Quiz-Course 8. IBM Data Visualization with Python (Coursera)

Week 1- Practice Quiz: Introduction to Data Visualization Tools

1.Matplotlib was created by:

- James Gosling, a Canadian computer scientist.
- Cleve Moler, an American mathematician and computer programmer.
- **John Hunter, an American neurobiologist**.
- Daniel Johnson, a German physicist.

2.True or False. Jupyter Notebook is an open-source web application that allows you to create and share documents.

- **True**
- False

3.What is the code for the Matplotlib magic function?

- (%matplotlib)
- {%matplotlib}
- '%matplotlib'
- **%matplotlib**

4.Fill in the blank. A line plot is a series of _____ points connected by straight line segments

- Plotly
- Connection
- **Data**
- Matplotlib

5.What is the most widely used data visualization library in Python?

- Plotly
- Jupyter Notebook
- **Matplotlib**
- Pyplot

Week 1- Graded Quiz: Introduction to Data Visualization Tools

1.Matplotlib was created by:

- **John Hunter, an American neurobiologist**
- James Gosling, a Canadian computer scientist
- Cleve Moler, an American mathematician and computer programmer
- Daniel Johnson, a German physicist

2.True or False. Using the **inline backend**, you can modify a figure after it is rendered.

- **False**
- True
  → One limitation of this backend is that you cannot modify a figure once it's rendered. So, after rendering the figure, we cannot add, for example, a figure title or labels to its axes.

3.Using Matplotlib magic functions which code starts the command?

- %matplotlib inline
- $matplotlib outline
- %matplotlib notebook
- **%matplotlib**
  → The command starts with "%matplotlib," and **notebook is one of the Matplotlib backends**.

4.True or False. A line plot displays information as a series of data points connected by straight lines.

- False
- **True**

5.Which of the following is **not** a main layer of Matplotlib.

- Scripting
- **Histogram**
- Artist
- Backend
  → Matplotlib's three main layers are Backend Layer, Artist Layer, and Scripting Layer.

6.What is Jupyter Notebook used for?

- **An open-source web application that allows you to create and share documents that contain live code, visualizations, and some explanatory text as well**
- A well-established data visualization library that can be integrated into different environments
- It is a tool used for creating conventional visualization tools using the plot function
- A Python library with a number of different backends available

7.Matplotlib was initially developed as an _____ and _____ visualization tool. Select two.

- ECG
- EG
- **EEG (Electroencephalography)**
- **ECoG (Electrocorticography)**

8.What are the backend layers three built-in interface classes in Matplotlib:

- Renderer, Event, and Figure
- FigureCanvas, Figure, and Event
- **FigureCanvas, Renderer, and Event**
- Figure, Renderer, and Canvas

→ FigureCanvas: This interface defines the area where the figure is drawn, such as a window, a bitmap file, or a vector graphics file. It handles the rendering of the figure's contents onto the canvas.

→ Renderer: This interface defines how the figure's elements (lines, text, markers, etc.) are converted into a format that can be displayed or saved. It's responsible for rendering the figure's elements onto the canvas provided by the FigureCanvas.

→ Event: This interface handles user interactions with the figure, such as mouse clicks, keyboard inputs, and other events. It allows for interactive features like zooming, panning, and responding to user actions. (net)

9.True or False. Line plots capture trends and changes over time, allowing us to see patterns and fluctuations.

- False
- **True**

→ **Line plots can be misleading if the scales on the axes are not carefully chosen to reflect the data accurately**.

→ Line plots capture trends and changes over time, allowing us to see patterns and fluctuations.

→ `df.plot(kind = 'line')# in matplotlib`

→

10.True or False. Bar plots are ideal for comparing different categories or groups.

- False
- **True**

Week 2- Practice Quiz: Basic Visualization Tools

1.Select two: An area plot depicts cumulated totals using _____ or _____ over time.

- **Percentages**
- **Numbers**
- Charts
- Data

2.An area plot, also known as an area chart or graph, displays the _____ of multiple variables.

