

## Calendar Heatmap - Deneb #1

Based on your above knowledge of the data model, please create a Deneb script in accordance with the following specifications

### Deneb Calendar Heat Map Prompt for Power BI

**Goal:** Create a calendar heat map in Power BI using Deneb that visualizes the number of sales per day, similar to the screenshot provided. The visualization should use a color scale to represent different volumes of sales activity over time.

#### Components Required:

#### Data Sources:

**Calendar Table:** Use the provided Date table from the model with columns for Year, Month, Week, and Day.

**Sales Table:** Use the provided Sales table containing transaction data, including date and sales amount columns.

#### Specifications for the Heat Map:

**Year Selection Control:** Create a year toggle button for users to switch between different years (as shown in the screenshot). It should include at least 2020, 2021, and 2022.

**Monthly Layout:** Arrange the calendar by months, with rows for each month, and weeks within each month. Each month should be represented as a compact grid where each cell represents a day.

#### Color Scale Representation:

Use a gradient color scale to represent the number of sales per day. The minimum value should be a light color (indicating low sales or no sales). The maximum value should be a dark, saturated color (indicating high sales activity).

**Legend:** Provide a color legend to indicate the range of sales (# of Sales) from lowest to highest.

**Calendar Cells:** Each cell should represent a day of the week, with sales values indicated by the depth of color.

#### Data Fields:

**Date Field Mapping:** Link each day cell to the corresponding date from the Calendar table.

**Sales Measure:** Use the 'Number of Sales' measure from the data model for the color intensity of each day.

#### Interaction Controls:

**Year Filter:** A slicer to select the year (as seen in the screenshot), using the field [Year].

**Tooltip:** Configure tooltips to show the number of sales for the selected day when hovered over.

#### Vega-Lite Configuration:

Encoding:  
 X Axis: Represent the week of the month (WkOfMonth).  
 Y Axis: Represent the days of the week (DayOfWeek), ranging from Monday to Sunday.  
 Marks:  
 Rectangles: Each cell should be a rect mark representing a day.  
 Use the sales measure for the color encoding (color channel) to show intensity.  
 Scale:  
 Set the color scale to use a diverging palette ranging from light blue (#cce5ff) for lower values to dark blue (#003366) for higher values.  
 Ensure the color legend is clear and provides enough differentiation between levels of activity.  
 Design Requirements:  
 Title: Include a title at the top of the visual: "Power BI Calendar Heat Map using Deneb".  
 Aesthetic Details:  
 Days with no sales data should have a very light gray color to indicate zero sales.  
 Maintain alignment of cells within each month, similar to a traditional calendar.  
 Ensure the months are clearly labeled and visually separated to create an intuitive and organized appearance.

Certainly! Based on your data model and specifications, I'll guide you through creating a calendar heat map in Power BI using Deneb and Vega-Lite. This visual will display the number of sales per day, using color intensity to represent sales volume.

## 1. Prepare the Data in Power BI

Before creating the visual, ensure that your data is properly prepared.

### a. Create Necessary Measures and Columns

#### i. Number of Sales Measure

Create a measure to count the number of sales per day:

DAX

```
Number of Sales = COUNTROWS(Sales)
```

#### ii. Week of Month Column

If your Dates table doesn't have a `WeekOfMonth` column, add it:

DAX

```
WeekOfMonth =
INT( ( Dates[DayOfMonth] - 1 ) / 7 ) + 1
```

This calculates the week number within each month.

#### iii. Ensure Relationships

Ensure there's a relationship between the `Sales` table and the `Dates` table on the `Date` field.

## 2. Add a Year Slicer to Your Report

- Insert a slicer visual onto your report canvas.

- Add the `Year` field from the `Dates` table.
- This will allow users to filter the data by year (e.g., 2020, 2021, 2022).

### 3. Create the Deneb Visual

#### a. Insert a Deneb Visual

- Add a Deneb visual to your report canvas.

#### b. Bind Data Fields

In the Deneb visual's data bindings, add the following fields:

- From the `Dates` Table:
  - `Date (Dates[Date])`
  - `Year (Dates[Year])`
  - `MonthOfYear (Dates[MonthOfYear])`
  - `DayOfWeekName (Dates[DayOfWeekName])` - Ensure this field contains day names like "Monday", "Tuesday", etc.
  - `WeekOfMonth (Dates[WeekOfMonth])`
- From the Measures:
  - `Number of Sales`

#### c. Vega-Lite Specification

Replace the default JSON specification with the following:

json

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "title": "Power BI Calendar Heat Map using Deneb",
  "data": { "name": "dataset" },
  "transform": [
    { "filter": "datum.Year != null" }
  ],
  "facet": {
    "field": "MonthOfYear",
    "type": "ordinal",
    "columns": 3,
    "sort": "ascending",
    "header": {
      "title": null,
      "labelExpr": "monthFormat(datum.MonthOfYear)"
    }
  },
  "spec": {
    "width": 100,
    "height": 100,
    "mark": {
      "type": "rect",
      "stroke": "white",
      "strokeWidth": 1
    },
    "encoding": {
      "x": {
        "field": "WeekOfMonth",
        "type": "ordinal",
        "axis": { "title": "Week of Month" }
      },
      "y": {
        "field": "DayOfWeekName",
        "type": "ordinal",
        "sort": ["Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"],
        "axis": { "title": "Day of Week" }
      },
      "color": {
        "field": "Number of Sales",
        "type": "quantitative",
        "aggregate": "sum",
        "scale": {
          "range": [0, 100]
        }
      }
    }
  }
}
```

```

    "type": "linear",
    "domain": [0, {"signal": "maxSales"}],
    "range": ["#cce5ff", "#003366"],
    "nice": true
  },
  "legend": {
    "title": "# of Sales",
    "orient": "right"
  },
  "tooltip": [
    { "field": "Date", "type": "temporal", "title": "Date", "format": "%A, %B %e, %Y" },
    { "field": "Number of Sales", "type": "quantitative", "title": "# of Sales", "aggregate": "sum" }
  ]
},
"signals": [
{
  "name": "monthFormat",
  "value": "function(value) { var date = new Date(2020, value - 1, 1); return date.toLocaleString('en-US', { month: 'long' }); }"
},
{
  "name": "maxSales",
  "update": "data('dataset').reduce((acc, d) => Math.max(acc, d['Number of Sales']), 0)"
}
],
"config": {
  "axis": {
    "grid": false,
    "domain": false
  },
  "view": {
    "stroke": "transparent"
  }
}
}

```

## 4. Explanation of the Vega-Lite Specification

### a. Data and Transform

- **Data Name:** "dataset" refers to the data fields you've bound in the Deneb visual.
- **Filter:** Excludes any records where `Year` is null.

### b. Signals

- `monthFormat`: A JavaScript function to convert `MonthOfYear` numbers into month names.
- `maxSales`: Calculates the maximum number of sales to set the upper bound of the color scale dynamically.

### c. Facet

- **Field:** `MonthOfYear` - Creates separate panels for each month.
- **Columns:** 3 - Arranges the months in 3 columns.
- **Header Label:** Uses `monthFormat` to display the month name.

### d. Spec

- **Width and Height:** Sets the size of each month's grid.
- **Mark:** Defines the cells as rectangles with a white stroke.
- **Encoding:**
  - **X Axis (Weeks):**
    - **Field:** `weekOfMonth`
    - **Type:** `ordinal`
    - **Axis Title:** "Week of Month"
  - **Y Axis (Days):**
    - **Field:** `dayOfWeekName`

- Type: `ordinal`
- Sort Order: Specifies the order of days from Monday to Sunday.
- Axis Title: "Day of Week"
- Color:
  - Field: `Number of Sales`
  - Aggregate: `sum` - Sums the sales for each day.
- Scale:
  - Type: `linear`
  - Domain: From 0 to the maximum number of sales (`maxSales`).
  - Range: Color gradient from light blue (#cce5ff) to dark blue (#003366).
- Legend: Displays on the right with the title "# of Sales".
- Tooltip: Shows the date and number of sales when hovering over a cell.

### e. Config

- Axis and View: Removes grid lines and axis domains for a cleaner look.

## 5. Final Adjustments and Notes

### a. Ensure Field Names Match

- Make sure the field names in the Vega-Lite spec match exactly with your data model. For example, if your day names are in a field called `DayOfWeekName`, ensure that's the field used.

### b. Adjusting for Days with No Sales

- Days with zero sales will appear in the lightest color.
- If you want days with no data to appear in a specific color (e.g., light gray), adjust the `range` in the color scale:

json

```
"range": ["lightgray", "#cce5ff", "#003366"]
```

### c. Aligning Cells within Each Month

- The facet arrangement and consistent `width` and `height` ensure that the cells are aligned within each month.

### d. Labeling and Visual Separation

- The month headers provide clear labels for each month's grid.
- Adjust the `columns` property in the `facet` to control the layout (e.g., 4 columns for a different arrangement).

## 6. Testing the Visual

- Interaction: Select different years using the year slicer to see the visual update accordingly.
- Tooltips: Hover over different cells to verify that the date and number of sales are displayed correctly.
- Color Legend: Check that the legend accurately reflects the range of sales in your data.

## 7. Additional Customizations

### a. Highlighting Specific Dates

- To highlight holidays or special dates, you can add a conditional encoding to change the stroke or color of specific cells.

### b. Formatting Adjustments

- Font Sizes and Styles: Adjust the `config` section to change font sizes, styles, and other aesthetic properties.
- Title: Modify the `title` property to change the visual's title or style.

## 8. Conclusion

By following these steps, you've created a dynamic and interactive calendar heat map in Power BI using Deneb and Vega-Lite. This visual allows users to explore sales data over time with intuitive controls and clear visual cues.

Feel free to ask if you need further assistance or have questions about customizing the visual further!

## Errors:

Line 13 - Property "columns" is not allowed.

Line 44 - Incorrect type. Expected "null".

Line 59 - Property signals is not allowed.

I apologize for the inconvenience caused by the errors in the previous Vega-Lite specification. Let's address each error and provide a corrected Deneb script that works within the constraints of Vega-Lite and Deneb.

## Understanding the Errors

### Error 1: Line 13 - Property "columns" is not allowed.

- In Vega-Lite, the `columns` property is not valid inside the `facet` definition when used as shown.
- The `columns` property is allowed when using `facet` with `encoding`, but not directly inside the `facet` mapping in the way it was used.

### Error 2: Line 44 - Incorrect type. Expected "null".

- The `labelExpr` property inside `header` may not be supported or expects a different type.
- Some versions of Vega-Lite or Deneb may not support expressions in `labelExpr`.

### Error 3: Line 59 - Property `signals` is not allowed.

- The `signals` property is a Vega concept, not Vega-Lite.
- Vega-Lite does not support top-level `signals`; instead, it uses `parameters` or expects computations to be done differently.

## Corrections Made

To resolve these issues, we'll:

- ① Remove the `columns` property from the `facet` definition.
  - ② We'll use `facet` with `row` and `column` to arrange the months in a grid.
  - ③ Create `MonthRow` and `MonthColumn` fields to control the layout.
- ④ Eliminate the use of `signals` and `labelExpr`.
  - ⑤ Add a `MonthName` field in the Dates table to use directly.
  - ⑥ Adjust the color scale to let Vega-Lite automatically determine the domain.
- ⑦ Update the Vega-Lite specification to comply with the schema and Deneb constraints.

## Updated Steps

### 1. Prepare the Data

a. Create Necessary Calculated Columns in the Dates Table

i. MonthName

DAX

```
MonthName = FORMAT(Dates[Date], "MMMM")
```

## ii. WeekOfMonth

(If not already created)

DAX

```
WeekOfMonth = INT((Dates[DayOfMonth] - 1) / 7) + 1
```

## iii. MonthRow and MonthColumn

To arrange the months in a grid (e.g., 3 columns):

DAX

```
MonthColumn = MOD(Dates[MonthOfYear] - 1, 3) + 1  
MonthRow = INT((Dates[MonthOfYear] - 1) / 3) + 1
```

- This will position months in a 3x4 grid.

## 2. Update the Deneb Visual

### a. Data Bindings

In the Deneb visual, bind the following fields:

- From the Dates Table:

- Date (Dates[Date])
- Year (Dates[Year])
- MonthName (Dates[MonthName])
- MonthOfYear (Dates[MonthOfYear])
- MonthRow (Dates[MonthRow])
- MonthColumn (Dates[MonthColumn])
- WeekOfMonth (Dates[WeekOfMonth])
- DayOfWeekName (Dates[DayOfWeekName])

- From the Measures:

- Number of Sales

### b. Replace the Vega-Lite Specification

Use the following corrected JSON:

json

```
{  
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",  
  "title": "Power BI Calendar Heat Map using Deneb",  
  "data": { "name": "dataset" },  
  "transform": [  
    { "filter": "datum.Year != null" }  
,  
    "facet": {  
      "row": {  
        "field": "MonthRow",  
        "type": "ordinal",  
        "header": { "title": null }  
      },  
      "column": {  
        "field": "MonthColumn",  
        "type": "ordinal",  
        "header": { "title": null }  
      }  
    },  
    "spec": {  
      "width": {"step": 20},  
      "height": {"step": 20},  
      "mark": {  
        "type": "rect",  
        "stroke": "white",  
        "strokeWidth": 1,  
        "color": "#F0F0F0"  
      }  
    }  
  ]  
}
```

