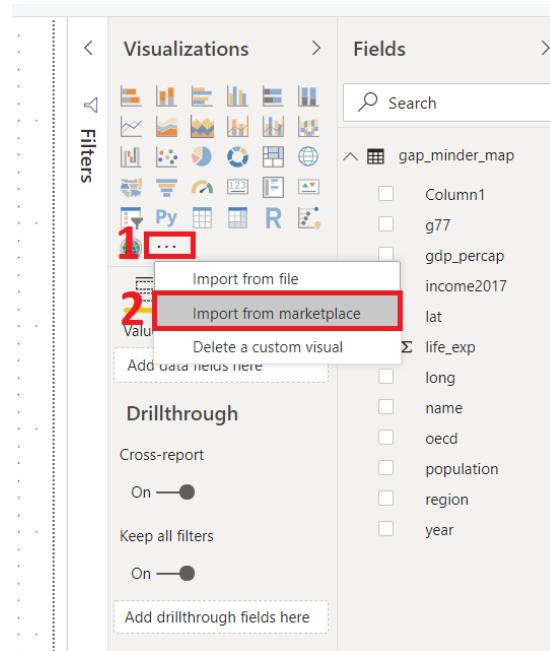
B: Filter the data for year-2010 only.

C: Use the slicer to visualize data for different countries For all countries

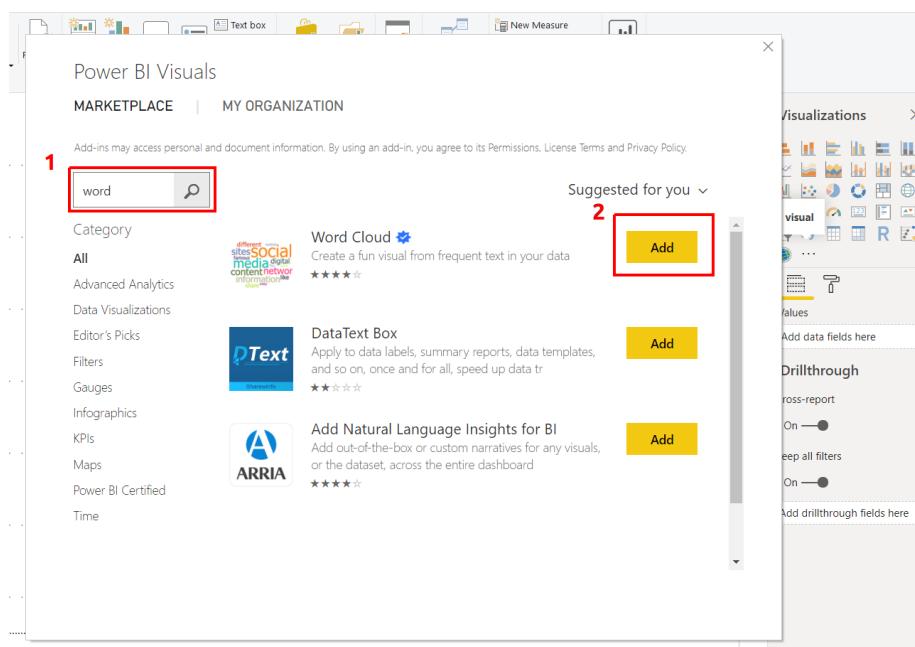


3.3 Explore Marketplace for other plot types

Till now, we have seen several different kinds of plots. Power BI comes with these default plots. There are other different kinds of plots available in the marketplace. To import new plot template from the marketplace, click on the icon “(....)”, i.e. three horizontal dots in the visualization panel then click on the import from the marketplace.



Once you click on Import from marketplace, It will pop a new window, where you can search for various types of templates. For example, we are looking for the Word Cloud template. Type Word Cloud in the search box, once you find the template click on the “Add icon” then it will added to the visualization panel.



3.3.1 Challenge 4: Create a WordCloud for countries by GDP per capita

####WordCloud

- Create a plot that compares GDP per capita for each country

Category: name Values: GDP per capita

- Filter this for the year 2010.
- Use a slicer with years

3.3.2 Map chart

We need Latitude (lat) and Longitude (long) values to create a Map chart. For this, we use following parameters:

Size: Population

Colour: Income level



This plot tells us if a country is one of the four- high income, upper-middle income, lower-middle income or low income country by the color of the bubbles.