- Proportion and perimeter
- Magnitude and area
- **Magnitude and proportion**
- Proportion and area

3.A histogram is a way of representing the frequency distribution of a _____.
- **Numeric dataset**
- Statistical dataset
- Demographic dataset
- Alphabetical dataset

4.In a Histogram, the _____ axis is the frequency or the number of data points in each bin.
- Horizontal
- Perpendicular
- Parallel
- **Vertical**

5.The following code will create a horizontal bar chart of the data in the panda's data frame question.
```
question.plot(type='bar', rot=90)
```
- True
- **False**
  ➔ `df.plot(type='barh')`

Week 2- Practice Quiz: Specialized Visualization Tools

1.What is a scatter plot?
- A scatter plot represents the frequency distribution of a numeric dataset
- A scatter plot displays the magnitude and proportion of multiple variables over a continuous axis
- **A scatter plot is a type of plot that displays values pertaining to typically two variables against each other**
- A scatter plot is a circular statistical graphic divided into segments

  → A scatter plot is a type of plot that displays values pertaining to typically two variables against each other. Usually, it is a dependent variable plotted against an independent variable.

2. True or False. Matplotlib is a general-purpose comprehensive plotting library that provides a flexible interface for creating a wide range of plots.
- **True**
- False

  → Its pyplot module offers a convenient way to create and customize plots quickly.

3. What is a pie chart?
- **A pie chart is a circular statistical graphic divided into segments to illustrate numerical proportions**
- A pie chart is a graphical representation that showcases the relative size and proportion of various variables along a continuous axis
- A pie chart visually depicts the distribution of a numeric dataset by showcasing the frequency of each category
- A pie chart is a type of plot in which the length of each bar is proportional to the value of the item that it represents

  → A pie chart is a circular statistical graphic divided into segments to illustrate numerical proportions. **The explode property** in a pie chart enables you to offset slices from the center, highlighting specific sections.

4.A box plot is a way of statistically representing the distribution of given data through how many primary dimensions?
- 8
- 3
- 1
- **5**

  → The five main dimensions are minimum, first quartile, median, third quartile, and maximum.

5.What is the first step when plotting with Matplotlib?
- Call the subplot function
- Import Pandas
- Call the plot function
- **Import matplotlib.pyplot as plt**

  → The first step is to import the library. You Import matplotlib.pyplot as plt.

Week 2- Graded Quiz: Basic and Specialized Visualization Tools

1.A scatter plot is a type of plot that displays values pertaining to typically how many variables?
- One
- **Two**
- Four
- Three

2.When plotting directly with Matplotlib, what module offers a convenient way to create and customize plots quickly?

- Plotly
- Numpy
- Folium
- **Pyplot**

3.A pie chart is a _____ statistical graphic, divided into segments, to illustrate numerical proportions.

- **Circular**
- Line plot
- Bar chart
- Folium

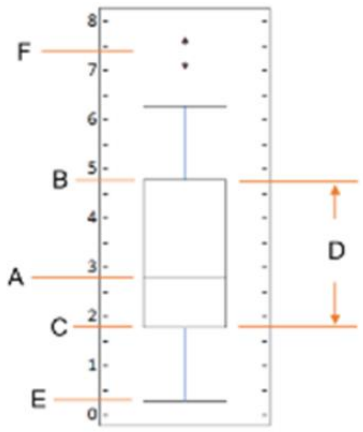
4.How many primary dimensions does a box plot utilize to statistically represent the distribution of a given data?

- 1
- **5**
- 3
- 4

5.Area plots are like a line plot but with the area below the line filled with color to emphasize the cumulative _____ of the variables.

- **Magnitude**
- Longitude
- Significance
- Latitude

6.True or False. The letters in the box plot above represent: A = Median, B = Third Quartile, C = First Quartile, D = Inter Quartile Range, E = Minimum, and F = Outliers.



- False
- **True**

7.What is the combination of function and parameter to create a box plot in Matplotlib?

- Function = plot, and Parameter = type with value = "box"
- Function = plot, and Parameter = kind with value = "boxplot"
- **Function = plot, and Parameter = kind with value = "box"**
- Function = boxplot, and Parameter = type with value = "plot"

8.True or False. The first step when creating a histogram in matplotlib is to import **matplotlib as mpl** and its **scripting interface as plt**.

- **True**
- False

9.True or False. The process of creating a scatter plot involves importing Matplotlib to visualize a large set of data.