```

        "strokeWidth": 1
    },
    "encoding": {
        "x": {
            "field": "WeekOfMonth",
            "type": "ordinal",
            "axis": { "title": null, "labels": false }
        },
        "y": {
            "field": "DayOfWeekName",
            "type": "ordinal",
            "sort": ["Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday", "Sunday"],
            "axis": { "title": null, "labels": false }
        },
        "color": {
            "field": "Number of Sales",
            "type": "quantitative",
            "aggregate": "sum",
            "scale": {
                "range": ["#cce5ff", "#003366"]
            },
            "legend": {
                "title": "# of Sales",
                "orient": "right"
            }
        },
        "tooltip": [
            {
                "field": "Date",
                "type": "temporal",
                "title": "Date",
                "format": "%A, %B %e, %Y"
            },
            {
                "field": "Number of Sales",
                "type": "quantitative",
                "title": "# of Sales",
                "aggregate": "sum"
            }
        ]
    },
    "resolve": {
        "scale": {
            "color": "shared"
        }
    },
    "config": {
        "facet": {
            "spacing": 5
        },
        "header": {
            "title": null,
            "labelFontSize": 12,
            "labelFontWeight": "bold",
            "labelExpr": "datum['MonthName']"
        },
        "axis": {
            "grid": false,
            "domain": false,
            "ticks": false,
            "labels": false
        },
        "view": {
            "stroke": "transparent"
        }
    }
}

```

### c. Explanation of the Adjusted Specification

- **Data and Transform:**

- Filters out any records where **Year** is null.

- **Facet:**

- Uses **row** and **column** to arrange the months in a grid.

- `MonthRow` and `MonthColumn` control the position of each month's grid.
- **Spec:**
  - Sets `width` and `height` using "step" to ensure cells are appropriately sized.
- **Mark:**
  - Rectangles with white borders represent days.
- **Encoding:**
  - **X and Y Axes:**
    - No titles or labels for a cleaner look.
  - **Color:**
    - Uses `Number of Sales` without specifying a domain, allowing automatic scaling.
    - Shares the color scale across all facets using `resolve`.
  - **Tooltip:**
    - Displays date and sales information on hover.
- **Resolve:**
  - Ensures that the color scale is shared across all facets.
- **Config:**
  - Adjusts facet spacing.
  - **Header:**
    - Uses `labelExpr` to display `MonthName` in the headers.
  - **Axis:**
    - Removes grid lines, domain lines, ticks, and labels.
  - **View:**
    - Removes borders around each facet for a seamless look.

### 3. Final Steps

#### a. Add the Year Slicer

- Use the `Year` field from the `Dates` table to create a slicer.
- Include the years 2020, 2021, and 2022.

#### b. Test the Visual

- Verify that selecting different years updates the heat map accordingly.
- Ensure that the months are arranged correctly in a grid.
- Check that the tooltips display the correct information.
- Confirm that the color scale accurately reflects the range of sales data.

### Additional Notes

- **Handling Days with No Sales:**
  - Days with zero sales will appear in the lightest color.
  - If you want days with no data to appear in a specific color (e.g., light gray), you can adjust the color scale's range or add a condition.
- **Adjusting Cell Sizes:**
  - Modify the "step" values in "width" and "height" to adjust the size of each day's cell.
- **Month Labels:**
  - The `labelExpr` in the `header` uses the `MonthName` field to label each month's grid.
- **Color Scale:**
  - By not specifying a `domain`, Vega-Lite automatically adjusts the color scale based on the data.
  - If you prefer to set fixed color thresholds, you can specify the `domain` property in the color scale.

## Conclusion

By making these adjustments, we've corrected the Vega-Lite specification to comply with the schema and Deneb's capabilities. The updated Deneb script should now work without errors and produce the desired calendar heat map visualizing the number of sales per day.

Feel free to let me know if you have any further questions or need additional assistance!

Specification runs, but heatmaps are not labeled with month names, and the heatmaps run vertically not horizontally, and don't have the days labeled with single initials for weekday name

I'm sorry to hear that the previous specification didn't produce the desired result. Let's address each of the issues you've encountered:

- ① Heatmaps are not labeled with month names.
- ② Heatmaps run vertically instead of horizontally.
- ③ Days are not labeled with single initials for weekday names.

I'll provide an updated Vega-Lite specification that fixes these issues, along with explanations for each change.

## 1. Prepare the Data

### a. Create Necessary Calculated Columns in the Dates Table

#### i. Month Name

We need to ensure that we have a `MonthName` column containing the full names of the months.

DAX

```
MonthName = FORMAT(Dates[Date], "MMMM")
```

#### ii. Day Abbreviation

Create a column `DayAbbrev` that contains abbreviations for the days of the week.

DAX

```
DayAbbrev =
SWITCH(
    Dates[DayOfWeekName],
    "Monday", "M",
    "Tuesday", "T",
    "Wednesday", "W",
    "Thursday", "Th",
    "Friday", "F",
    "Saturday", "Sa",
    "Sunday", "Su",
    LEFT(Dates[DayOfWeekName],1)
)
```

#### iii. Week of Month

Ensure that the `WeekOfMonth` column exists (if not already created):

DAX

```
WeekOfMonth = INT((Dates[DayOfMonth] - 1) / 7) + 1
```

## b. Ensure Data Bindings in Deneb

In your Deneb visual, bind the following fields:

- From the Dates Table:

- Date (Dates[Date])
- Year (Dates[Year])
- MonthName (Dates[MonthName])
- MonthOfYear (Dates[MonthOfYear])
- WeekOfMonth (Dates[WeekOfMonth])
- DayAbbrev (Dates[DayAbbrev])

- From the Measures:

- Number of Sales

## 2. Update the Vega-Lite Specification

Here is the updated Vega-Lite JSON specification:

json

```
{  
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",  
  "title": "Power BI Calendar Heat Map using Deneb",  
  "data": { "name": "dataset" },  
  "transform": [  
    { "filter": "datum.Year != null" }  
  ],  
  "facet": {  
    "field": "MonthName",  
    "type": "ordinal",  
    "sort": [  
      "January", "February", "March", "April", "May", "June",  
      "July", "August", "September", "October", "November", "December"  
    ],  
    "header": {  
      "title": null,  
      "labelFontSize": 12,  
      "labelFontWeight": "bold"  
    }  
  },  
  "columns": 3,  
  "spec": {  
    "width": {"step": 25},  
    "height": {"step": 25},  
    "mark": {  
      "type": "rect",  
      "stroke": "white",  
      "strokeWidth": 1  
    },  
    "encoding": {  
      "x": {  
        "field": "WeekOfMonth",  
        "type": "ordinal",  
        "axis": { "title": null, "labels": false }  
      },  
      "y": {  
        "field": "DayAbbrev",  
        "type": "ordinal",  
        "sort": ["M", "T", "W", "Th", "F", "Sa", "Su"],  
        "axis": {  
          "title": null,  
          "labels": true,  
          "labelFontSize": 10  
        }  
      },  
      "color": {  
        "field": "Number of Sales",  
        "type": "quantitative",  
        "aggregate": "sum",  
        "scale": {  
          "range": [0, 100]  
        }  
      }  
    }  
  }  
}
```

```

        "range": ["#cce5ff", "#003366"]
    },
    "legend": {
        "title": "# of Sales",
        "orient": "right"
    }
},
"tooltip": [
    {
        "field": "Date",
        "type": "temporal",
        "title": "Date",
        "format": "%A, %B %e, %Y"
    },
    {
        "field": "Number of Sales",
        "type": "quantitative",
        "title": "# of Sales",
        "aggregate": "sum"
    }
]
},
"resolve": {
    "scale": {
        "color": "shared"
    }
},
"config": {
    "facet": {
        "spacing": 5
    },
    "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold"
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false
    },
    "view": {
        "stroke": "transparent"
    }
}
}

```

## Explanation of Changes

### a. Labeling Months with Month Names

- **Facet Field:** Changed `facet.field` to `"MonthName"` to use the month names directly.
- **Sort Order:** Provided a `sort` array in the `facet` to ensure months are in the correct order.
- **Header Labels:** The `header` in the `facet` will display the month names above each heatmap.

### b. Arranging Heatmaps Horizontally

- **Columns:** Added `"columns": 3` at the top level to arrange the months horizontally in three columns.
  - Adjust this number to change the layout:
    - `columns: 4` for four columns.
    - `columns: 6` for six columns.
    - `columns: 12` for all months in a single row.

### c. Labeling Days with Single Initials

- **Y Encoding Field:** Changed `y.field` to `"DayAbbrev"` to use the day abbreviations.
- **Axis Labels:** Set `"labels": true` in the `y` axis to display the day initials.
- **Sort Order:** Updated the `sort` array in the `y` encoding to match the abbreviations.

### d. Adjusting Cell Sizes

- Increased the `step` values in `"width"` and `"height"` to make the cells larger and labels more readable.

### 3. Additional Adjustments

#### a. Ensuring Axis Labels Appear

- In the `config`, set `"labels": true` under `"axis"` to ensure day labels appear.
- Adjusted the `labelFontSize` for better readability.

#### b. Testing the Visual

- **Month Names:** Verify that month names appear above each heatmap.
- **Horizontal Layout:** Confirm that the months are arranged horizontally in the specified number of columns.
- **Day Labels:** Check that the days are labeled with single initials on the y-axis.

---

### 4. Final Steps

#### a. Add the Year Slicer

- Use the `Year` field from the `Dates` table to create a slicer in your report.
- Include the years 2020, 2021, and 2022, or adjust based on your data.

#### b. Test the Interactivity

- Select different years using the slicer to ensure the heat map updates accordingly.
- Hover over the cells to verify that the tooltips display the correct date and number of sales.

---

### 5. Notes on Adjustments

- **Data Bindings:** Ensure all fields used in the Vega-Lite specification are bound in Deneb.
- **Color Scale:** The color scale automatically adjusts based on your data. If you want to set specific color thresholds, you can modify the `scale` property in the `color` encoding.
- **Cell Sizes:** Adjust the `"step"` values in `"width"` and `"height"` to change the size of the cells to fit your design preferences.

---

## Conclusion

By applying these changes, the calendar heat map should now:

- Display month names above each heatmap.
- Arrange the heatmaps horizontally in the number of columns you specified.
- Label the days with single initials for weekday names.

If you have any further questions or need additional assistance, please let me know, and I'll be happy to help!

swap x and y axes. Start week on Sunday - add single letter day abbreviation above first row of each monthly calendar. Each calendar should be labeled with the month name and have the total quantity ordered in the day cell of each calendar

Certainly! Let's adjust the Vega-Lite specification and the data preparation steps to meet your new requirements:

- Swap the x and y axes.
- Start the week on Sunday.
- Add single-letter day abbreviations above the first row of each monthly calendar.
- Label each calendar with the month name.

- Display the total quantity ordered in the day cell of each calendar.

## 1. Prepare the Data

### a. Create Necessary Calculated Columns in the Dates Table

We need to ensure that our `Dates` table has the required columns.

#### i. Day Abbreviation

Create a column `DayAbbrev` that contains single-letter abbreviations for the days of the week, starting with Sunday.

DAX

```
DayAbbrev =  
SWITCH(  
    Dates[DayOfWeekName],  
    "Sunday", "S",  
    "Monday", "M",  
    "Tuesday", "T",  
    "Wednesday", "W",  
    "Thursday", "T",  
    "Friday", "F",  
    "Saturday", "S",  
    LEFT(Dates[DayOfWeekName],1)  
)
```

**Note:** Since both "Tuesday" and "Thursday" start with "T" you may use "Tu" and "Th" or decide on single letters knowing there may be duplicates.

For clarity, let's use:

DAX

```
DayAbbrev =  
SWITCH(  
    Dates[DayOfWeekName],  
    "Sunday", "S",  
    "Monday", "M",  
    "Tuesday", "T",  
    "Wednesday", "W",  
    "Thursday", "R", // Using 'R' for Thursday  
    "Friday", "F",  
    "Saturday", "S",  
    LEFT(Dates[DayOfWeekName],1)  
)
```

#### ii. Day of Week Number Starting from Sunday

Create a column `DayOfWeekNum_SunStart` to represent the day of the week as a number starting from Sunday (1) to Saturday (7).

DAX

```
DayOfWeekNum_SunStart =  
SWITCH(  
    Dates[DayOfWeekName],  
    "Sunday", 1,  
    "Monday", 2,  
    "Tuesday", 3,  
    "Wednesday", 4,  
    "Thursday", 5,  
    "Friday", 6,  
    "Saturday", 7,  
    0  
)
```

#### iii. Week of Month

Ensure the `WeekOfMonth` column exists:

DAX

```
WeekOfMonth = INT((Dates[DayOfMonth] - 1) / 7) + 1
```

#### iv. Month Name

Ensure we have the `MonthName` column:

DAX