The color correspondence to these categories can be seen in the legend at the top of the chart. It also indicates the population size of each country by the size of bubble. Bigger the bubble, higher the population of the country.

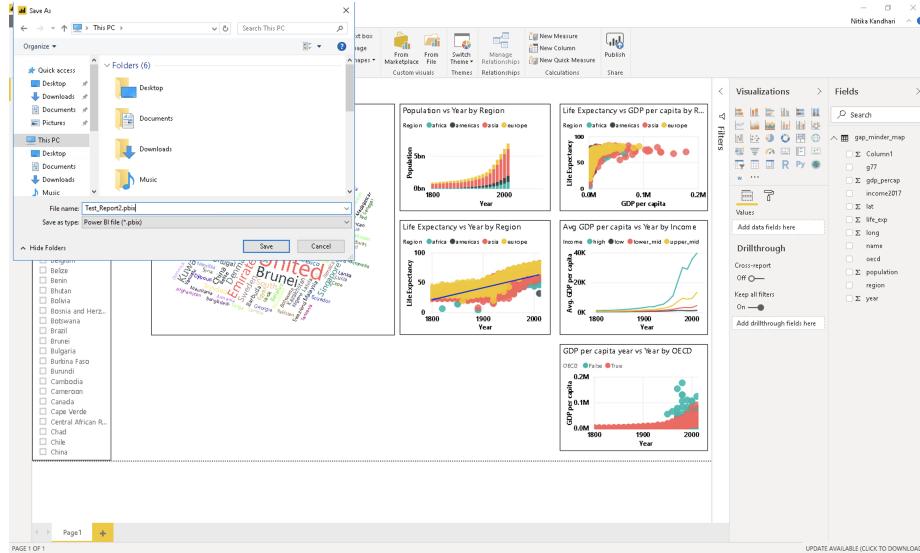
Chapter 4

Saving and Exporting

Now that we have visualised the data and created various types of plots, let's save our visuals.

4.1 Saving as pbix files

To save your work, go to “File > Save”, then choose an appropriate file name and the folder to save it. Click on “Save”.



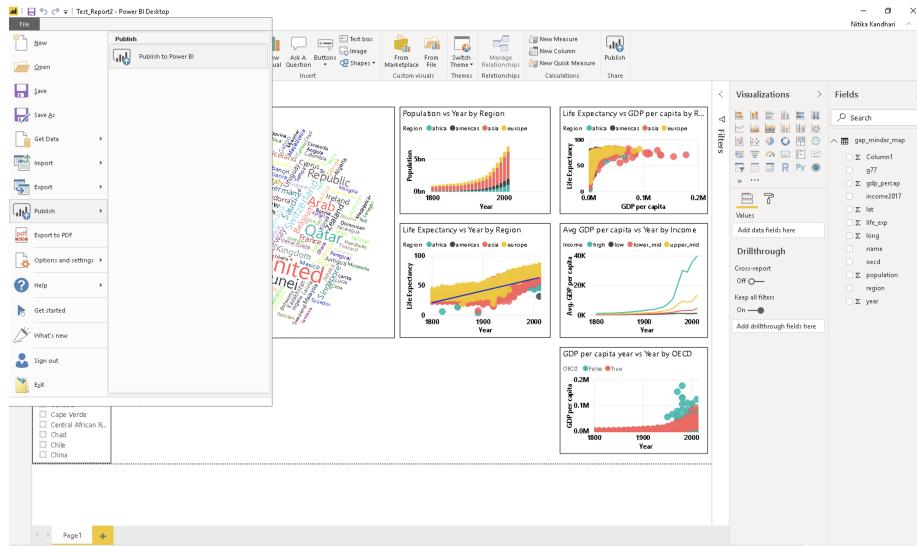
The file extension for Power BI files is “.pbix”. The .pbix files are highly compressed file types that contains all the graphics along with the actual data.

Note: If you share your .pbix file with others, your actual data gets shared as well.