- False
- **True**

10.A ____ is a type of plot where the length of each bar is proportional to the value of the item that it represents.

- Line plot
- **Bar chart = Bar graph**
- Figma plot
- Histogram chart

Week 3- Practice Quiz: Advanced Visualization Tools

1.True or false. Waffle charts are a visualization technique that represents categorical data in the form of square tiles or cells.

- False
- True

→ Waffle charts are a visualization technique that represents categorical data in the form of square tiles or cells. Their shape has square boxes on a grid that resembles a waffle appearance.

2.What do the squares on a waffle chart represent?

- The squares represent location plots on the graph.
- These squares resemble a grid of different-sized squares, each representing a specific value or category.
- The squares represent the trajectory of the statistics.
- **These squares resemble a grid of equal-sized squares, with each square representing a specific value or category.**

3.What is Seaborn based on?

- **Matplotlib**
- Python
- Waffle Charts
- Word Clouds

→ Although Seaborn is another data visualization library, it is based on Matplotlib.

4.Seaborn is a _____ visualization library that provides a high-level interface for visualizing geospatial data.

- **Python**
- Matplotlib
- Data
- Digital

5.The easiest way to create a waffle chart in Python is using the Python package _____.

- Matplotlib
- **PyWaffle**
- Data visualization library
- Waffle chart

→ Using the PyWaffle library in Python, you can easily create visually appealing waffle charts to communicate categorical data effectively.

Week 3- Practice Quiz: Visualizing Geospatial Data

1.Which application is a powerful data visualization library in Python, built primarily to help people visualize geospatial data?

- **Folium**
- PyWaffle
- Plotly
- Matplotlib

→ Folium is an excellent library for geospatial data visualization. It creates interactive and customizable maps.

2.Which Folium map style enables you to visualize natural vegetation colors?

- Stamen toner
- Open Street map
- **Stamen terrain**
- Street-level map

→ The stamen terrain style is great for visualizing hill shading and natural vegetation colors.

3.True or False: With Folium, you can display multiple markers on a map.

- False
- **True**

4.Complete the following: To create a choropleth map of a region of interest, Folium requires a Geo JSON file that includes_____.

- df_Canada
- Statistical variable
- The mapbox bright tiles set
- **Geospatial data of the region**
  → For creating a choropleth map of the world, you would need a Geo JSON file that lists each country and any geospatial data to define its borders and boundaries.

5.What is the first step when converting a world map into a choropleth map?

- Apply the choropleth function
- Use the columns "Country" and "Total" in our df_Canada dataframe
- Use the country names to look up the geospatial information
- **Define the variable**
  → When converting a world map into a choropleth map, the first step is to define a variable that points to our Geo JSON file.

Week 3- Graded Quiz- Advanced Visualization Tools and Visualizing Geospatial Data

1. Although Seaborn is another data visualization library, it is based on _____.

- NumPy
- SciPy
- Pandas
- **Matplotlib**

2.What is the default map style in Folium?

- Stamen Toner
- Stamen Terrain
- **Open Street Map**
- Arial
  → Open Street Map shows a street view of an area when you are zoomed in and the borders of the world countries when you are zoomed out all the way.

3.The code for setting the initial zoom level in Folium is _____.

- {zoom_start} parameter
- **zoom_start=parameter**
- (zoom_start) parameter
- zoom-start parameter

4.What parameter specify the latitude and longitude coordinates of the map's center point?

- Destination
- Geographic
- **Location**
- Navigation

5. Which feature is vital in improving interactivity and adding context to maps?

- Navigation
- Locations
- Zoom function
- **Markers**
  → Markers represent specific locations or points of interest, providing additional information when clicked. Markers are like signposts that guide us through the map, highlighting essential elements.

6.A choropleth map is a _____ map.

- Open Street Map
- **Thematic**
- Stamen Terrain
- Stamen Toner
  → A choropleth map is a thematic map in which areas are shaded or patterned in proportion to the measurement of the statistical variable displayed on the map.

7.Folium is a _____ library used for creating interactive maps and visualizations.
- Choropleth
- Folium
- Data
- **Python**

→ Folium is a Python library used for creating interactive maps and visualizations. It provides a simple and intuitive way to generate maps using data from various sources, including GeoJSON, Pandas DataFrames, and NumPy arrays.