```
MonthName = FORMAT(Dates[Date], "MMMM")
```

#### v. Total Quantity Ordered Measure

Create a measure `Total Quantity Ordered` to sum the `Order Quantity` from the `Sales` table:

DAX

```
Total Quantity Ordered = SUM(Sales[Order Quantity])
```

---

## 2. Update Data Bindings in Deneb

In your Deneb visual, bind the following fields:

- From the Dates Table:

- `Date(Dates[Date])`
- `Year(Dates[Year])`
- `MonthName(Dates[MonthName])`
- `MonthOfYear(Dates[MonthOfYear])`
- `WeekOfMonth(Dates[WeekOfMonth])`
- `DayAbbrev(Dates[DayAbbrev])`
- `DayOfWeekNum_SunStart(Dates[DayOfWeekNum_SunStart])`

- From the Measures:

- `Total Quantity Ordered`

---

## 3. Update the Vega-Lite Specification

Here is the updated Vega-Lite JSON specification that incorporates your requirements:

json

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "title": "Power BI Calendar Heat Map using Deneb",
  "data": { "name": "dataset" },
  "transform": [
    { "filter": "datum.Year != null" }
  ],
  "facet": {
    "field": "MonthName",
    "type": "ordinal",
    "sort": [
      "January", "February", "March", "April", "May", "June",
      "July", "August", "September", "October", "November", "December"
    ],
    "header": {
      "title": null,
      "labelFontSize": 14,
      "labelFontWeight": "bold"
    }
  },
  "columns": 3,
  "spec": {
    "width": { "step": 25 },
    "height": { "step": 25 },
    "layer": [
      {
        "mark": {
          "type": "rect",
          "stroke": "white",
          "strokeWidth": 1
        }
      }
    ]
  }
}
```



```

    "scale": {
      "color": "shared"
    },
    "config": {
      "facet": {
        "spacing": 5
      },
      "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold"
      },
      "axis": {
        "grid": false,
        "domain": false,
        "ticks": false
      },
      "view": {
        "stroke": "transparent"
      }
    }
  }
}

```

## 4. Explanation of the Adjusted Specification

### a. Swapping X and Y Axes

- X-Axis:

- Now represents the `DayOfWeekNum_SunStart` (1-7), starting from Sunday.
- Encoding:

json

```

"x": {
  "field": "DayOfWeekNum_SunStart",
  "type": "ordinal",
  "axis": {
    "title": null,
    "labels": false,
    "ticks": false
  }
}

```

- Y-Axis:

- Represents the `WeekOfMonth`.
- Encoding:

json

```

"y": {
  "field": "WeekOfMonth",
  "type": "ordinal",
  "axis": {
    "title": null,
    "labels": false,
    "ticks": false
  }
}

```

### b. Starting Week on Sunday

- The `DayOfWeekNum_SunStart` field starts from 1 (Sunday) to 7 (Saturday), aligning the calendar to start weeks on Sunday.

### c. Adding Single-Letter Day Abbreviations Above First Row

- Creating Day Labels:

Add an additional specification outside the `layer` to include the day labels at the top of each calendar.

However, Vega-Lite doesn't support adding axis labels outside of the data-driven axes in facets. To work around this, we can modify the x-axis to display the day abbreviations.

● **Adjusting X-Axis Labels:**

```
json
{
  "x": {
    "field": "DayOfWeekNum_SunStart",
    "type": "ordinal",
    "axis": {
      "title": null,
      "labels": true,
      "labelExpr": "[S,M,T,W,R,F,S][datum.value - 1]",
      "labelFontSize": 10,
      "labelPadding": 5
    }
  }
}
```

- **labelExpr:** A JavaScript expression that maps the day numbers to abbreviations.
  - `datum.value` represents the `DayOfWeekNum_SunStart` value.
  - The array `[S,M,T,W,R,F,S]` provides the labels.

#### d. Displaying Total Quantity Ordered in Each Day Cell

- Added a new layer for text marks:

```
json
{
  "mark": {
    "type": "text",
    "baseline": "middle",
    "align": "center",
    "fontSize": 10
  },
  "encoding": {
    "x": {
      "field": "DayOfWeekNum_SunStart",
      "type": "ordinal"
    },
    "y": {
      "field": "WeekOfMonth",
      "type": "ordinal"
    },
    "text": {
      "field": "Total Quantity Ordered",
      "type": "quantitative",
      "aggregate": "sum",
      "format": ".0f"
    },
    "color": {
      "value": "black"
    }
  }
}
```

- **Text Encoding:**

- Displays the `Total Quantity Ordered` in each cell.
- Uses aggregation `sum` to match the color encoding.
- Formats the number with no decimal places.

- **Color of Text:**

- Set to black for readability.
- You may adjust the color based on the background color for better contrast.

#### e. Labeling Each Calendar with the Month Name

- The `facet` header already includes the `MonthName` as labels above each calendar.

---

## 5. Final Steps

### a. Add the Year Slicer

- Use the `Year` field from the `Dates` table to create a slicer in your report.
- Include the years relevant to your data (e.g., 2020, 2021, 2022).

## b. Test the Visual

- **Interactivity:**
  - Select different years using the slicer to ensure the heat map updates accordingly.
  - Hover over the cells to verify that the tooltips display the correct date and total quantity ordered.
- **Layout:**
  - Verify that the calendars are arranged horizontally in three columns.
  - Ensure that each calendar starts the week on Sunday.
  - Check that the day abbreviations appear above the first row of each calendar.
  - Confirm that the total quantity ordered is displayed in each day cell.

## 6. Additional Notes

### a. Adjusting Day Abbreviations

- If you prefer different abbreviations or need to resolve duplicate letters (e.g., "Tuesday" and "Thursday"), you can adjust the `labelExpr` in the x-axis:

```
json
"labelExpr": "[ 'S' , 'M' , 'T' , 'W' , 'R' , 'F' , 'S' ][ datum.value - 1 ]"
```

- Adjust the array to your desired abbreviations.

### b. Cell Sizes

- Modify the `"step"` values in `"width"` and `"height"` to adjust cell sizes:

```
json
"width": {"step": 25},
"height": {"step": 25},
```

- Increase or decrease the numbers to make the cells larger or smaller.

### c. Color Scale

- The color scale ranges from light blue to dark blue:

```
json
"scale": {
  "range": [ "#cce5ff" , "#003366" ]
}
```

- Adjust the colors as needed to fit your design preferences.

### d. Handling Days with No Data

- Days with zero sales will have the lightest color and display "0" in the cell.
- If you want to display an empty cell or a dash instead of "0," adjust the `format` and add a conditional expression in the `text` encoding.

## 7. Conclusion

By making these adjustments, your calendar heat map should now:

- Swap the x and y axes, with days of the week on the x-axis and weeks on the y-axis.
- Start each week on Sunday.
- Display single-letter day abbreviations above the first row of each calendar.
- Label each calendar with the month name.

- Show the total quantity ordered in each day cell.

This visual provides an intuitive and informative way to explore sales data over time, combining both color intensity and numerical values to represent sales volume.

If you have any further questions or need additional assistance with customizing the visual, please feel free to ask!

The monthly calendars now just show "Nan". Here's the info from the debug pane:

0  
2023-01-01T05:00:00.000Z

2023

1

Sunday

1

1

1

January

11

0

11

1

2023-01-02T05:00:00.000Z

2023

1

Monday

1

1

1

January

8

0

8

2

2023-01-03T05:00:00.000Z

2023

1

Tuesday

1

1

1

January

7

0

7

3

2023-01-04T05:00:00.000Z

2023

1

Wednesday

1

1

1

January

10	
0	
10	
4	
	2023-01-05T05:00:00.000Z
2023	
1	
	Thursday
1	
1	
1	
	January
8	
0	
8	
5	
	2023-01-06T05:00:00.000Z
2023	
1	
	Friday
1	
1	
1	
	January
4	
0	
4	
6	
	2023-01-07T05:00:00.000Z
2023	
1	
	Saturday
1	
1	
1	
	January
5	
0	
5	
7	
	2023-01-08T05:00:00.000Z
2023	
1	
	Sunday
2	
1	
1	
	January
6	
0	
6	
8	
	2023-01-09T05:00:00.000Z
2023	

1  
Monday  
2  
1  
1  
1  
January  
11  
0  
11  
9

2023-01-10T05:00:00.000Z

2023  
1  
Tuesday  
2  
1  
1

January  
10  
0  
10  
10

2023-01-11T05:00:00.000Z

2023  
1  
Wednesday  
2  
1  
1

January  
7  
0  
7  
11

2023-01-12T05:00:00.000Z

2023  
1  
Thursday  
2  
1  
1

January  
10  
0  
10  
12

2023-01-13T05:00:00.000Z

2023  
1  
Friday  
2  
1  
1  
January

5	
0	
5	
13	
2023-01-14T05:00:00.000Z	
2023	
1	
Saturday	
2	
1	
1	
January	
1	
0	
1	
14	
2023-01-15T05:00:00.000Z	
2023	
1	
Sunday	
3	
1	
1	
January	
6	
0	
6	
15	
2023-01-16T05:00:00.000Z	
2023	
1	
Monday	
3	
1	
1	
January	
8	
0	
8	
16	
2023-01-17T05:00:00.000Z	
2023	
1	
Tuesday	
3	
1	
1	
January	
7	
0	
7	
17	
2023-01-18T05:00:00.000Z	
2023	

1	
Wednesday	
3	
1	
1	
January	
10	
0	
10	
18	
2023-01-19T05:00:00.000Z	
2023	
1	
Thursday	
3	
1	
1	
January	
8	
0	
8	
19	
2023-01-20T05:00:00.000Z	
2023	
1	
Friday	
3	
1	
1	
January	
5	
0	
5	
20	
2023-01-21T05:00:00.000Z	
2023	
1	
Saturday	
3	
1	
1	
January	
18	
0	
18	
21	
2023-01-22T05:00:00.000Z	
2023	
1	
Sunday	
4	
1	
1	
January	

8	
0	
8	
22	
2023-01-23T05:00:00.000Z	
2023	
1	
Monday	
4	
1	
1	
January	
11	
0	
11	
23	
2023-01-24T05:00:00.000Z	
2023	
1	
Tuesday	
4	
1	
1	
January	
9	
0	
9	
24	
2023-01-25T05:00:00.000Z	
2023	
1	
Wednesday	
4	
1	
1	
January	
9	
0	
9	
25	
2023-01-26T05:00:00.000Z	
2023	
1	
Thursday	
4	
1	
1	
January	
8	
0	
8	
26	
2023-01-27T05:00:00.000Z	
2023	

1	
Friday	
4	
1	
1	
January	
10	
0	
10	
27	
2023-01-28T05:00:00.000Z	
2023	
1	
Saturday	
4	
1	
1	
January	
5	
0	
5	
28	
2023-01-29T05:00:00.000Z	
2023	
1	
Sunday	
5	
1	
1	
January	
7	
0	
7	
29	
2023-01-30T05:00:00.000Z	
2023	
1	
Monday	
5	
1	
1	
January	
9	
0	
9	
30	
2023-01-31T05:00:00.000Z	
2023	
1	
Tuesday	
5	
1	
1	
January	

9	
0	
9	
31	
2023-02-01T05:00:00.000Z	
2023	
2	
Wednesday	
1	
2	
1	
February	
9	
0	
9	
32	
2023-02-02T05:00:00.000Z	
2023	
2	
Thursday	
1	
2	
1	
February	
7	
0	
7	
33	
2023-02-03T05:00:00.000Z	
2023	
2	
Friday	
1	
2	
1	
February	
9	
0	
9	
34	
2023-02-04T05:00:00.000Z	
2023	
2	
Saturday	
1	
2	
1	
February	
8	
0	
8	
35	
2023-02-05T05:00:00.000Z	
2023	

2	
Sunday	
1	
2	
1	
February	
8	
0	
8	
36	
2023-02-06T05:00:00.000Z	
2023	
2	
Monday	
1	
2	
1	
February	
11	
0	
11	
37	
2023-02-07T05:00:00.000Z	
2023	
2	
Tuesday	
1	
2	
1	
February	
5	
0	
5	
38	
2023-02-08T05:00:00.000Z	
2023	
2	
Wednesday	
2	
2	
1	
February	
8	
0	
8	
39	
2023-02-09T05:00:00.000Z	
2023	
2	
Thursday	
2	
2	
1	
February	

6	
0	
6	
40	
2023-02-10T05:00:00.000Z	
2023	
2	
Friday	
2	
2	
1	
February	
14	
0	
14	
41	
2023-02-11T05:00:00.000Z	
2023	
2	
Saturday	
2	
2	
1	
February	
13	
0	
13	
42	
2023-02-12T05:00:00.000Z	
2023	
2	
Sunday	
2	
2	
1	
February	
10	
0	
10	
43	
2023-02-13T05:00:00.000Z	
2023	
2	
Monday	
2	
2	
1	
February	
15	
0	
15	
44	
2023-02-14T05:00:00.000Z	
2023	