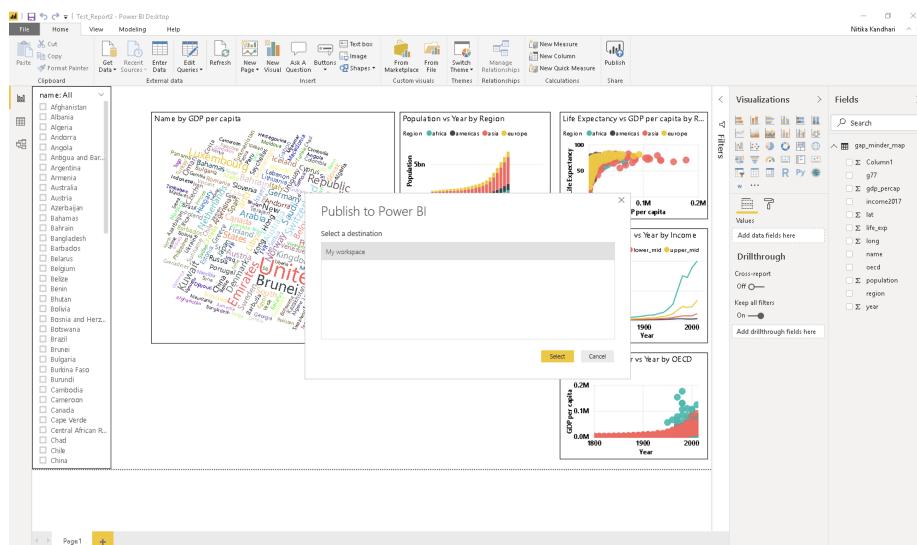
4.2 Exporting and publishing report

Finally, we want to create a report of our analysis and share it with others. The way it is done in Power BI is to publish the report on the Power BI server.

To do this, go to “File > Publish > Publish to Power BI”.

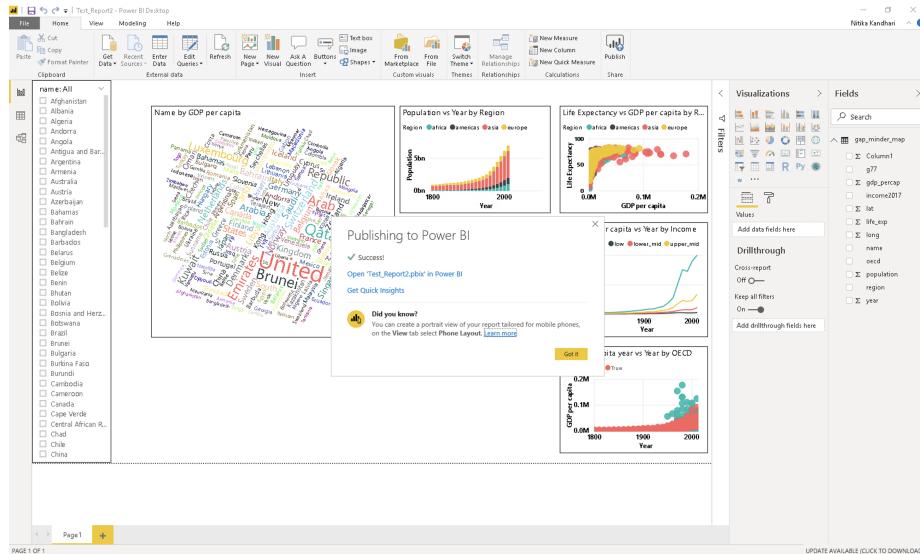


After clicking on “Publish to Power BI”, you will be prompted to select a destination on the Power BI server where you want to publish your report. The default setting is “My workspace”. You can create different workspaces dedicated to different projects on the server. Let’s use the default option, and click “Select”.

