Time Series Analysis -   
Sales Forecast

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### **Objective**

The objective of this exercise is to use Time Series analysis to forecast Global Bike U.S. sales and interpret the reliability of the forecasting model.

### **Activities**

* Import and prepare data.
* Configure forecasting models.
* Analyze and interpret output from models.

### **Software Prerequisites**

Access to SAP Analytics Cloud with Predictive Scenarios

### **Data Set**

GBSales\_transactions.xlsx

# Scenario

Nina and other managers at Global Bike are getting ready to develop strategic plans and budgets for the upcoming year. Therefore, Nina is interested in forecasting Sales Revenue for at least one year from the date for which data are available. She will use Time Series Analysis for forecasting.

# Time Series Analysis

*Time Series Analysis* is a technique that analysts use to (a) uncover any implicit structure (patterns or trends) in the data and (b) model that structure to make forecasts. The assumption is that the future, at least in the short term, will continue the structure of the past. This technique is useful wherever forecasting values such as sales quantities, airline passenger volume, economic metrics, and traffic volume are needed.

## Acquire and Aggregate the Data

The data set given to Nina includes sales transactions from 2008 through 2020. To create a forecast, you will want to consolidate/aggregate the details into one-month time periods. You can do this easily in a private model in SAC.

* + - 1. Select **Stories** from the menu on the left side of the screen.
      2. Select **Create New Canvas**.
      3. Select **Add data.**
         1. Select **Data uploaded from a File 🡪 Source File**.

Find and open the Excel sheet **GBSales\_transactions.xlsx**.

* + - * 1. **Import**.
        2. On the Data tab of the Story do the following:

**Change Year and Month to Dimensions**

Change Year and Month Details. (Click the column, then click the Details icon to the right of the Builder pane title.)

Change **Data Type to String**.

Check to be sure Statistical Type is set to **Continuous**.

**Concatenate Month and Year** (select using the CTRL key in this order) as shown below using the transformation function. The name of the column will default to Month\_Year.

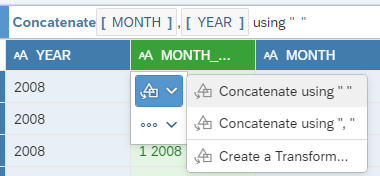


Figure 1: Concatenate Month and Year

* + - * 1. Go to the Story view; **create a Table**.

Include **Revenue** as the Measure and **Currency and Month\_Year**, in that order, as Rows. Your results should look similar to those in Figure 2.

Graphical user interface, application, table

Description automatically generated

Figure 2: Create the Table

* + - 1. **Export** the results of the table using the Export function under the table’s More Actions. The parameters for the Export function are shown in Figure 3.

Graphical user interface, text, application, email

Description automatically generated

Figure 3: Export the Table Results

* + - * 1. **Open the .csv file** that was downloaded to your computer. It should look similar to the following figure.

Graphical user interface, application, table, Excel

Description automatically generated

Figure 4: The .csv File from SAC

**Move the heading “REVENUE” to row 2 and delete row 1**.

**Save** the file as an Excel spreadsheet. (You may also save as a .csv) named GBSales\_transactions\_agreggated.xlsx.

## Create the Aggregated Data to a Data Set

SAC Predictive Scenario uses data sets or data models to model predictive analyses. Data sets are models created for “personal” use; that is, they are not deployed out to the organization. Models are more formal data structures and are usually created to be used by many. In this assignment, you will convert the aggregated Global Bike sales data into a “Data Set”.

* + - 1. Select **Datasets** from the menu on the left side of the screen.
      2. Select **Create New From a CSV or Excel File**.
         1. Select **Source File**.
         2. Select **GBSales\_transactions\_aggregated.xlsx**.

**Use first row as column headers** should be selected.

* + - * 1. **Import**.
        2. Choose **your folder** for the location.
        3. **Enter a Name**; for example, “Global Bike Forecast Dataset”.
        4. Description: “**Global Bike Sales Data 2008-2020**”.
        5. **OK**.
        6. **Save**. The Dataset will be saved with your other files and is available for use for other analyses.

## Create the Forecasting Model

* + - 1. Select **Predictive Scenarios** from the menu on the left side of the screen.
         1. Select **Time Series Forecast**.
         2. **Choose your folder** to save your forecast model.
         3. **Enter a Name** such as “Sales Forecast”.
         4. Enter a Description: “**Forecast of Global Bike sales**”.
         5. **OK**.
         6. **Settings**:

**Enter a description**.

Under **Time Series Data Source**, select the dataset that you created in the previous step.

Choose **Revenue** for Target.

Choose **Month\_Year** for Date.

Number of Forecasts = **12 (12 months)**.

Choose **Currency** **for Entity**. This will allow you to segregate U.S. and German sales.

**Leave the defaults** for the Predictive Model Training. These settings are shown in Figure 5.

Graphical user interface, text, application, email

Description automatically generated

Figure 5: Predictive Model Training Settings

* + - * 1. Click **Train & Forecast**. Be patient while the model is trained. Sometimes it takes a minute or two. The results will be shown on three tabs or pages: Overview, Forecast, and Explanation. Use these data to answer the assignment questions at the end of this document. Be sure to expand the Explanation visuals to include all components.
        2. **Save** the Sales Forecast Results in your folder. The Save Forecast function is circled in the figure below. Provide a name of your choosing for the saved forecast. I named mine “Liz’s Sales Forecast Results”.

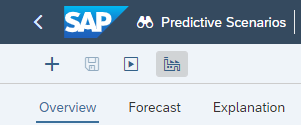


Figure 6: Save the Forecast Results

1. Define MAPE. What is the significance of MAPE in this forecast?  
   Support your answer with a screenshot.
2. Take a screen shot of the visualization of your U.S. forecast.
3. What are the forecasted sales for December 2021 in Germany? What are the forecasted sales for December 2021 in the U.S.?
4. Are there any signal outliers in the US data? If so, what are they? How might these types of outliers affect this analysis?
5. Use the model Explanation for the US forecast to determine which components had the largest impacts on the Time Series predictions. Compare these to the impacts for the Germany predictions; are there any differences? Include screenshots to support your conclusion.