8.What kind of file does Folium require to create a Choropleth map of a specific region?
- Json
- Geo
- **GeoJson**
- HTML

9.Which of the following are specialized plot types in Seaborn? Selecttwo.
- Pie plot
- **Regression plot**
- **Categorical plot**
- Bar plot

→ Seaborn provides specialized plot types such as regression, distribution, and categorical plotsthat are particularly useful for analyzing data and modeling relationships.

→ **Categorical plot**: count plot and bar plot

10.True or False. Waffle charts are a visualization technique that represents categorical data in the form of square tiles or cells.
- **True**
- False

Week 4- Practice Quiz: Creating Dashboards with Plotly

1.Dashboards can provide real-time visuals.
- **True**
- False

2.What is Dash?
- A framework tool used for building software.
- **Dash is a Python framework for building web analytic applications.**
- A framework application used for creating statistical graphs.
- Dash is a Python framework tool used for building Plotly applications.

3.What is Plotly?
- An interactive chart that displays statistical data.
- An interactive coding library.
- **Plotly is an interactive, open-source plotting library that supports over 40 unique chart types.**
- An interactive open-source code.

4.A Callback function is a Python function that is automatically called by Dash whenever an input component's property changes.
- False
- **True**

→ A Callback function is a Python function that is automatically called by Dash whenever an input component’s property changes. Callback functions are decorated with `@app.callback` decorator.

5.What two functions are required to create a callback?
- Input and Library
- Input and Outlet
- Output and Library
- **Output and Input**

Week 4- Practice Quiz: Working with Dash

1.True or False: Dashboard simplifies the dynamic aspects of the business.
- **True**
- False

2.Fill in the blank. Plotly express is a _____ wrapper.

- **High-level**
- Low-level

→ Plotly Express is a high-level wrapper for Plotly. It is a recommended starting point for creating the most common figures provided by Plotly because of its simple syntax. It uses graph objects internally.

3.A Callback function is a Python function that is automatically called by _____ whenever an input component's property changes.

- Plotly
- HTML
- **Dash**
- Matplotlip

→ A Callback function is a Python function automatically called by Dash whenever an input component's property changes. Callback functions use the `@app.callback` decorator.

4.Which of the following is the correct way to add the callback decorator?

- @app.callback{ Output{component_id='bar-plot', component_property='figure'}, Input{component_id='input-yr', component_property='value'}}
- @app.callback(Output{component_id='bar-plot', component_property='figure'}, Input{component_id='input-yr', component_property='value'})
- **@app.callback(Output(component_id='bar-plot', component_property='figure'), Input(component_id='input-yr', component_property='value'))**
- @app.callback[Output(component_id='bar-plot', component_property='figure'), Input(component_id='input-yr', component_property='value')]

5.The callback function takes input and output components as _____.

- **Parameters**
- Data
- Matplotlib
- Perimeter

Week 4- Graded Quiz: Creating Dashboards with Plotly and Dash

1.With Plotly, where can created web-based visualizations be displayed?

- Dash
- Python
- **Jupyter notebook**
- Matplotlib

→ Web-based visualizations created using Plotly Python can be displayed in Jupyter Notebook, saved to standalone HTML files, or served as part of pure Python-built web applications using Dash.

2.True or False. The Plotly graph objects module provides an automatically generated hierarchy of classes. It is the low-level interface to figures, traces, and layouts.

- False
- **True**

3.Which Plotly.graph object has a dictionary structure?

- Figure
- Plotly
- Graph
- **JSON**

4.True or False. Real-time visuals on the dashboard simplify the comprehension of various aspects of the business.

- **True**
- False

→ Real-time visuals on the dashboard simplify the comprehension of various aspects of the business. Also, getting the big picture in one place can help businesses make informed decisions, thereby improving performance.

5.Fill in the blank. Matplotlib is a comprehensive library for creating static, animated, and interactive _____ in Python.

- Charts
- **Visualizations**
- Videos
- Graphs

6.True or False. Data can be presented by using different types of dashboards.

- **True**
- False

7._____ Express is a high-level wrapper for Plotly.