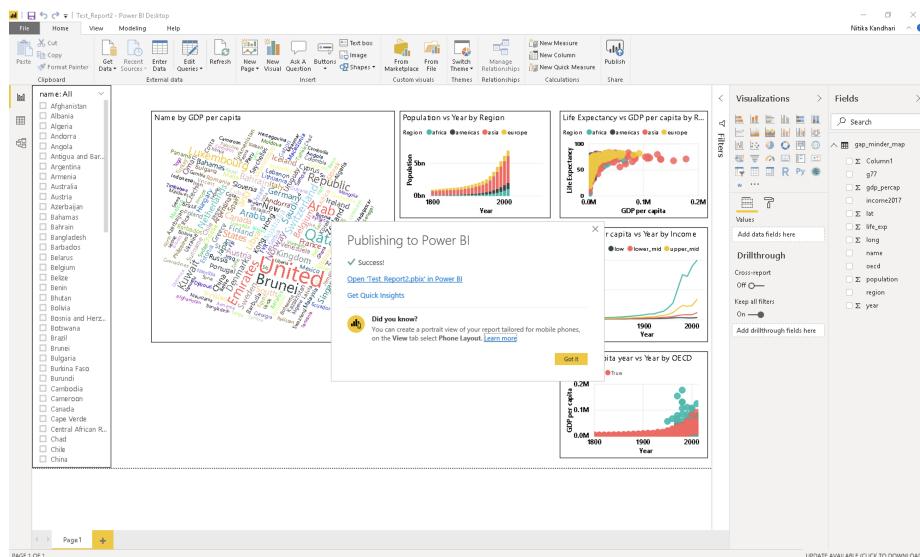


CHAPTER 4. SAVING AND EXPORTING

It takes about 2-3 mins to finalise your report, then you will see the following success message on your screen.

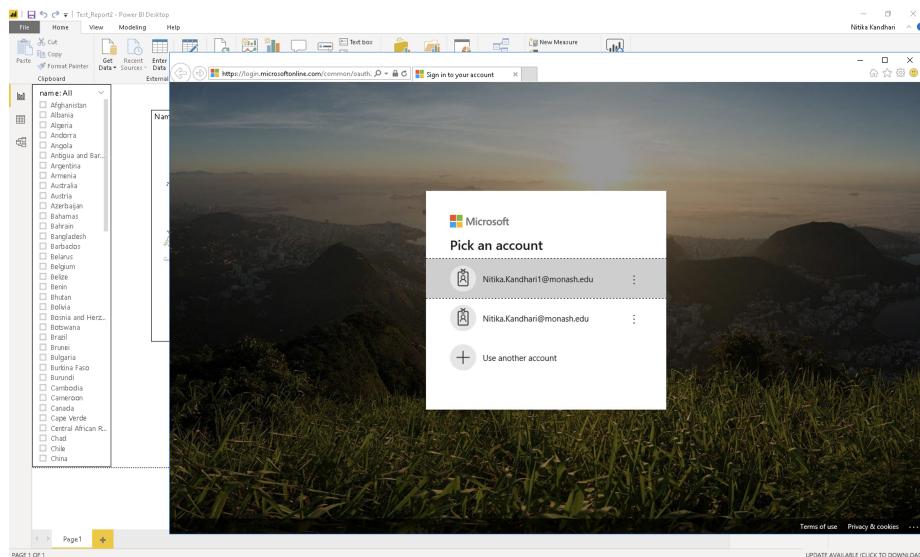


Congratulations! Your report has been published to your workspace on Power BI. To access it, click on “[Open <YOUR_FILENAME.pbix>](#)” in Power BI.

