

UNIT 3 -BASICS OF DATA VISUALIZATION

PART - A Questions

1. What are the steps involved in data visualization process? (CO3 , K3)

- Acquire, Parse , Filter, Mine, Represent, Refine, Interact

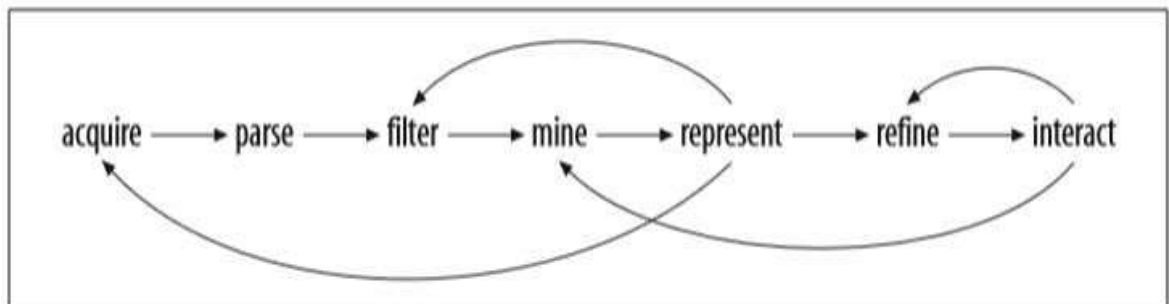
2. Why acquisition step is needed? (CO3 , K3)

- The acquisition step involves obtaining the data. Like many of the other steps, this can be either extremely complicated (i.e., trying to glean useful data from a large system) or very simple (reading a readily available text file).
- Acquisition concerns how the user downloads our data as well as how we obtained the data in the first place.

3. What is Interact stage in a process ? (CO3 , K3)

- This stage of the process adds interaction, letting the user control or explore the data.
- Interaction might cover things like selecting a subset of the data or changing the viewpoint.
- This stage can also affect the refinement step, as a change in viewpoint might require the data to be designed differently.

4. How does the seven stages of visualization interact with each other ? (CO3 , K3)



The connections between the steps in the process illustrate the importance of the individual or team in addressing the project as a whole.

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5. What is Processing? (CO3, K3)

- Processing is a simple programming environment that was created to make it easier to develop visually oriented applications with an emphasis on animation and providing users with instant feedback through interaction.
- The developers wanted a means to “sketch” ideas in code.
- As its capabilities have expanded over the past decade, Processing has come to be used for more advanced production-level work in addition to its sketching role.

6. What is Processing Development Environment? (CO3, K3)

- Processing consists of Processing Development Environment (PDE). This is the software that runs when you double-click the Processing icon. The PDE is an
- Integrated Development Environment (IDE) with a minimalist set of features designed as a simple introduction to programming or for testing one-off ideas.
- A collection of functions (also referred to as commands or methods) that make up the “core” programming interface, or API, as well as several libraries that support more advanced features such as sending data over a network, reading live images from a webcam, and saving complex imagery in PDF format.

7. What is sketching with processing? (CO3, K3)

- A Processing program is called a sketch.
- The idea is to make Java-style programming feel more like scripting, and adopt the process of scripting to quickly write code. Sketches are stored in the sketchbook, a folder that's used as the default location for saving all of your projects.
- Sketches that are stored in the sketchbook can be accessed from File → Sketchbook.

8. Give the “Hello World” program example of processing. (CO3, K3)

The Processing equivalent of a "Hello World" program is simply to draw a line:

```
line(15, 25, 70, 90);
```

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9. What is smooth Interpolation of Values over Time? (CO3, K3)

- When updating data, it's important to show users the transition over time.
- Interpolating between values helps users track where the changes occur and provides context for the change as it happens.
- The way to think about interpolation is that our data values are never "equal" to some number; rather, they're always "becoming" or "transitioning to" another value.
- For this, we use another class called an Integrator.

10. What is the use of map() function? (CO3, K3)

- The map() function converts numbers from one range to another.
- The map() function is useful for hiding the math involved in the conversion, which makes code quicker to write and easier to read.
- A lot of visualization problems revolve around mapping data from one range to another (e.g., from the min and max of the input data to the width or height of a plot), so the map() method is used frequently.

11. What is time series? (CO3 , K3)

- The time series is a ubiquitous type of data set.
- It describes how some measurable feature (for instance, population, snowfall, or items sold) has changed over a period of time.
- Because of its ubiquity, the time series is a good place to start when learning about visualization.

12. How do you draw tabs in visualization? (CO3 , K3)

- The important part of this method keeps track of a value named runningX to calculate the positions of each tab.
- The width of each tab is calculated using textWidth(), and the tabPad value is added to provide padding on the sides.

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13. What is the use of introducing conditional operator in a code? (CO3 , K3)

- The conditional operator is most useful in situations where a simple if test is used to control something straightforward like the fill color.
- The conditional operator has to be used sparingly because overuse can result in code that is difficult to read.

14. What is handling mouse input? (CO3 , K3)

- The `mousePressed()` method tests whether the mouse is inside one tab or another.
- This method is a simple matter of iterating through each tab and checking the `mouseX` and `mouseY` coordinates against the variables that contain the boundaries of each tab rectangle.
- If the `mouseY` value is in the correct range, `mouseX` is tested against each `tabLeft` and `tabRight` value. If inside, the value of `currentColumn` is updated with the `setColumn()` method.