- Python
- JSON
- **Plotly**
- Matplotlib

→ Plotly Express is a high-level wrapper for Plotly. It is a recommended starting point for creating the most common figures provided by Plotly because of its simple syntax. It uses graph objects internally.

8.What is a callback function?

- A file
- A line of Code
- **A decorator**
- An extension

→ Whenever there is a change in the input component value, the Callback function wrapped by the decorator is called, followed by the update to the output component children in the application layout.

9.Fill in the blank. Dash is an _____Source User Interface Python library for creating reactive, web-based applications.

- Closed
- Data
- **Open**
- Code

→ Dash is an Open-Source User Interface Python library for creating reactive, web-based applications. It is enterprise-ready and a first-class member of Plotly's open-source tools.

10.Fill in the blank. _____ sets results returned from the callback function to a component id.

- Dash core
- Input
- Dash
- **Output**

→ Output sets results returned from the callback function to a component id. The set input is provided to the callback function to a component id.

Week 5- Final Exam: Data Visualization with Python - Timed Quiz

1.What three key points form the basis for creating a visual?

- Less is not attractive. Less is more attractive. Less is more impact
- Less is more effective; Less is not attractive; Less is more impactive.
- **Less is more effective; Less is more attractive; Less is more impactive.**
- Less is ineffective; Less is not attractive; Less is not impactive.

→ When creating a visual, the approach revolves around three key points less is more effective, more attractive, and more impactive. Every feature or design should support the intended message of the plot without causing distraction.

2.Which layer within the Matplotlib architecture generates graphics and plots quickly and easily?

- Backend Layer
- Figure Layer
- **Scripting Layer**
- FigureCanvas

→ The scripting layer is the appropriate layer for everyday purposes. It is considered a lighter scripting interface to simplify common tasks and for a quick and easy generation of graphics and plots.

→ Backend, Artist, and Scripting layers make up the architecture in Matplotlib

3.Which plot library is an excellent choice for geospatial data visualization and helps to create interactive and customizable maps?

- **Folium**
- PyWaffle
- Seaborn
- Matplotlib

4.What is the code for the Matplotlib magic function?

- #matplotlib
- **%matplotlib**
- $matplotlib
- +matplotlib

5.Area plots are particularly effective in depicting data of what nature?

- Numerical data
- Metadata
- Continuous dataset
- **Population demographics**

→ Area plots are particularly effective in depicting data with a cumulative nature, such as visualizing population demographics.

6.What is a way of statistically representing the distribution of the data through five main dimensions?

- **Box plot**
- Scatter plot
- Histogram
- Line plot

→ A box plot is a way of statistically representing given data distribution through five primary dimensions. These include Minimum, First quartile, Median, Third quartile, and Maximum.

7.Which library must you import to work with tabular data in Matplotlib?

- **Pandas**
- Subplot
- NumPy
- Matplotlib. pyplot

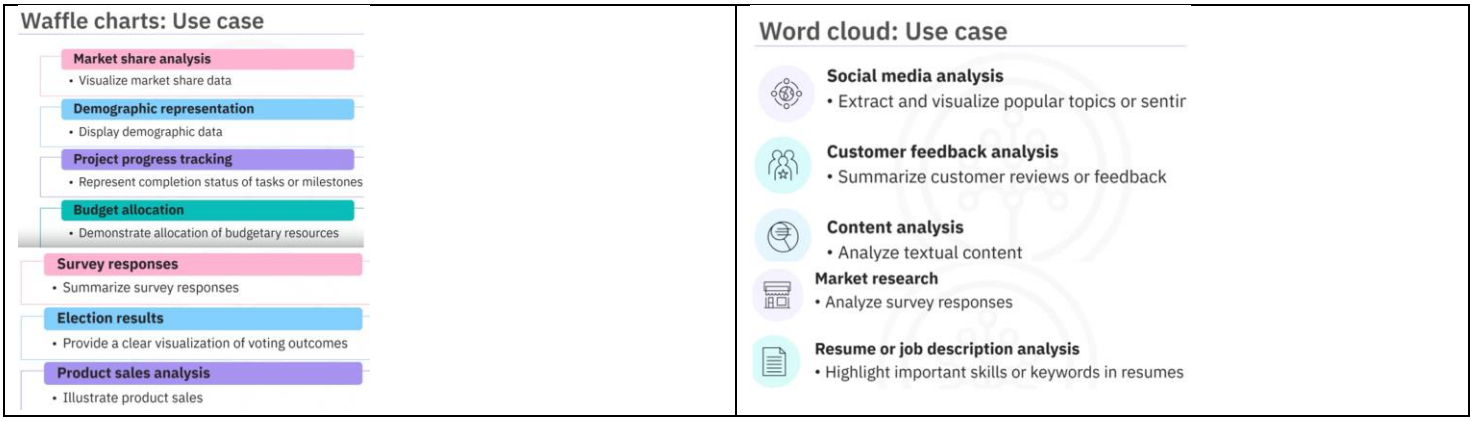
8.Identify the use case for a Word Cloud.