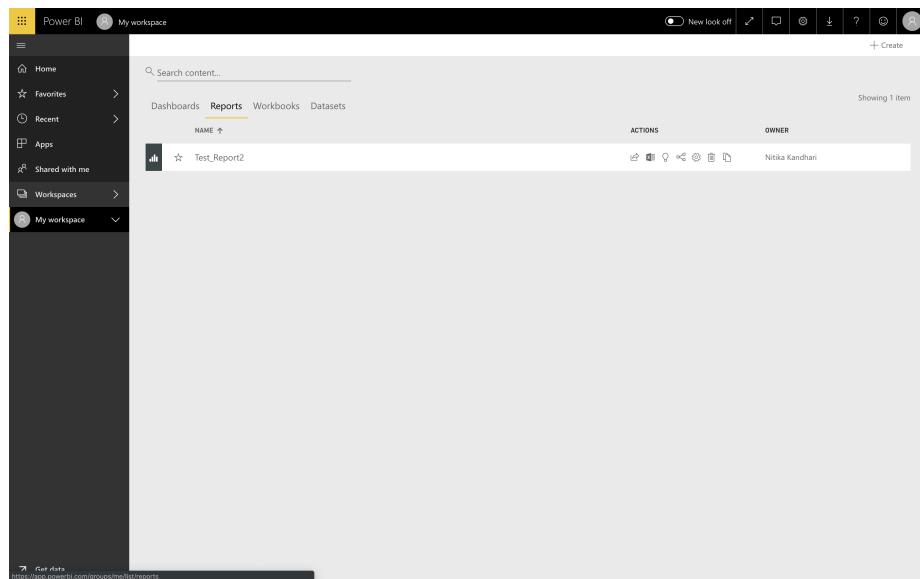


After you click on the link, you will be taken to Power BI's login through Microsoft. You need to fill in your login credentials.

CHAPTER 4. SAVING AND EXPORTING

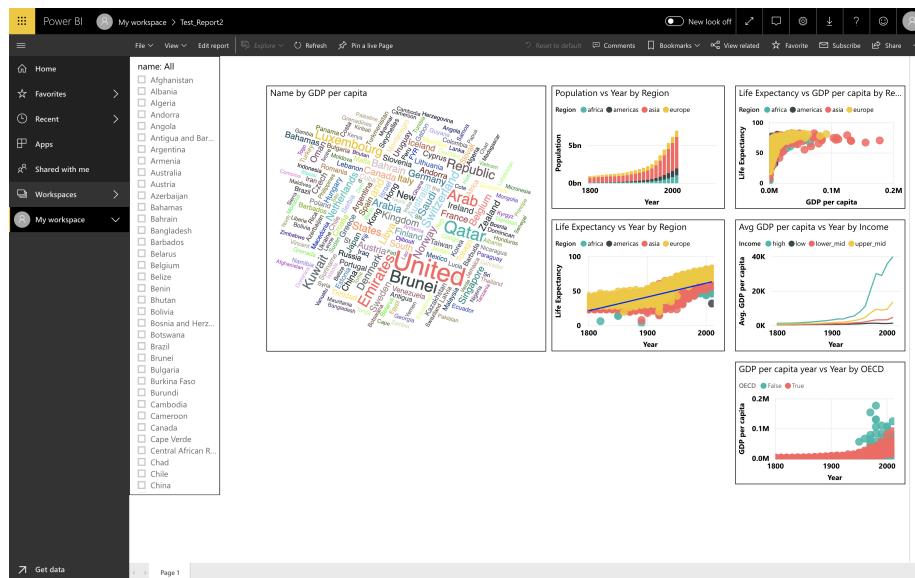


Once you sign in, you will see the Power BI dashboard. Scroll through the tabs on the top - Dashboards, Reports, Workbooks and Datasets. We are interested in the “Reports” tab because that is where you can find your published report. The different types of actions can be seen under the “Actions” tab. These actions include - share, analyze in Excel, quick insights etc. Hover over the different symbols to find out what they do and select the appropriate action.

