ENVIRONMENTAL MONITORING

## INRODUCTION

Data Incorporating visualization techniques to showcase historical temperature and humidity trends can be a powerful way to convey information effectively.

## Here's a step-by-step guide on how you can create visualizations for this purpose:

Cary Institute's Environmental Monitoring Program is a long-term research program. The purpose of the program is to monitor environmental parameters that affect natural ecosystems. The program includes monitoring of weather and climate, air, precipitation and solar radiation and water, including stream flow and temperature, and soil moisture and temperature.

**1. Gather Data:**

First, collect historical temperature and humidity data from reliable sources. You may find this data from meteorological agencies, research institutions, or online databases. Ensure that the data covers a sufficiently long period to identify trends.

**2. Data Cleaning and Preparation:**

Import the data into a spreadsheet or data analysis tool. Clean and format the data by removing any outliers or missing values, and organize it in a way that makes it easy to work with. You may need to calculate averages or aggregate data by month or year.

**3. Choose Vistioualizan Tools:**

Select the appropriate data visualization tools for your project. Common choices include Microsoft Excel, Google Sheets, Python libraries like Matplotlib and Seaborn,or specialized data visualization software like Tableau or Power BI.

**4. Select Visualization Types:**

For showing temperature trends, consider using line charts or area charts. These can effectively display how temperatures change over time.

For humidity trends, line charts or bar charts can work well. You can also consider using a combination of line and bar charts to visualize both temperature and humidity on the same graph for easy comparison.

**5. Create the Visualizations:**

For line charts, plot time (e.g., years or months) on the x-axis and temperature or humidity values on the y-axis. Use different markers to distinguish between temperature and humidity data.

For you can create grouped bar charts or stacked bar charts to show variations in temperature and humidity side by side or on top of each other.

**6. Add Context**:

Include labels, titles, and axis descriptions to make your visualizations self-explanatory. You can also add annotations or text to highlight significant events or trends in the data, such as , droughts, or unusual temperature fluctuations.

**7. Enhance Interactivity:**

If you're creating interactive visualizations, consider using tools like D3.js or interactive libraries in Python to allow users to explore the data further. Users can hover over data points for more information or zoom in on specific time periods.

**8. Choose Schemes Carefully:**

Use schemes that are easy to distinguish and interpret. Avoid overly bright or clashing that can make the visualization difficult to read.

**9. Test and Refine**:

Review your visualizations for accuracy and clarity. Test them with colleagues or potential users to gather feedback and make improvements.

**10. Publish and Share**:

Once you are satisfied with your visualizations, publish them in a format that can be easily shared, such as PDFs, images, or interactive web applications. Consider creating a report or a webpage where you can provide context and insights alongside the visualizations. Remember that effective data visualization not only conveys information but also tells a compelling story. Consider the narrative you want to convey through your visualizations and ensure that they support that story. Additionally, always provide the source of your data and any necessary context to make the visualizations more informative and trustworthy.

## HISTORICAL TEMPERATURE

When we need to know what will happen with the weather in the next couple of weeks, we can turn to the traditional weather forecast. The [standard weather forecasts](https://www.visualcrossing.com/resources/documentation/how-do-we-create-our-weather-forecast/) are based around computer models that simulate what will happen with the weather over the next few weeks.

But what happens when you aren’t interested in the next few weeks? Perhaps you are planning wedding, a vacation or outdoor even and you need to know what will the likely weather be on a given location and date further into the future. In that case we use historical weather observations collected over many years to help us understand the likely weather we will experience.

In this article we will use the Historical Weather Summary statistical weather analysis queries to create a picture of what the weather for a given will likely be like.

If you are interested in seeing how we can use this data, check out the [Weather Event Planner Dashboard](https://www.visualcrossing.com/legacy/weather/weather-event-planner) which uses the historical weather summary data sets described in this article to display the typical weather for a location.

## DATA VISUALIZATION:

**Data visualization** is the process of creating graphical representations of information. This process helps the presenter communicate data in a way that’s easy for the viewer to interpret and draw conclusions.