- Project progress tracking
- Demographic representation
- Market share analysis
- **Content analysis**

→ Word cloud assists in analyzing textual content, such as articles, blogs, or research papers, to uncover prevalent keywords or themes.

9. Where can Waffle charts be applied?

- **Budget allocation**
- Market research
- Social media analysis
- Customer feedback analysis



10.Which specialized plot type in Seaborn is useful for data and modeling relationships? **[Select two]**

- **Categorical plot**
- **Regression plot**
- Bar plot
- Pie plot

→ Seaborn provides specialized plot types such as regression, distribution, and categorical plots that are particularly useful for analyzing data and modeling relationships.

→ **Categorical plot**: count plot and bar plot

11.Which Folium Map style is great for visualizing and exploring river meanders and coastal zones?

- **Stamen toner**
- Stamen terrain
- Open street map
- Street-level map

→ Backend, artist, scripting layers make up the articeture in matplotlib

12.What specific type of map does a Choropleth map represent?

- Open street map
- **Thematic**
- Stamen terrain
- Stamen toner

13.Which tool allows you to switch between Jupyter Notebooks and standalone deployed apps and dashboards?

- **Panel**
- Streamlit
- Voilà
- Matplotlib

Web-Based Dashboarding	
Plotly | Dash (Dash)	• Dash is a Python framework for building web analytic applications. It runs on top of flask plotly.js and react.js. • Dash is well suited for building data visualization apps with highly customized user interfaces.
Panel	• Panel works with visualizations from Bokeh, Matplotlib, HoloViews, and many other Python plotting libraries, making them instantly viewable, either individually or when combined with interactive widgets that control them. • Panel works equally well in Jupyter Notebooks for creating quick data exploration tools or as a standalone deployed app in dashboards and **allows you to easily switch between those contexts as needed.**
Viola	• Viola turns Jupyter notebooks into standalone web applications. • Viola is compatible with separate layout tools like Jupyter-flex or templates like viola-vuetify
Streamlit	• Streamlit can easily turn data scripts into shareable web apps with three main principles: embrace Python scripting, treat widgets as variables, and reuse data and computation.

14.What command creates a line chart using **Plotly Graph Objects**?

- `go.Scatter()`
- `px.line()`
- **`go.Figure()`**
- `fig.show()`

→ **Plotly Graph Objects:** fig = go.Figure(data=go.Scatter(x=, y=mode='lines'))

→ **Plotly Express:** px.line() creates a line chart

15.What does the @app.callback decorator in Dash indicate?

- **It connects the input and output components.**
- It specifies the input component's ID.
- It defines the callback function.
- It specifies the output component's ID.

→ In Python, @app.callback is a decorator used in the Dash framework to specify that a function should be called when an input component changes its value. The Input and Output functions are used to define the inputs and outputs of a callback function.

→ The core idea of the application is to get input function) and update the dashboard(output function) in real-time with the help of callback function.

16.What type of interface does **Dash** have?

- Closed source
- Code-based
- Data-based
- **Open source**
  → Dash is an Open-Source User Interface Python library for creating reactive, web-based applications. It is enterprise-ready and a first-class member of Plotly's open-source tools.

17. What type of chart is similar to a histogram and is commonly used to compare the values of a varible at a given point in time?

- Table chart
- Pie chart
- Radial column chart
- **Bar chart**

18. What is the recommended starting point for creating figures in Plotly?

- Plotly Library
- **Plotly Express**
- Plotly Dash
- Plotly Graph Objects