15. How do you handle data that varies across multiple dimensions? (CO3 , K3)

- Data that varies across multiple dimensions is common, and it can be difficult to represent in traditional charts that exploit only the two dimensions of the screen or printed page.
- In particular, you often have an independent variable and a dependent variable that change over time.
- Many techniques for representing change exist, but one of the most engaging ways is animation.

16. What is regexp? (CO3 , K3)

- A regexp is defined by a pattern and a matcher, which checks the pattern against some input data.
- A pattern is made up of a series of symbols that identify whitespace, characters, numbers, and how many of each are expected.
- The regexp APIs of programming languages use a more precise format.

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17. What is the meaning of the pattern `([\\w\\d]+)` ? (CO3 , K3)

- This portion matches the attribute name (such as w or team). The most powerful part of this string is the enclosing parentheses, which mark that set of characters as a group. This means the program can later point to and extract the matching characters.
- Inside the grouping parentheses are a set of square brackets, which denote a character class.
- This is a way to match a variety of different characters that can appear at this point in the input text.

18. What is sophisticated sorting ? (CO3 , K3)

- When two teams have an identical record, the tie should go to the team with the lower salary.
- Inside `RankedList`, sorting is performed by a function that compares two elements in the list.
- This is common for most sorting algorithms, which invoke a comparison function that returns zero if the items are identical, a positive value if the first is greater, and a negative value if the second is greater.
- Writing a new `compare()` method lets us specify a more sophisticated sort.

19. What are scatter plots? (CO3 , K3)

- Scatter plots are the graphs that present the relationship between two variables in a data-set.
- It represents data points on a two-dimensional plane or on a Cartesian system.
- The independent variable or attribute is plotted on the X-axis, while the dependent variable is plotted on the Y-axis.

20. How do you handle deployment issues? (CO3 , K3)

- For an online project, downloading two megabytes of data is likely to be a problem. In its current iteration, the program will stop until all data has been downloaded.
- A better alternative is to use the built-in `Thread` class to load the data asynchronously.
- The thread acts independently of the rest of the program, gradually adding locations by incrementing `placeCount`. When `placeCount` and `totalCount` are identical, the data has finished loading.
- A thread provides a way to bundle a function in your program so that it can run at the same time as another part of the program.

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21. What are treemaps? (CO3, K3)

- A set of algorithms to subdivide 2D space to show the relative size of files and directories.
- The representation of a treemap refers the two-dimensional mapping of tree structures.
- One key trait of a treemap as a hierarchical structure is that the viewer can click on any part of the display to burrow down and see that part's structure.
- The whole data structure is hierarchical, but different parts can be displayed by themselves.

22. How do you import treemap library ? (CO3, K3)

- Through a collaboration between Wattenberg and the HCIL, an open source library for creating treemap structures was released online under the Mozilla Public License.
- Start a new sketch, and select Sketch -> Import Library -> treemap.

23. Name the three classes necessary to use treemap library. (CO3, K3)

- To use the treemap library at a high level, it's necessary to become acquainted with three classes.
- A SimpleMapItem class encapsulates a single element of a treemap display (in this case a word).
- The SimpleMapModel class is a list of SimpleMapItem objects. A third class, named Treemap, converts a SimpleMapModel object into a nicely laid out 2D mapping.

24. What is the purpose of creating tab named WordItem? (CO3, K3)

- The implementation of WordItem will draw each square as a white rectangle with black text.
- However, the text is drawn only if the width and height of the text are smaller than the width and height of the rectangle.

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25. What is the function of class WordMap? (CO3, K3)

- This class handles the list of WordItem objects. The items array is inherited from SimpleMapModel, and it simply needs to be filled by methods in WordMap.
- The WordMap class has a HashMap object that maps between a word (as a String) and its associated WordItem object.
- This is used by the addWord() method, which either adds new entries to the HashMap for new words or calls the incrementSize() method for words already found.
- After loading has finished, the finishAdd() method converts the values of the HashMap (a series of WordItem objects) into an array.

26. How does the drawTag() method works? (CO3, K3)

- The drawTag() method handles placement of the tag itself.
- If the height of the box is at least twice the height of the tag, the tag is drawn inside the box.
- Otherwise, if there's sufficient room above the box, then the tag is drawn there.

27. What is FileItem Class ? (CO3, K3)

- The most important change to the FileItem class is the calcBox() method, which calculates the values for boxLeft and the rest using the zoomBounds object.
- The mapX() and mapY() methods stretch and squeeze x- and y-coordinates based on the current values of zoomBounds.
- The second and third parameters of spanX and spanY control the range for the outgoing values.

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28. What is FolderItem class ? (CO3, K3)

- The changes to FolderItem are similar to those of FileItem.
- Most of the changes are inside mousePressed(), and they handle triggering a zoom when the contents of a folder are already visible.

29. What are networks and graphs ? (CO3, K3)

- A graph is a collection of elements, usually called nodes, linked together by edges (sometimes called branches).
- It is a common structure for mapping connections of many related elements.
- This is partly because the visual representation of a network shows the sort of connectedness that makes sense to someone familiar with the data, whether as a free-form map of associations written out on paper (sometimes called a mind map) or, in computer science, as a visual analogue to a common data model for connections between many elements.

30. What is processing syntax? (CO3, K3)

- The Processing syntax is essentially a dialect of Java. A preprocessor converts Processing syntax into Java syntax, and then a Java compiler creates Java .class files from the code.
- The syntax changes made by the preprocessor are covered here. The first step in using the Processing Core is to find core.jar in the lib subfolder of the Processing installation.

Part B – Questions

Part-B Questions

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