2  
Tuesday

2  
2  
1

February

11  
0  
11  
45

2023-02-15T05:00:00.000Z

2023  
2

Wednesday  
3  
2  
1

February

6  
0  
6  
46

2023-02-16T05:00:00.000Z

2023  
2

Thursday  
3  
2  
1

February

5  
0  
5  
47

2023-02-17T05:00:00.000Z

2023  
2

Friday  
3  
2  
1

February

7  
0  
7  
48

2023-02-18T05:00:00.000Z

2023  
2

Saturday  
3  
2  
1

February

11  
0  
11  
49

2023-02-19T05:00:00.000Z

2023

2

Sunday

3

2

1

February

8

0

8

50

2023-02-20T05:00:00.000Z

2023

2

Monday

3

2

1

February

20

0

20

51

2023-02-21T05:00:00.000Z

2023

2

Tuesday

3

2

1

February

8

0

8

52

2023-02-22T05:00:00.000Z

2023

2

Wednesday

4

2

1

February

7

0

7

53

2023-02-23T05:00:00.000Z

2023

2	
Thursday	
4	
2	
1	
February	
9	
0	
9	
54	
2023-02-24T05:00:00.000Z	
2023	
2	
Friday	
4	
2	
1	
February	
8	
0	
8	
55	
2023-02-25T05:00:00.000Z	
2023	
2	
Saturday	
4	
2	
1	
February	
9	
0	
9	
56	
2023-02-26T05:00:00.000Z	
2023	
2	
Sunday	
4	
2	
1	
February	
7	
0	
7	
57	
2023-02-27T05:00:00.000Z	
2023	
2	
Monday	
4	
2	
1	
February	

14	
0	
14	
58	
2023-02-28T05:00:00.000Z	
2023	
2	
Tuesday	
4	
2	
1	
February	
9	
0	
9	
59	
2023-03-01T05:00:00.000Z	
2023	
3	
Wednesday	
1	
3	
1	
March	
7	
0	
7	
60	
2023-03-02T05:00:00.000Z	
2023	
3	
Thursday	
1	
3	
1	
March	
9	
0	
9	
61	
2023-03-03T05:00:00.000Z	
2023	
3	
Friday	
1	
3	
1	
March	
7	
0	
7	
62	
2023-03-04T05:00:00.000Z	
2023	

3

Saturday

1

3

1

March

5

0

5

63

2023-03-05T05:00:00.000Z

2023

3

Sunday

1

3

1

March

8

0

8

64

2023-03-06T05:00:00.000Z

2023

3

Monday

1

3

1

March

2

0

2

65

2023-03-07T05:00:00.000Z

2023

3

Tuesday

1

3

1

March

9

0

9

66

2023-03-08T05:00:00.000Z

2023

3

Wednesday

2

3

1

March

12	
0	
12	
67	
2023-03-09T05:00:00.000Z	
2023	
3	
Thursday	
2	
3	
1	
March	
7	
0	
7	
68	
2023-03-10T05:00:00.000Z	
2023	
3	
Friday	
2	
3	
1	
March	
12	
0	
12	
69	
2023-03-11T05:00:00.000Z	
2023	
3	
Saturday	
2	
3	
1	
March	
8	
0	
8	
70	
2023-03-12T05:00:00.000Z	
2023	
3	
Sunday	
2	
3	
1	
March	
10	
0	
10	
71	
2023-03-13T04:00:00.000Z	
2023	

3  
Monday

2

3

1

March

10

0

10

72

2023-03-14T04:00:00.000Z

2023

3

Tuesday

2

3

1

March

8

0

8

73

2023-03-15T04:00:00.000Z

2023

3

Wednesday

3

3

1

March

13

0

13

74

2023-03-16T04:00:00.000Z

2023

3

Thursday

3

3

1

March

13

0

13

75

2023-03-17T04:00:00.000Z

2023

3

Friday

3

3

1

March

8

0

8

76

2023-03-18T04:00:00.000Z

2023

3

Saturday

3

3

1

March

6

0

6

77

2023-03-19T04:00:00.000Z

2023

3

Sunday

3

3

1

March

8

0

8

78

2023-03-20T04:00:00.000Z

2023

3

Monday

3

3

1

March

12

0

12

79

2023-03-21T04:00:00.000Z

2023

3

Tuesday

3

3

1

March

10

0

10

80

2023-03-22T04:00:00.000Z

2023

3	
Wednesday	
4	
3	
1	
March	
17	
0	
17	
81	
2023-03-23T04:00:00.000Z	
2023	
3	
Thursday	
4	
3	
1	
March	
8	
0	
8	
82	
2023-03-24T04:00:00.000Z	
2023	
3	
Friday	
4	
3	
1	
March	
4	
0	
4	
83	
2023-03-25T04:00:00.000Z	
2023	
3	
Saturday	
4	
3	
1	
March	
4	
0	
4	
84	
2023-03-26T04:00:00.000Z	
2023	
3	
Sunday	
4	
3	
1	
March	

11	
0	
11	
85	
2023-03-27T04:00:00.000Z	
2023	
3	
Monday	
4	
3	
1	
March	
7	
0	
7	
86	
2023-03-28T04:00:00.000Z	
2023	
3	
Tuesday	
4	
3	
1	
March	
6	
0	
6	
87	
2023-03-29T04:00:00.000Z	
2023	
3	
Wednesday	
5	
3	
1	
March	
10	
0	
10	
88	
2023-03-30T04:00:00.000Z	
2023	
3	
Thursday	
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I'm sorry to hear that you're experiencing issues with the calendar heat map showing "NaN" values. Let's work through this problem together to identify the cause and implement a solution.

## Understanding the Issue

From the debug data you've provided, it appears that the `Total Quantity Ordered` is zero for all dates. This could be causing the "NaN" (Not a Number) values to appear in the visual when the Vega-Lite specification attempts to display this measure.

## Possible Causes and Solutions

### 1. Verify the `Total Quantity Ordered` Measure

**Issue:** The `Total Quantity Ordered` measure might not be calculating correctly, resulting in zero values for all dates.

**Solution:**

- Check the Measure Calculation:

Ensure that the measure is correctly summing the `Order Quantity` from the `Sales` table.

DAX

```
Total Quantity Ordered = SUM(Sales[Order Quantity])
```

- **Confirm Data in Sales[Order Quantity]:**

Verify that the Order Quantity column in the Sales table contains valid data and is not null or zero.

- **Test the Measure:**

- Create a simple table visual in Power BI.
- Add Date from the Dates table and the Total Quantity Ordered measure.
- Check if the measure displays expected values for each date.

If the measure returns zero or unexpected values:

- There might be an issue with the data in the Sales table.
- Ensure that there is a relationship between the Sales table and the Dates table on the Date field.

## 2. Adjust the Vega-Lite Specification

If the Total Quantity Ordered measure is correct and returns expected values, the issue might be in the Vega-Lite specification.

Possible Issues:

- **Field Name Mismatch:**

The field names in the Vega-Lite specification might not match exactly with the bound data fields.

- **Aggregation Errors:**

The aggregation functions might not be correctly applied.

Solution:

- **Double-Check Field Names:**

Ensure that the field names in the Vega-Lite specification match exactly with those in the data bindings. For example, if the measure is named Total Quantity Ordered, it must be referred to as "field": "Total Quantity Ordered" in the specification.

- **Handle Zero or Null Values:**

Modify the text encoding to handle cases where the value is zero or null.

## 3. Modify the Vega-Lite Specification

Here's an updated Vega-Lite specification with adjustments to handle zero values and ensure that the field names match the data:

json

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "title": "Power BI Calendar Heat Map using Deneb",
  "data": { "name": "dataset" },
  "transform": [
    { "filter": "datum.Year != null" }
  ],
  "facet": {
    "field": "MonthName",
    "type": "ordinal",
    "sort": [
      "January", "February", "March", "April", "May", "June",
      "July", "August", "September", "October", "November", "December"
    ],
    "header": {
      "title": null,
      "labelFontSize": 14,
      "labelFontWeight": "bold"
    }
  },
  "columns": 3,
```



```
        "aggregate": "sum",
        "format": ".0f"
    },
    "color": {
        "value": "black"
    }
}
],
"resolve": {
    "scale": {
        "color": "shared"
    }
},
"config": {
    "facet": {
        "spacing": 5
    },
    "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold"
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false
    },
    "view": {
        "stroke": "transparent"
    }
}
}
```

#### Key Adjustments:

- X-Axis Labels:

- Included `labelExpr` to display day abbreviations.

json

```
"axis": {
    "title": null,
    "labels": true,
    "labelExpr": "[ 'S', 'M', 'T', 'W', 'R', 'F', 'S' ][ datum.value - 1 ]",
    "labelFontSize": 10,
    "labelPadding": 5
}
```

- Handling Zero Values in Text:

- Modified the `text` encoding to display "0" for zero values and handle nulls.

json

```
"text": {
    "field": "Total Quantity Ordered",
    "type": "quantitative",
    "aggregate": "sum",
    "format": ".0f"
}
```

- If you continue to see "NaN", you can adjust the `text` encoding to handle null or zero values explicitly:

json

```
"text": {
    "aggregate": "sum",
    "type": "quantitative",
    "field": "Total Quantity Ordered",
    "format": ".0f",
    "invalid": null
}
```

- Alternatively, use a conditional expression:

json

```
"text": {
  "condition": {
    "test": "datum['Total Quantity Ordered'] > 0",
    "field": "Total Quantity Ordered",
    "type": "quantitative",
    "aggregate": "sum",
    "format": ".0f"
  },
  "value": ""
}
```

- This will display the number if it's greater than zero; otherwise, the cell will be blank.

## Testing the Measure

Before updating the Vega-Lite specification, let's confirm that the `Total Quantity Ordered` measure is working correctly.

### Steps:

- 1 Create a Table Visual:
  - 2 Add a new table visual to your Power BI report.
- 3 Add Fields:
  - 4 From the `Dates` table, add `Date`.
  - 5 Add the `Total Quantity Ordered` measure.
- 6 Review the Data:
  - 7 Check if the `Total Quantity Ordered` displays expected values for each date.
- 8 If the Values Are Zero or Null:
  - 9 There might be an issue with the data or relationships.
  - 10 Ensure that:
    - 11 The `Sales` table has data in the `Order Quantity` column.
    - 12 There is a relationship between the `Sales` table and the `Dates` table on the `Date` field.
- 13 If the Measure Works Correctly:
  - 14 Proceed to update the Vega-Lite specification.

## Verifying Data Bindings in Deneb

Ensure that all fields used in the Vega-Lite specification are correctly bound in the Deneb visual.

### Fields to Bind:

- From the Dates Table:
  - Date
  - Year
  - MonthName
  - MonthOfYear
  - WeekOfMonth
  - DayAbbrev
  - DayOfWeekNum\_SunStart
- From the Measures:
  - Total Quantity Ordered

**Note:** The field names in the data bindings must match exactly with those used in the Vega-Lite specification, including capitalization and spacing.

## Additional Considerations

### 1. Check for Field Name Typos

Ensure there are no typos in field names in both the data bindings and the Vega-Lite specification.

### 2. Data Types

Confirm that the data types of the fields are appropriate:

- `Total Quantity Ordered` should be a numeric (quantitative) field.
- Date fields should be of type date or datetime.

### 3. Data Refresh

If you've recently added or modified data, refresh your data model to ensure all changes are reflected.

## Alternative Approach

If the issue persists, you can test the visual using the `Number of Sales` measure instead to see if the problem is specific to the `Total Quantity Ordered` measure.

Modify the Vega-Lite Specification:

- Replace `Total Quantity Ordered` with `Number of Sales` in both the `color` and `text` encodings.

json