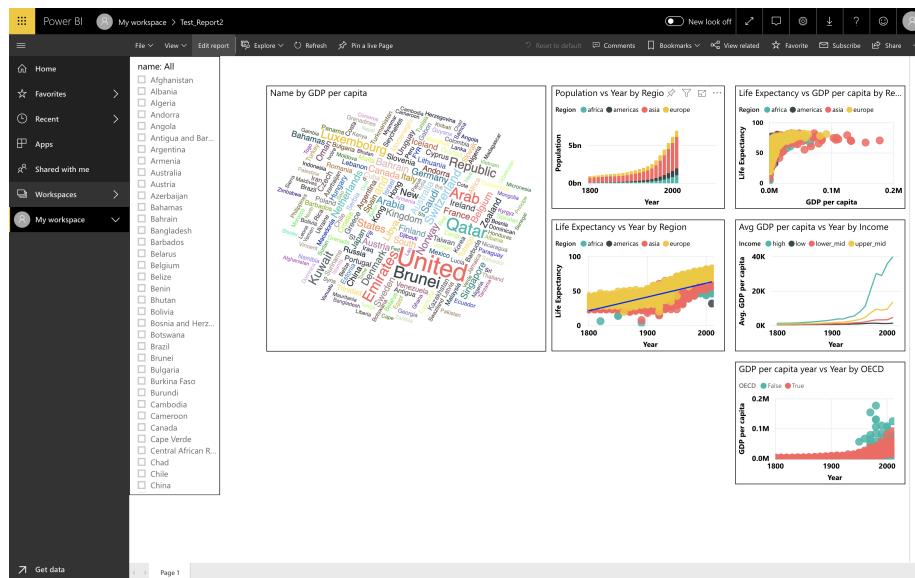


We want to take a look at our report and share with others. Let's click on the report itself. You will see your report as following:

CHAPTER 4. SAVING AND EXPORTING

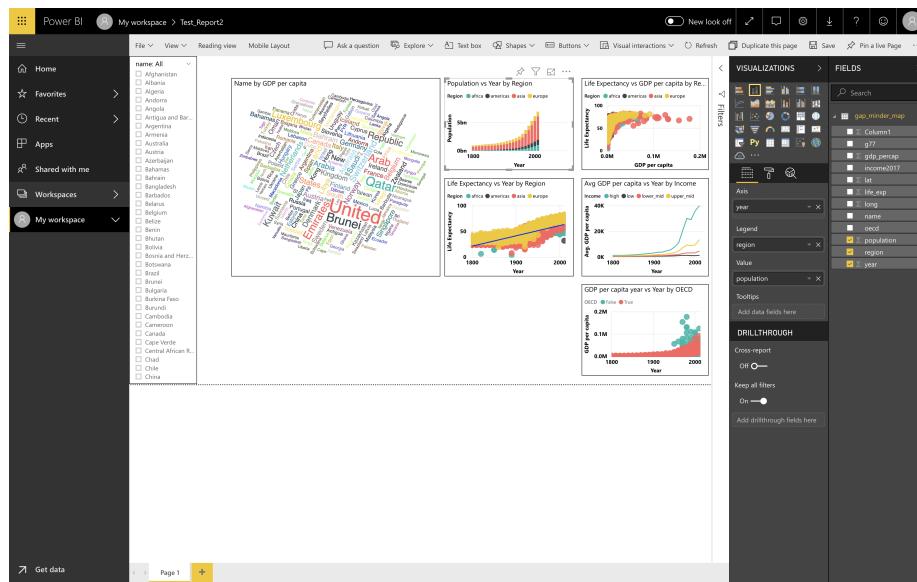


If you click on “Edit” on the top, you will be able to edit mode and actually perform everything you did in the Power BI desktop.



Now, you can see all the Visualization options and fields in the Power BI server. Click on the “Share” button in the top left corner. This allows you to share your report with others.

CHAPTER 4. SAVING AND EXPORTING



4.3 What's next?

We will also have an intermediate level workshop on Power BI, which is about establishing relational connections between different datasets.

Chapter 5

Next steps

5.1 Deepen your understanding

Our number one recommendation is to read the “Power BI Guided Learning”¹ by Microsoft.

Also, you can visit the Microsoft Power BI Blog² for the latest updates on performance improvements, more visualization options and so on. There is a community of forums and blogs for you to discuss with others.

5.2 Join the community

Join the Data Fluency community at Monash³.

- Mailing list for workshop and event announcements.
- Slack for discussion.
- Monthly seminars on Data Science topics.
- Drop-in sessions on Friday afternoon.

The Carpentries⁴ run intensive two day workshops on scientific computing and data science topics worldwide. The style of this present workshop is very much based on theirs. For bioinformatics, COMBINE⁵ is an Australian student and early career researcher organization, and runs Carpentries workshops and similar.

¹https://docs.microsoft.com/en-us/power-bi/guided-learning/?WT.mc_id=PBIService_GettingStarted

²<https://powerbi.microsoft.com/en-us/blog/>

³<https://www.monash.edu/data-fluency>

⁴<https://carpentries.org/>

⁵<https://combine.org.au/>