There are many different techniques and [tools](https://online.hbs.edu/blog/post/data-visualization-tools) you can leverage to visualize data, so you want to know which ones to use and when. Here are some of the most important data visualization techniques all professionals should know.

**DATA VISUALIZATION TECHNIQUES**

The type of data visualization technique you leverage will vary based on the type of data you’re working with, in addition to the [story you’re telling with your data](https://online.hbs.edu/blog/post/data-storytelling).

Here are some important data visualization techniques to know:

* Pie Chart
* Bar Chart
* Histogram
* Gantt Chart
* Heat Map
* Box and Whisker Plot
* Waterfall Chart
* Area Chart
* Scatter Plot
* Pictogram Chart
* Timeline
* Highlight Table
* Bullet Graph
* Word Cloud
* Network Diagram
* Correlation Matrices

### Importance of Data Visualization

### 1. Analyzing the Data in a Better Way

Analyzing reports helps business stakeholders focus on the areas that require attention. The visual mediums help analysts understand the key points needed for their business. Whether it is a sales report or a marketing strategy, a visual representation of data helps companies increase their profits through better analysis and better business decisions.

### 2. Faster Decision Making

Humans process visuals better than any tedious tabular forms or reports. If the data communicates well, decision-makers can quickly take action based on the new data insights, accelerating decision-making, and business growth simultaneously.

### 3. Making Sense of Complicated Data

Data visualization allows business users to gain insight into their vast amounts of data. It benefits them to recognize new patterns and errors in the data. Making sense of these patterns helps the users pay attention to areas that indicate red flags or progress. This process, in turn, drives the business ahead.

## Purpose of Data Visualization:

The purpose of data visualization is pretty clear. It is to make sense of the data and use the information for the organization’s benefits. That said, data is complicated, and it gains more value as and when it gets visualized. Without visualization, it is challenging to quickly communicate the data findings and identify patterns to pull insights and interact with the data seamlessly.

Data scientists can find patterns or errors without visualization. However, it is crucial to communicate data findings and identify critical information from them. And for this, [interactive data visualization](https://splashbi.com/interactive-data-visualization/) tools make all the difference.

* Data visualization strengthens the impact of messaging for your audiences and presents the data analysis results in the most persuasive manner. It unifies the messaging systems across all the groups and fields within the organization.
* Visualization lets you comprehend vast amounts of data at a glance and in a better way. It helps to understand the data better to measure its impact on the business and communicates the insight visually to internal and external audiences.
* Decisions can’t be made in a vacuum. Available data and insights enable decision-makers to aid decision analysis. Unbiased data without inaccuracies allows access to the right kind of information and visualization to represent that information and keep it relevant.
* Data visualization has the potential to solve many business issues. All businesses must incorporate data visualization tools and reap transformative benefits in their critical areas of operations.

## Benefits of Data Visualization Tools

1. Effective Data Visualization is the key to unlock Big Data. It can solve any data inefficiencies and easily and instantly absorb vast amounts of data presented in visual formats.
2. By enabling users to understand data rapidly, visualization can quickly increase the speed of decision making as well. Any business must make fast decisions and not get bogged down by inefficiencies. Timely actions result in averting any losses and benefit from any market condition.
3. A big reveal for any differences in the trends and patterns is vital for any business’s survival. It is critical to know what is causing increased losses or what is required to maximize gains.
4. Visualization helps identify errors and inaccuracies in data quickly.
5. Companies can utilize visualization to access real-time information and assist in management functions in a significant manner. Decision-makers can benefit from on-demand data and use visualization to increase the effectiveness of operations and improve productivity.

## Abstract

## In recent decades, the land surface has warmed substantially more than the ocean surface, and relative humidity has fallen over land. Amplified warming and declining relative humidity over land are also dominant features of future climate projections, with implications for climate-change impacts. An emerging body of research has shown how constraints from atmospheric dynamics and moisture budgets are important for projected future land–ocean contrasts, but these ideas have not been used investigate temperature and humidity records over recent decades.