```
"color": {  
  "field": "Number of Sales",  
  "type": "quantitative",  
  "aggregate": "sum",  
  "scale": {  
    "range": ["#cce5ff", "#003366"]  
  },  
  "legend": {  
    "title": "Number of Sales",  
    "orient": "right"  
  }  
},  
"text": {  
  "field": "Number of Sales",  
  "type": "quantitative",  
  "aggregate": "sum",  
  "format": ".0f"  
}
```

Test the Visual:

- If the visual works correctly with `Number of Sales`, the issue may be with the `Total Quantity Ordered` measure.

## Conclusion

By verifying the measure calculations, ensuring correct data bindings, and adjusting the Vega-Lite specification to handle zero or null values, we should be able to resolve the "NaN" issue in your calendar heat map.

Please let me know if you need further assistance or if the problem persists after trying these suggestions. I'm here to help you get the visual working as intended!

\*\*Problem Description:\*\*

The current Deneb calendar heat map in Power BI has an incorrect structure for day labels in the calendar grid layout:

1. The horizontal labels for days of the week (Sun, Mon, Tue, etc.) are not correctly displayed above each row of the monthly calendar view.
2. The current visualization lacks the expected clear horizontal day labels for each

month, resulting in misalignment and making it difficult for users to follow the weekly pattern.

**\*\*Solution Requirements:\*\***

**1. \*\*Horizontal Day Labels Above Each Week:\*\***

- Ensure the day-of-the-week labels ("S M T W T F S") appear as a single row above the grid for each month, acting as a header. Each label should correspond directly to the columns of dates below.
- The labels should always start with **\*\*Sunday\*\*** and be represented by their **\*\*single-letter abbreviations\*\***.

**2. \*\*Grid Layout Changes:\*\***

- Adjust the layout to ensure that **\*\*each month has an individual, clearly labeled grid\*\***, with days arranged correctly.
- Each day should be properly aligned under its respective day-of-week label, maintaining consistency across all months.

**\*\*Desired Changes in Deneb Configuration (Vega-Lite Specification):\*\***

**- Update the `x` and `y` axes encoding so that:**

- The `x` axis should represent **\*\*DayOfWeek\*\*** with a **\*\*sort order starting from Sunday\*\***.
- Ensure the single-letter day labels ("S", "M", etc.) are visible as a header row above each monthly grid.
- Each month should have a distinct title, and each day cell should display the **\*\*total quantity ordered\*\*** inside the rectangle for that date.

**\*\*Additional Context:\*\***

- The visual should look like a traditional monthly calendar, where each day is clearly marked under its respective weekday column.
- Include a `label` mark layer to handle the day-of-week headers for each month facet, positioned above the day cells.

**\*\*Summary:\*\***

- Fix the alignment issue by adding a distinct header for the day-of-week labels.
- Ensure the calendar starts on **\*\*Sunday\*\*** and that the visual clarity is enhanced for easy interpretation of sales activity across different days of each month.

I'm sorry to hear that you're experiencing issues with the day labels and alignment in your calendar heat map. Let's work together to adjust the Vega-Lite specification to meet your requirements:

- ① Display single-letter day-of-week labels ("S M T W T F S") above each month's grid, starting with Sunday.
- ② Ensure each month has a clearly labeled grid with days properly aligned under their respective day-of-week labels.
- ③ Display the total quantity ordered inside each day cell.

## 1. Prepare the Data

### a. Ensure Necessary Calculated Columns in the Dates Table

We need to make sure that the `Dates` table has the required columns.

#### i. Day of Week Number Starting from Sunday

DAX

```
DayOfWeekNum_SunStart =  
SWITCH(  
    Dates[DayOfWeekName],  
    "Sunday", 1,  
    "Monday", 2,  
    "Tuesday", 3,  
    "Wednesday", 4,  
    "Thursday", 5,  
    "Friday", 6,  
    "Saturday", 7,  
    BLANK()  
)
```

## ii. Month Name

DAX

```
MonthName = FORMAT(Dates[Date], "MMMM")
```

## iii. Week of Month

Ensure the `WeekOfMonth` column is calculated correctly:

DAX

```
WeekOfMonth = INT((Dates[DayOfMonth] + Dates[DayOfWeekNum_SunStart] - 2) / 7) + 1
```

This calculation adjusts for weeks starting on Sunday.

## iv. Total Quantity Ordered Measure

DAX

```
Total Quantity Ordered = SUM(Sales[Order Quantity])
```

## 2. Update Data Bindings in Deneb

In your Deneb visual, bind the following fields:

- From the Dates Table:

- Date(Dates[Date])
- Year(Dates[Year])
- MonthName(Dates[MonthName])
- MonthOfYear(Dates[MonthOfYear])
- WeekOfMonth(Dates[WeekOfMonth])
- DayOfWeekNum\_SunStart(Dates[DayOfWeekNum\_SunStart])

- From the Measures:

- Total Quantity Ordered

## 3. Updated Vega-Lite Specification

Here is the revised Vega-Lite JSON specification:

json

```
{  
    "$schema": "https://vega.github.io/schema/vega-lite/v5.json",  
    "title": "Power BI Calendar Heat Map using Deneb",  
    "data": { "name": "dataset" },  
    "transform": [  
        { "filter": "datum.Year != null" }  
    ],  
    "facet": {  
        "field": "MonthName",  
        "type": "interval",  
        "step": 1  
    },  
    "layer": [  
        {  
            "mark": "rule",  
            "encoding": {  
                "x": { "field": "MonthName", "type": "ordinal", "stack": true },  
                "y": { "field": "Year", "type": "nominal" }  
            }  
        },  
        {  
            "mark": "rule",  
            "encoding": {  
                "x": { "field": "Year", "type": "nominal" },  
                "y": { "field": "MonthName", "type": "ordinal", "stack": true }  
            }  
        },  
        {  
            "mark": "rect",  
            "encoding": {  
                "x": { "field": "Year", "type": "nominal" },  
                "y": { "field": "MonthName", "type": "ordinal", "stack": true },  
                "color": "steelblue"  
            }  
        }  
    ]  
}
```



```

        },
        "tooltip": [
            {
                "field": "Date",
                "type": "temporal",
                "title": "Date",
                "format": "%A, %B %e, %Y"
            },
            {
                "field": "Total Quantity Ordered",
                "type": "quantitative",
                "title": "Total Quantity Ordered",
                "aggregate": "sum"
            }
        ]
    },
    {
        "mark": {
            "type": "text",
            "baseline": "middle",
            "align": "center",
            "fontSize": 10
        },
        "encoding": {
            "x": {
                "field": "DayOfWeekNum_SunStart",
                "type": "ordinal"
            },
            "y": {
                "field": "WeekOfMonth",
                "type": "ordinal"
            },
            "text": {
                "field": "Total Quantity Ordered",
                "type": "quantitative",
                "aggregate": "sum",
                "format": ".0f"
            },
            "color": {
                "value": "black"
            }
        }
    }
],
"resolve": {
    "scale": {
        "color": "shared"
    }
},
"config": {
    "facet": {
        "spacing": 5
    },
    "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold"
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false,
        "labels": false
    },
    "view": {
        "stroke": "transparent"
    }
}
}

```

## 4. Explanation of Adjustments

### a. Adding Day-of-Week Labels Above Each Monthly Grid

To display the day-of-week labels ("S M T W T F S") above each month's grid, we've added a separate data source and a text mark layer.

#### Data Source for Day Labels:

```
json
{
  "data": {
    "name": "day_labels",
    "values": [
      {"day": 1, "label": "S"}, {"day": 2, "label": "M"}, {"day": 3, "label": "T"}, {"day": 4, "label": "W"}, {"day": 5, "label": "T"}, {"day": 6, "label": "F"}, {"day": 7, "label": "S"}
    ]
  }
}
```

- This creates a static dataset with the day numbers and their corresponding single-letter abbreviations.

#### Text Mark Layer for Day Labels:

```
json
{
  "data": { "name": "day_labels" },
  "mark": {
    "type": "text",
    "baseline": "bottom",
    "dy": -5,
    "fontSize": 10
  },
  "encoding": {
    "x": {
      "field": "day",
      "type": "ordinal",
      "axis": null
    },
    "y": {
      "value": -0.5
    },
    "text": {
      "field": "label",
      "type": "nominal"
    }
  }
}
```

- Positioning:**

- `x`: Uses the `day` field to align labels with the day columns.
- `y`: Sets a constant value slightly above the first week (`-0.5`) to position the labels above the grid.

- Visual Properties:**

- `baseline: "bottom"` ensures text is aligned from the bottom.
- `dy`: Negative value to fine-tune vertical positioning.
- `fontSize`: Sets the size of the day labels.

## b. Adjusting the Grid Layout

- Axes:** We set `"axis": null` in the `x` and `y` encodings to remove default axes, preventing unwanted labels or ticks.
- Week Calculation:** Ensure the `WeekOfMonth` calculation aligns with weeks starting on Sunday.

## c. Ensuring Proper Alignment

- Day Cells:**

- `x Encoding:`

```
json
```

```
"x": {
  "field": "DayOfWeekNum_SunStart",
  "type": "ordinal",
```

```
        "axis": null
    }
```

- Aligns day cells under the correct day-of-week label.

- **y Encoding:**

json

```
"y": {
  "field": "WeekOfMonth",
  "type": "ordinal",
  "axis": null
}
```

- Positions days within the correct week row.

#### d. Displaying Total Quantity Ordered Inside Each Day Cell

- Text Mark Layer for Day Values:

json

```
{
  "mark": {
    "type": "text",
    "baseline": "middle",
    "align": "center",
    "fontSize": 10
  },
  "encoding": {
    "x": {
      "field": "DayOfWeekNum_SunStart",
      "type": "ordinal"
    },
    "y": {
      "field": "WeekOfMonth",
      "type": "ordinal"
    },
    "text": {
      "field": "Total Quantity Ordered",
      "type": "quantitative",
      "aggregate": "sum",
      "format": ".0f"
    },
    "color": {
      "value": "black"
    }
  }
}
```

- Places the total quantity ordered inside each day cell.

#### e. Configuring Facet and Layout

- **Columns:** Set to 3 to arrange months horizontally.
- **Facet Header:** Includes the month names above each grid.
- **Spacing and Styling:** Adjusted in the config section for visual appeal.

---

## 5. Final Steps

### a. Add the Year Slicer

- Use the **Year** field from the **Dates** table to create a slicer.
- Include relevant years (e.g., 2020, 2021, 2022).

### b. Test the Visual

- **Day Labels:**
  - Verify that "S M T W T F S" appears above each month's grid.
  - Ensure labels align correctly with the day columns.
- **Grid Alignment:**

- Check that each day cell is under the correct day-of-week label.
  - Confirm that weeks start on Sunday.
- Data Display:**
- Ensure the total quantity ordered is displayed inside each day cell.
  - Hover over cells to see tooltips with detailed information.
- 

## 6. Additional Notes

### a. Handling Days with No Data

- Days without data will appear with the lightest color and display "0" or be blank.
- To display an empty cell instead of "0", adjust the `text` encoding:

json

```
"text": {
  "condition": {
    "test": "datum['Total Quantity Ordered'] > 0",
    "field": "Total Quantity Ordered",
    "type": "quantitative",
    "aggregate": "sum",
    "format": ".0f"
  },
  "value": ""
}
```

### b. Adjusting Cell Sizes

- Modify the `step` values in `width` and `height` to resize cells:

json

```
"width": {"step": 25},
"height": {"step": 25},
```

### c. Color Scale

- Adjust the color scale range to fit your design preferences:

json

```
"scale": {
  "range": ["#cce5ff", "#003366"]
}
```

### d. Formatting Dates

- In the tooltip, adjust the date format as needed:

json

```
"format": "%A, %B %e, %Y"
```

---

## 7. Conclusion

By implementing these changes, your calendar heat map should now:

- Display single-letter day-of-week labels ("S M T W T F S") above each month's grid.
  - Start each week on Sunday, with days properly aligned under their respective labels.
  - Show the total quantity ordered inside each day cell.
  - Provide a clear, traditional calendar layout for easy interpretation of sales activity.
- 

Please let me know if you have any further questions or need assistance with any part of this process. I'm here to help you achieve the desired visualization!

Days are misordered. dates should read from left to right and top to bottom. For example, if the first day of a month is a Thursday, in the first week Sun through Wed should be blank, and the month starts on the Thursday

I understand that the days are misordered in the calendar heat map and that dates should read from left to right and top to bottom, just like in a traditional calendar. Specifically, if the first day of a month is a Thursday, the calendar should display blank cells from Sunday to Wednesday, with the month starting on Thursday.

This issue occurs because the current data and Vega-Lite specification do not account for the blank days needed to align the dates correctly under their respective days of the week. To fix this, we need to adjust the data to include these blank days and modify the Vega-Lite specification accordingly.

## 1. Solution Overview

Objective:

- Create a complete calendar grid for each month, including blank cells for days before the first day and after the last day of the month.
- Ensure that dates are properly aligned under their respective day-of-week labels, starting from Sunday.

Approach:

- Step 1: Prepare a new calculated table in Power BI ([CalendarHeatmapData](#)) that includes all the necessary dates and blank cells for each month.
- Step 2: Modify the Vega-Lite specification to use this new table and correctly render the calendar grid with proper alignment.

## 2. Prepare the Data in Power BI

### a. Create a New Calculated Table: [CalendarHeatmapData](#)

We will create a calculated table that generates all dates needed to fill the calendar grids for each month, including the blank days. This table will include the full weeks required to display each month completely.

DAX Code for [CalendarHeatmapData](#):

```
DAX

CalendarHeatmapData =
VAR StartDate = CALCULATE(MIN(Dates[Date]), ALL(Dates))
VAR EndDate = CALCULATE(MAX(Dates[Date]), ALL(Dates))
VAR FirstSunday = StartDate - WEEKDAY(StartDate, 1) + 1
VAR LastSaturday = EndDate + (7 - WEEKDAY(EndDate, 1))

RETURN
ADDCOLUMNS(
    CALENDAR(FirstSunday, LastSaturday),
    "Year", YEAR([Date]),
    "Month", MONTH([Date]),
    "MonthName", FORMAT([Date], "MMMM"),
    "DayOfMonth", DAY([Date]),
    "DayOfWeekNum_SunStart", WEEKDAY([Date], 1),
    "WeekOfMonth", INT((DAY([Date]) + WEEKDAY(DATE(YEAR([Date]), MONTH([Date]), 1), 1) - 2) / 7) + 1,
    "IsCurrentMonth", IF(MONTH([Date]) = MONTH(TODAY()), 1, 0)
)
```

Explanation:

- Variables:

- [StartDate](#): The earliest date in your [Dates](#) table.
- [EndDate](#): The latest date in your [Dates](#) table.

- `FirstSunday`: Adjusted start date to the first Sunday before or on the `StartDate`.
- `LastSaturday`: Adjusted end date to the last Saturday after or on the `EndDate`.
- **Calendar Generation:**
  - `CALENDAR(FirstSunday, LastSaturday)`: Generates a continuous list of dates from `FirstSunday` to `LastSaturday`.
- **Additional Columns:**
  - `Year, Month, MonthName, DayOfMonth`: Basic date components.
  - `DayOfWeekNum_SunStart`: Day of the week number starting from Sunday (1) to Saturday (7).
  - `WeekOfMonth`: Calculates the week number within the month, adjusted for weeks starting on Sunday.
  - `IsCurrentMonth`: A flag to indicate if the date is within the current month (can be adjusted as needed).

## b. Create a Relationship

- **Optional:** If you need to bring in sales data, create a relationship between `CalendarHeatmapData[Date]` and `Sales[OrderDate]`.
- Ensure that the relationship is set to `Many to One` and `Cross filter direction: Single` from `Sales` to `CalendarHeatmapData`.

## c. Create Measures

### i. Total Quantity Ordered

Modify the measure to calculate total quantity ordered per date, handling dates with no sales:

DAX

```
Total Quantity Ordered =
VAR Qty = CALCULATE(SUM(Sales[Order Quantity]), 'CalendarHeatmapData'[Date])
RETURN
IF(NOT(ISBLANK(Qty)), Qty, 0)
```

## 3. Update the Vega-Lite Specification

We will adjust the Vega-Lite JSON to use the `CalendarHeatmapData` table and ensure that dates are aligned correctly in the calendar grid.

### Data Binding in Deneb

In the Deneb visual, bind the following fields from the `CalendarHeatmapData` table:

- **Fields:**
  - `Date(CalendarHeatmapData[Date])`
  - `Year(CalendarHeatmapData[Year])`
  - `MonthName(CalendarHeatmapData[MonthName])`
  - `Month(CalendarHeatmapData[Month])`
  - `WeekOfMonth(CalendarHeatmapData[WeekOfMonth])`
  - `DayOfWeekNum_SunStart(CalendarHeatmapData[DayOfWeekNum_SunStart])`
  - `DayOfMonth(CalendarHeatmapData[DayOfMonth])`
  - `IsCurrentMonth(CalendarHeatmapData[IsCurrentMonth])`
- **Measures:**
  - `Total Quantity Ordered`

### Updated Vega-Lite Specification

json

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "title": "Power BI Calendar Heat Map using Deneb",
  "data": { "name": "dataset" },
```

```
"transform": [
  { "filter": "datum.Year != null" }
],
"facet": {
  "field": "MonthName",
  "type": "ordinal",
  "sort": [
    "January", "February", "March", "April", "May", "June",
    "July", "August", "September", "October", "November", "December"
  ],
  "header": {
    "title": null,
    "labelFontSize": 14,
    "labelFontWeight": "bold"
  }
},
"columns": 3,
"spec": {
  "width": {"step": 25},
  "height": {"step": 25},
  "layer": [
    {
      "data": {
        "values": [
          {"day": 1, "label": "S"}, {"day": 2, "label": "M"}, {"day": 3, "label": "T"}, {"day": 4, "label": "W"}, {"day": 5, "label": "T"}, {"day": 6, "label": "F"}, {"day": 7, "label": "S"}
        ]
      },
      "mark": {
        "type": "text",
        "baseline": "bottom",
        "dy": -5,
        "fontSize": 10
      },
      "encoding": {
        "x": {
          "field": "day",
          "type": "ordinal"
        },
        "y": {
          "value": -0.5
        },
        "text": {
          "field": "label",
          "type": "nominal"
        }
      }
    },
    {
      "mark": {
        "type": "rect",
        "stroke": "white",
        "strokeWidth": 1
      },
      "encoding": {
        "x": {
          "field": "DayOfWeekNum_SunStart",
          "type": "ordinal",
          "axis": null
        },
        "y": {
          "field": "WeekOfMonth",
          "type": "ordinal",
          "axis": null
        },
        "color": {
          "condition": {
            "test": "datum.IsCurrentMonth == 1",
            "field": "Total Quantity Ordered",
            "type": "quantitative",
            "aggregate": "sum",
            "scale": {
              "range": ["#cce5ff", "#003366"]
            }
          }
        }
      }
    }
  ]
}
```



## Explanation of Adjustments

### a. Adding Blank Cells for Proper Alignment

- The `CalendarHeatmapData` table includes all dates needed to fill the calendar grids, including dates before and after the current month.
- The `IsCurrentMonth` field identifies whether a date belongs to the current month being displayed.

### b. Coloring Cells Based on `IsCurrentMonth`

- In the `color` encoding of the `rect` mark, we use a `condition`:

json

```
"color": {  
  "condition": {  
    "test": "datum.IsCurrentMonth == 1",  
    "field": "Total Quantity Ordered",  
    "type": "quantitative",  
    "aggregate": "sum",  
    "scale": {  
      "range": ["#cce5ff", "#003366"]  
    }  
  },  
  "value": "#E0E0E0"  
}
```

- If `IsCurrentMonth` is `1`, the cell color is determined by the `Total Quantity Ordered`.
- If `IsCurrentMonth` is `0`, the cell is colored light gray (`#E0E0E0`), representing a blank cell.

### c. Displaying Day Numbers Inside Each Cell

- In the `text` encoding of the `text` mark, we use a similar `condition`:

json

```
"text": {  
  "condition": {  
    "test": "datum.IsCurrentMonth == 1",  
    "field": "DayOfMonth",  
    "type": "quantitative",  
    "format": "d"  
  },  
  "value": ""  
}
```

- Displays the day number if `IsCurrentMonth` is `1`.
- Leaves the cell blank if `IsCurrentMonth` is `0`.

### d. Adjusting the Day Labels

- The first layer includes the day-of-week labels ("S M T W T F S") positioned above each month's grid.

### e. Ensuring Correct Alignment

- By including all necessary dates and correctly calculating `DayOfWeekNum_SunStart` and `WeekOfMonth`, the dates align under their respective days of the week.
- The weeks start on Sunday, and the dates progress from left to right and top to bottom.

## 4. Final Steps

### a. Add the Year Slicer

- Use the `Year` field from the `CalendarHeatmapData` table to create a slicer.
- Include the relevant years for your data (e.g., 2020, 2021, 2022).

### b. Test the Visual

- **Alignment:** Verify that the dates align correctly under the day labels and that blank cells appear where appropriate.
- **Interactivity:** Select different years to ensure the calendar updates accordingly.

- **Toolips:** Hover over the cells to confirm that the tooltips display the correct date and total quantity ordered.
- **Appearance:** Check that the month names appear above each calendar grid and that the overall layout resembles a traditional calendar.

## 5. Additional Notes

### a. Adjusting Cell Sizes

- Modify the "step" values in "width" and "height" to adjust the size of the cells:

json

```
"width": {"step": 25},  
"height": {"step": 25},
```

- Increase or decrease these values based on your design preferences.

### b. Color Scale

- The color scale can be adjusted to fit your branding or design needs:

json

```
"scale": {  
  "range": ["#cce5ff", "#003366"]  
}
```

### c. Handling Zero Sales Days

- Days with zero sales will appear in the lightest color within the scale.
- You can adjust the scale domain or add conditions to handle days with zero sales differently.

### d. Date Formatting

- In the tooltip, you can adjust the date format to your preference:

json

```
"format": "%A, %B %e, %Y"
```

## 6. Conclusion

By creating a comprehensive calendar data set and adjusting the Vega-Lite specification, we've resolved the issue of misordered days. The calendar heat map now displays dates from left to right and top to bottom, with proper alignment under their respective day-of-week labels. Blank cells are included where necessary, ensuring that each month starts on the correct day of the week and resembles a traditional calendar layout.

Please let me know if you have any questions or need further assistance. I'm here to help you achieve the desired visualization!

Calendar is now working fine, but Total Quantity Ordered returns 56579 for every day in the dataset

I'm glad to hear that the calendar is now displaying correctly. I understand that you're experiencing an issue where the `Total Quantity Ordered` returns the same value (56579) for every day in the dataset. Let's work together to diagnose and resolve this problem.

### Understanding the Issue

The fact that `Total Quantity Ordered` returns the same value for every day suggests that the measure is not being filtered by the date context. Instead, it's calculating the total sum across all dates and displaying that same total for each day in the visual.

## Possible Causes

- ① **Measure Calculation:** The DAX measure for `Total Quantity Ordered` may not be properly respecting the date context in which it's being evaluated.
- ② **Vega-Lite Specification:** The use of `aggregate: "sum"` in the Vega-Lite encoding may be summing the measure over all data points, resulting in the total sum being displayed for each day.

## Steps to Resolve the Issue

### 1. Verify the DAX Measure

Let's start by examining the DAX measure for `Total Quantity Ordered`.

Current Measure:

```
DAX  
Total Quantity Ordered =  
VAR Qty = CALCULATE(SUM(Sales[Order Quantity]), 'CalendarHeatmapData'[Date])  
RETURN  
IF(NOT(ISBLANK(Qty)), Qty, 0)
```

Issues with the Current Measure:

- **Context Filtering:** The measure uses `'CalendarHeatmapData'[Date]` inside `CALCULATE`, but this doesn't effectively filter the `Sales` table by date.
- **Overriding Filters:** By specifying `'CalendarHeatmapData'[Date]` in `CALCULATE`, we're not applying any filter, and the measure may ignore the row context provided by the visual.

### Solution: Simplify the Measure

Let's simplify the measure to allow it to be correctly filtered by the date context provided by the visual.

Revised Measure:

```
DAX  
Total Quantity Ordered = SUM(Sales[Order Quantity])
```

Explanation:

- By defining the measure as simply `SUM(Sales[Order Quantity])`, it will respect the filters applied by the visual, including the date context.
- The visual will provide the necessary context for each date, and the measure will calculate the sum of `Order Quantity` for that specific date.

### 2. Test the Measure in a Table Visual

Before updating the Vega-Lite specification, let's confirm that the measure works as expected.

Steps:

- ① **Create a New Table Visual in Power BI:**
  - ② Add a table visual to your report canvas.
- ③ **Add Fields to the Table:**
  - ④ **Date:** Add the `Date` field from the `CalendarHeatmapData` table.
  - ⑤ **Total Quantity Ordered:** Add the revised `Total Quantity Ordered` measure.
- ⑥ **Review the Data:**
  - ⑦ Verify that the measure displays the correct `Total Quantity Ordered` for each date.
  - ⑧ Ensure that different dates show different values corresponding to the actual order quantities.

Expected Outcome:

- Each date should display the sum of `Order Quantity` for that specific date.
- If the measure shows the correct values, we can proceed to update the Vega-Lite specification.

### 3. Update the Vega-Lite Specification

Now that the measure is correctly calculating the `Total Quantity Ordered` per date, we need to adjust the Vega-Lite specification to ensure it doesn't override the filtering context.

#### Issue in Vega-Lite Specification:

- The use of `aggregate: "sum"` in the encoding may cause Vega-Lite to sum the values across all data points, leading to the total sum being displayed for each day.

#### Solution: Remove the Aggregation in Vega-Lite

Since the measure already aggregates the data at the desired level (per date), we can remove the `aggregate` property from the Vega-Lite encoding.

#### Updated Vega-Lite Specification:

```
json

{
  // ... [Rest of the specification remains the same]

  "spec": {
    // ... [Other layers and settings remain the same]

    "layer": [
      // ... [Day labels layer remains the same]

      {
        "mark": {
          "type": "rect",
          "stroke": "white",
          "strokeWidth": 1
        },
        "encoding": {
          "x": {
            "field": "DayOfWeekNum_SunStart",
            "type": "ordinal",
            "axis": null
          },
          "y": {
            "field": "WeekOfMonth",
            "type": "ordinal",
            "axis": null
          },
          "color": {
            "condition": {
              "test": "datum.IsCurrentMonth == 1",
              "field": "Total Quantity Ordered",
              "type": "quantitative",
              "scale": {
                "range": ["#cce5ff", "#003366"]
              }
            },
            "value": "#E0E0E0"
          },
          "tooltip": [
            {
              "field": "Date",
              "type": "temporal",
              "title": "Date",
              "format": "%A, %B %e, %Y"
            },
            {
              "field": "Total Quantity Ordered",
              "type": "quantitative",
              "title": "Total Quantity Ordered"
            }
          ]
        }
      },
      {
        "mark": {
          "type": "text",
        }
      }
    ]
  }
}
```

```

        "baseline": "middle",
        "align": "center",
        "fontSize": 10
      },
      "encoding": {
        "x": {
          "field": "DayOfWeekNum_SunStart",
          "type": "ordinal"
        },
        "y": {
          "field": "WeekOfMonth",
          "type": "ordinal"
        },
        "text": {
          "condition": {
            "test": "datum.IsCurrentMonth == 1",
            "field": "DayOfMonth",
            "type": "quantitative",
            "format": "d"
          },
          "value": ""
        },
        "color": {
          "value": "black"
        }
      }
    ],
    // ... [Rest of the specification remains the same]
}

```

#### Explanation:

- **Removed `aggregate: "sum"`:** By removing the `aggregate` property from the `color` and `text` encodings, Vega-Lite will use the value of `Total Quantity Ordered` as provided by the measure, respecting the date context.
- **Measure Provides Aggregated Data:** Since the measure already provides the sum for each date, there's no need for additional aggregation in the Vega-Lite encoding.

---

## 4. Verify the Changes

After updating the Vega-Lite specification, check the visual to ensure that `Total Quantity Ordered` displays correctly for each day.

**Steps:**

- 1 **Refresh the Deneb Visual:**
  - 2 Ensure that the Deneb visual updates with the new Vega-Lite specification.
- 3 **Inspect the Calendar:**
  - 4 Verify that different days display different values for `Total Quantity Ordered`, matching the data in your `Sales` table.
- 5 **Cross-Check with the Table Visual:**
  - 6 Compare the values displayed in the calendar heat map with those in the table visual you created earlier.
- 7 **Test the Tooltips:**
  - 8 Hover over the cells to see if the tooltips display the correct date and `Total Quantity Ordered`.

---

## Additional Considerations

### 1. Ensure Correct Data Binding

Make sure that the field names in the Vega-Lite specification match exactly with the fields bound in the Deneb visual.

- **Field Names:**
  - `Total Quantity Ordered`
  - `Date`
  - `DayOfWeekNum_SunStart`

- WeekOfMonth
- IsCurrentMonth
- DayOfMonth
- **Consistency:** Field names are case-sensitive and must match exactly between the data bindings and the Vega-Lite specification.

## 2. Check for Overlapping Filters

If you have any report-level or page-level filters that might be affecting the data, review them to ensure they're not causing unexpected results.

## 3. Review the Measure in the Data Model

Ensure that there are no additional filters or context modifiers applied to the `Total Quantity Ordered` measure elsewhere in your data model.

## Testing the Visual

After implementing the changes, thoroughly test the visual:

- **Different Years:**
  - Use the year slicer to select different years and verify that the calendar updates accordingly.
- **Date Comparison:**
  - Pick specific dates and compare the values in the calendar with the data in your source tables.
- **Edge Cases:**
  - Check dates with zero orders to ensure they display correctly.

## Alternative Approach

If the issue persists, consider the following:

### Create a Calculated Column

Instead of relying on a measure, create a calculated column in the `Sales` table to represent the quantity ordered per date.

**DAX Calculated Column in CalendarHeatmapData:**

```
DAX
Daily Quantity Ordered =
VAR CurrentDate = 'CalendarHeatmapData'[Date]
RETURN
CALCULATE(
    SUM(Sales[Order Quantity]),
    FILTER(Sales, Sales[OrderDate] = CurrentDate)
)
```

**Update the Vega-Lite Specification:**

- Replace `Total Quantity Ordered` with `Daily Quantity Ordered` in the encoding fields.
- Since it's a column, you won't need to aggregate it in Vega-Lite.

**Note:** Calculated columns can increase the size of your data model. Measures are generally preferred for aggregation in visuals.

## Conclusion

By simplifying the `Total Quantity Ordered` measure and removing unnecessary aggregation in the Vega-Lite specification, we allow the visual to correctly display the sum of `Order Quantity` for each date. This ensures that each day in the calendar heat map shows the accurate total quantity ordered, rather than the overall total for the entire dataset.

---

Please let me know if these steps resolve the issue or if you need further assistance. I'm here to help you achieve the desired result with your calendar heat map!

Works great - now let's just add a blank line before each calendar line to improve spacing

I'm glad to hear that the calendar is now working as expected! Adding a blank line before each calendar can enhance readability by improving the visual spacing between months.

## Adjusting the Vega-Lite Specification to Add Spacing

To add a blank line before each calendar (i.e., before each month's grid), we can modify the Vega-Lite specification in the following ways:

- ① Increase the Spacing Between Facets (Months).
- ② Add Extra Padding Above Each Month's Calendar Grid.
- ③ Insert a Blank Row in the Calendar Grid Itself.

I'll provide detailed steps for each option, and you can choose the one that best fits your needs.

### Option 1: Increase the Spacing Between Facets

The simplest way to add spacing is by increasing the `spacing` between facets in the `config` section of the Vega-Lite specification.

Modify the Facet Spacing:

```
json

"config": {
  "facet": {
    "spacing": 20 // Increase this value to add more space between months
  },
  ...
}
```

- Explanation:
  - The `spacing` property controls the space between facets (in this case, months).
  - Increasing the value adds more space between each month's calendar grid.

### Option 2: Add Extra Padding Above Each Month's Calendar Grid

You can add padding above each calendar grid by adjusting the `labelPadding` in the `header` configuration.

Adjust Header Label Padding:

```
json

"header": {
  "labelFontSize": 14,
  "labelFontWeight": "bold",
  "labelPadding": 20 // Increase this value for more space above the calendar
},
```

- Explanation:
  - The `labelPadding` property adds space between the month label and the calendar grid.
  - Increasing this value creates a larger gap before the calendar starts.

### Option 3: Insert a Blank Row in the Calendar Grid

If you prefer to have an actual blank line within the calendar grid itself, we can adjust the y-axis to include an extra row.

### Step 1: Adjust the Y-Axis Domain

We can modify the `y` encoding to include an extra value at the top of the calendar grid.

Modify the Y Encoding in the Vega-Lite Specification:

json

```
"y": {  
  "field": "WeekOfMonthPlusOne", // We'll create this field in the data  
  "type": "ordinal",  
  "axis": null  
},
```

### Step 2: Adjust the Data

Add a calculated column `WeekOfMonthPlusOne` in your `CalendarHeatmapData` table to shift the week numbers down by one.

Create `WeekOfMonthPlusOne`:

DAX

```
WeekOfMonthPlusOne = 'CalendarHeatmapData'[WeekOfMonth] + 1
```

● Explanation:

- By adding 1 to `WeekOfMonth`, we shift all the weeks down, leaving the first row empty.

### Step 3: Adjust the Position of Day Labels

Modify the day labels layer to align with the new grid.

Update the Day Labels Layer:

json

```
{  
  "data": {  
    "values": [  
      {"day": 1, "label": "S"},  
      {"day": 2, "label": "M"},  
      {"day": 3, "label": "T"},  
      {"day": 4, "label": "W"},  
      {"day": 5, "label": "T"},  
      {"day": 6, "label": "F"},  
      {"day": 7, "label": "S"}  
    ]  
  },  
  "mark": {  
    "type": "text",  
    "baseline": "middle",  
    "dy": -5,  
    "fontSize": 10  
  },  
  "encoding": {  
    "x": {  
      "field": "day",  
      "type": "ordinal"  
    },  
    "y": {  
      "value": 1 // Adjusted to align with the shifted grid  
    },  
    "text": {  
      "field": "label",  
      "type": "nominal"  
    }  
  }  
}
```

● Explanation:

- The `y` value is set to `1` to position the day labels in the first row after the blank line.

### Step 4: Update the Calendar Layers

Adjust the `y` encoding in the rectangle and text layers to use `WeekOfMonthPlusOne`.

#### Rectangle Layer:

```
json

{
  "mark": {
    "type": "rect",
    "stroke": "white",
    "strokeWidth": 1
  },
  "encoding": {
    "x": {
      "field": "DayOfWeekNum_SunStart",
      "type": "ordinal",
      "axis": null
    },
    "y": {
      "field": "WeekOfMonthPlusOne",
      "type": "ordinal",
      "axis": null
    },
    // ... [rest of the encoding remains the same]
  }
}
```

#### Text Layer:

```
json

{
  "mark": {
    "type": "text",
    "baseline": "middle",
    "align": "center",
    "fontSize": 10
  },
  "encoding": {
    "x": {
      "field": "DayOfWeekNum_SunStart",
      "type": "ordinal"
    },
    "y": {
      "field": "WeekOfMonthPlusOne",
      "type": "ordinal"
    },
    // ... [rest of the encoding remains the same]
  }
}
```

- **Explanation:**

- By using `WeekOfMonthPlusOne`, we shift the calendar grid down by one row, creating a blank line at the top.

## Complete Updated Vega-Lite Specification

Here is the updated Vega-Lite specification incorporating the changes:

```
json

{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "title": "Power BI Calendar Heat Map using Deneb",
  "data": { "name": "dataset" },
  "transform": [
    { "filter": "datum.Year != null" }
  ],
  "facet": {
    "field": "MonthName",
    "type": "ordinal",
    "sort": [
      "January", "February", "March", "April", "May", "June",
      "July", "August", "September", "October", "November", "December"
    ],
    "header": {
      "title": null,
      "labelFontSize": 14,
      "labelAlign": "left"
    }
  },
  "layer": [
    { "mark": "rect", "encoding": { "x": "DayOfWeekNum_SunStart", "y": "WeekOfMonthPlusOne" } },
    { "mark": "text", "encoding": { "x": "DayOfWeekNum_SunStart", "y": "WeekOfMonthPlusOne" } }
  ]
}
```



```
        "type": "quantitative",
        "title": "Total Quantity Ordered"
    }
]
}
},
{
    "mark": {
        "type": "text",
        "baseline": "middle",
        "align": "center",
        "fontSize": 10
    },
    "encoding": {
        "x": {
            "field": "DayOfWeekNum_SunStart",
            "type": "ordinal"
        },
        "y": {
            "field": "WeekOfMonthPlusOne",
            "type": "ordinal"
        },
        "text": {
            "condition": {
                "test": "datum.IsCurrentMonth == 1",
                "field": "DayOfMonth",
                "type": "quantitative",
                "format": "d"
            },
            "value": ""
        },
        "color": {
            "value": "black"
        }
    }
}
],
"resolve": {
    "scale": {
        "color": "shared"
    }
},
"config": {
    "facet": {
        "spacing": 20 // Increased spacing between months
    },
    "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold",
        "labelPadding": 20 // Added padding above the calendars
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false,
        "labels": false
    },
    "view": {
        "stroke": "transparent"
    }
}
}
```

## Final Steps

- 1 Update the Data Model:

2 Ensure you've added the `WeekOfMonthPlusOne` column to your `CalendarHeatmapData` table.

DAX

```
WeekOfMonthPlusOne = 'CalendarHeatmapData'[WeekOfMonth] + 1
```

- 3 Test the Visual:

- ④ Refresh the data in Power BI to make sure the new column is recognized.
- ⑤ Verify that the Deneb visual reflects the changes.
- ⑥ Check that there's a blank line before each calendar grid, improving the spacing.
- ⑦ **Adjust as Needed:**
  - ⑧ If you want more or less spacing, adjust the `spacing` and `labelPadding` values in the `config` section.
  - ⑨ You can also tweak the `dy` and `y` values in the day labels layer to fine-tune the positioning.

## Conclusion

By implementing these changes, you should now see improved spacing before each calendar, enhancing readability and the overall appearance of your calendar heat map.

**Feel free to adjust the values as needed to achieve the desired visual effect. If you have any further questions or need additional assistance, please let me know!**

increase title font to 14, change Total Quantity Ordered color to black or white based on the luminosity of the background

I'm glad to hear that the calendar is working as expected! Let's address your latest requests:

- ① Increase the title font size to 14.
- ② Change the `Total Quantity Ordered` text color to black or white based on the luminosity of the background color.

### 1. Increase the Title Font Size to 14

To increase the title font size, we can adjust the `config` section of the Vega-Lite specification to set the `fontSize` for the `title`.

**Modification:**

Add the following to your `config` section:

json

```
"config": {
  "title": {
    "fontSize": 14,
    "fontWeight": "bold"
  },
  // ... [rest of the config remains the same]
}
```

**Updated `config` Section:**

json

```
"config": {
  "title": {
    "fontSize": 14,
    "fontWeight": "bold"
  },
  "facet": {
    "spacing": 20
  },
  "header": {
    "labelFontSize": 14,
    "labelFontWeight": "bold",
    "labelColor": "#fff" // New line
  }
}
```

```
        "labelPadding": 20
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false,
        "labels": false
    },
    "view": {
        "stroke": "transparent"
    }
}
```

This will increase the title font size to 14 and make it bold.

## 2. Change Total Quantity Ordered Text Color Based on Background Luminosity

We can change the text color of the `Total Quantity Ordered` displayed inside each day cell to be either black or white, depending on the background color's luminosity. This improves readability by ensuring sufficient contrast between the text and the background.

**Approach:**

- Step 1: Approximate the background color's luminosity based on the data value.
- Step 2: Use a condition in the `color` encoding of the `text` mark to set the text color based on the data value.

**Implementation Steps:**

### a. Determine a Threshold for Switching Text Color

- Decide on a data value threshold where the background color becomes dark enough to require white text.
- For example, calculate the midpoint of the data range and use it as the threshold.

### b. Modify the `text` Mark's `color` Encoding

- Use a conditional expression in the `color` encoding to set the text color based on the data value.

**Updated `text` Mark Layer:**

```
json
{
    "mark": {
        "type": "text",
        "baseline": "middle",
        "align": "center",
        "fontSize": 10
    },
    "encoding": {
        "x": {
            "field": "DayOfWeekNum_SunStart",
            "type": "ordinal"
        },
        "y": {
            "field": "WeekOfMonthPlusOne",
            "type": "ordinal"
        },
        "text": {
            "condition": {
                "test": "datum.IsCurrentMonth == 1",
                "field": "DayOfMonth",
                "type": "quantitative",
                "format": "d"
            },
            "value": ""
        },
        "color": {
            "condition": {
                "test": "datum['Total Quantity Ordered'] >= threshold",
                "value": "white"
            },
            "value": "black"
        }
}
```

```
}
```

- Replace `threshold` with the actual value you decide upon.

### c. Determine the Threshold Based on Your Data

Since Vega-Lite doesn't support dynamic thresholds based on data statistics in conditions, you'll need to set a fixed threshold. Here's how you can do it:

#### 1 Analyze Your Data:

- 2 Check the range of `Total Quantity Ordered` in your data.
- 3 Determine a value that divides the data into lighter and darker backgrounds.

#### 4 Set the Threshold:

- 5 For example, if `Total Quantity Ordered` ranges from 0 to 100, you might set the threshold at 50.
- 6 Adjust this value based on your specific data distribution.

Example with Threshold Set to 50:

```
json
```

```
"color": {  
  "condition": {  
    "test": "datum['Total Quantity Ordered'] >= 50",  
    "value": "white"  
  },  
  "value": "black"  
}
```

## Complete Updated Vega-Lite Specification

Here's the updated Vega-Lite specification incorporating both changes:

```
json
```

```
{  
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",  
  "title": "Power BI Calendar Heat Map using Deneb",  
  "data": { "name": "dataset" },  
  "transform": [  
    { "filter": "datum.Year != null" }  
  ],  
  "facet": {  
    "field": "MonthName",  
    "type": "ordinal",  
    "sort": [  
      "January", "February", "March", "April", "May", "June",  
      "July", "August", "September", "October", "November", "December"  
    ],  
    "header": {  
      "title": null,  
      "labelFontSize": 14,  
      "labelFontWeight": "bold",  
      "labelPadding": 20  
    }  
  },  
  "columns": 3,  
  "spec": {  
    "width": { "step": 25 },  
    "height": { "step": 25 },  
    "layer": [  
      {  
        "data": {  
          "values": [  
            { "day": 1, "label": "S" },  
            { "day": 2, "label": "M" },  
            { "day": 3, "label": "T" },  
            { "day": 4, "label": "W" },  
            { "day": 5, "label": "T" },  
            { "day": 6, "label": "F" },  
            { "day": 7, "label": "S" }  
          ]  
        }  
      }  
    ]  
  }  
}
```



```

        "type": "ordinal"
    },
    "text": {
        "condition": {
            "test": "datum.IsCurrentMonth == 1",
            "field": "DayOfMonth",
            "type": "quantitative",
            "format": "d"
        },
        "value": ""
    },
    "color": {
        "condition": {
            "test": "datum['Total Quantity Ordered'] >= 50", // Adjust threshold as needed
            "value": "white"
        },
        "value": "black"
    }
}
],
"resolve": {
    "scale": {
        "color": "shared"
    }
},
"config": {
    "title": {
        "fontSize": 14,
        "fontWeight": "bold"
    },
    "facet": {
        "spacing": 20
    },
    "header": {
        "labelFontSize": 14,
        "labelFontWeight": "bold",
        "labelPadding": 20
    },
    "axis": {
        "grid": false,
        "domain": false,
        "ticks": false,
        "labels": false
    },
    "view": {
        "stroke": "transparent"
    }
}
}

```

## Final Steps

### 1. Adjust the Threshold Based on Your Data

- Review Your Data:
  - Analyze the range of `Total Quantity Ordered` in your dataset.
  - Determine a threshold that makes sense for your data distribution.
- Set the Threshold in the Vega-Lite Specification:
  - Replace `50` in the `test` condition with your chosen threshold value.

### 2. Test the Visual

- Update the Vega-Lite Specification:
  - Replace your current Vega-Lite specification in Deneb with the updated one above.
- Verify the Title Font Size:
  - Ensure that the title now appears with a font size of 14 and is bold.
- Check the Text Color Changes:

- Look at the calendar cells to see if the `Total Quantity Ordered` text color changes appropriately based on the background color.
- For days with higher values (darker backgrounds), the text should be white.
- For days with lower values (lighter backgrounds), the text should be black.

### 3. Fine-Tune as Needed

- **Adjust the Threshold:**
  - If the text color change doesn't align well with the background colors, adjust the threshold value accordingly.
- **Modify the Color Scale:**
  - If necessary, tweak the color scale's `range` in the `color` encoding to better match your data and improve contrast.

## Additional Notes

### Handling Dynamic Thresholds

Vega-Lite doesn't support calculating dynamic thresholds based on data statistics directly in expressions used for encoding. If you need a more data-driven approach, you might consider:

- **Preprocessing the Data:**
  - Calculate the threshold in Power BI or your data source before it reaches Vega-Lite.
  - Add a field to your data that indicates whether the text color should be black or white.

#### Example in Power BI:

DAX

```
TextColor =
IF(
    'CalendarHeatmapData'[Total Quantity Ordered] >= [Threshold Value],
    "white",
    "black"
)
```

- Use the `TextColor` Field in Vega-Lite:

json

```
"color": {
  "field": "TextColor",
  "type": "nominal"
}
```

### Adjusting the Color Scale

If the background colors are not providing enough contrast with the text, consider adjusting the color scale's `range` to lighter or darker colors.

#### Example:

json

```
"scale": {
  "range": ["#e0f3db", "#0868ac"]
}
```

## Conclusion

By adjusting the `config` section and modifying the `color` encoding in the `text` mark, we've:

- Increased the title font size to 14.
- Implemented conditional text coloring for `Total Quantity Ordered` based on the background luminosity, enhancing readability.

Please feel free to adjust the threshold and other parameters as needed to best suit your data and design preferences. If you have any further questions or need additional assistance, don't hesitate to ask!

For Deneb code below, change color of Total Quantity Ordered to white or black based on the luminosity of the background color in the heatmap

```
{  
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",  
  // "title": "Power BI Calendar Heat Map using Deneb",  
  "data": { "name": "dataset" },  
  "transform": [  
    { "filter": "datum['Year'] != null" }  
  ],  
  "facet": {  
    "field": "MonthName",  
    "type": "ordinal",  
    "sort": [  
      "January", "February", "March", "April", "May", "June",  
      "July", "August", "September", "October", "November", "December"  
    ],  
    "header": {  
      "title": null,  
      "labelFontSize": 14,  
      "labelFontWeight": "bold"  
    },  
    "columns": 4,  
    "spec": {  
      "width": [{"step": 25},  
      "height": [{"step": 25},  
      "layer": [  
        {  
          "data": {  
            "name": "day_labels",  
            "values": [  
              {"day": 1, "label": "S"},  
              {"day": 2, "label": "M"},  
              {"day": 3, "label": "T"},  
              {"day": 4, "label": "W"},  
              {"day": 5, "label": "T"},  
              {"day": 6, "label": "F"},  
              {"day": 7, "label": "S"}  
            ]  
          },  
          "mark": {  
            "type": "text",  
            "baseline": "bottom",  
            "dy": -5,  
            "fontSize": 10  
          },  
          "encoding": {  
            "x": {  
              "field": "day",  
              "type": "ordinal",  
              "sort": [  
                "January", "February", "March", "April", "May", "June",  
                "July", "August", "September", "October", "November", "December"  
              ]  
            },  
            "y": {  
              "field": "MonthName",  
              "type": "ordinal",  
              "sort": [  
                "January", "February", "March", "April", "May", "June",  
                "July", "August", "September", "October", "November", "December"  
              ]  
            }  
          }  
        ]  
      ]  
    }  
  ]  
}
```

```
        "type": "ordinal",
        "axis": null
      },
      "y": {
        "value": -0.5
      },
      "text": {
        "field": "label",
        "type": "nominal"
      }
    }
  },
  {
    "mark": {
      "type": "rect",
      "stroke": "white",
      "strokeWidth": 1
    },
    "encoding": {
      "x": {
        "field": "DayOfWeekNum_SunStart",
        "type": "ordinal",
        "axis": null
      },
      "y": {
        "field": "WeekOfMonth",
        "type": "ordinal",
        "axis": null
      },
      "color": {
        "field": "Total Quantity Ordered",
        "type": "quantitative",
        "aggregate": "sum",
        "scale": {
          "range": ["#cce5ff", "#003366"]
        },
        "legend": {
          "title": "Total Quantity Ordered",
          "orient": "right"
        }
      },
      "tooltip": [
        {
          "field": "Date",
          "type": "temporal",
          "title": "Date",
          "format": "%A, %B %e, %Y"
        },
        {
          "field": "Total Quantity Ordered",
          "type": "quantitative",
          "title": "Total Quantity Ordered",
          "aggregate": "sum"
        }
      ]
    }
  }
]
```

```
        "mark": {
          "type": "text",
          "baseline": "middle",
          "align": "center",
          "fontSize": 10
        },
        "encoding": {
          "x": {
            "field": "DayOfWeekNum_SunStart",
            "type": "ordinal"
          },
          "y": {
            "field": "WeekOfMonth",
            "type": "ordinal"
          },
          "text": {
            "field": "Total Quantity Ordered",
            "type": "quantitative",
            "aggregate": "sum",
            "format": ".0f"
          },
          "color": {
            "value": "black"
          }
        },
        "resolve": {
          "scale": {
            "color": "shared"
          }
        },
        "config": {
          "facet": {
            "spacing": 5
          },
          "header": {
            "labelFontSize": 14,
            "labelFontWeight": "bold"
          },
          "axis": {
            "grid": false,
            "domain": false,
            "ticks": false,
            "labels": false
          },
          "view": {
            "stroke": "transparent"
          }
        }
      }
    }
  }
]
```

```
}
```

```
}
```

Certainly! To change the color of the "Total Quantity Ordered" text to white or black based on the luminosity of the background color in your heatmap, we'll adjust your Vega-Lite specification accordingly.

## Understanding the Requirement

- **Objective:** Dynamically set the text color to `white` when the background is dark (higher values) and `black` when the background is light (lower values).
- **Approach:** Use a conditional expression in the `color` encoding of the text mark based on the value of "Total Quantity Ordered".

## Step-by-Step Solution

### 1. Remove Aggregation from Encodings

Since your measure "Total Quantity Ordered" is already aggregated per date in your data model, we should remove the `aggregate: "sum"` from the encodings to prevent double aggregation.

Modified Encodings:

- **Rect Layer (color encoding):** Remove `aggregate: "sum"`.
- **Text Layer (text encoding):** Remove `aggregate: "sum"`.

### 2. Add a Threshold Parameter

We'll define a parameter `threshold_value` to determine when to switch the text color from black to white. You can adjust this value based on your data.

Add Parameter at the Top:

```
json

"params": [
  {
    "name": "threshold_value",
    "value": 50 // Adjust this value based on your data range
  }
],
```

### 3. Modify the Text Mark's Color Encoding

We'll use a conditional expression to set the text color based on the "Total Quantity Ordered" value.

Updated `color` Encoding in the Text Mark:

```
json

"color": {
  "condition": {
    "test": "datum['Total Quantity Ordered'] >= threshold_value",
    "value": "white"
  },
  "value": "black"
}
```

- **Explanation:**
  - If "Total Quantity Ordered" is greater than or equal to `threshold_value`, the text color is `white`.
  - Otherwise, the text color is `black`.

## Updated Vega-Lite Specification

Here's your updated Vega-Lite code with the necessary changes:



```
        },
        "y": {
          "field": "WeekOfMonth",
          "type": "ordinal",
          "axis": null
        },
        "color": {
          "field": "Total Quantity Ordered",
          "type": "quantitative",
          "scale": {
            "range": ["#cce5ff", "#003366"]
          },
          "legend": {
            "title": "Total Quantity Ordered",
            "orient": "right"
          }
        },
        "tooltip": [
          {
            "field": "Date",
            "type": "temporal",
            "title": "Date",
            "format": "%A, %B %e, %Y"
          },
          {
            "field": "Total Quantity Ordered",
            "type": "quantitative",
            "title": "Total Quantity Ordered"
          }
        ]
      }
    },
    {
      "mark": {
        "type": "text",
        "baseline": "middle",
        "align": "center",
        "fontSize": 10
      },
      "encoding": {
        "x": {
          "field": "DayOfWeekNum_SunStart",
          "type": "ordinal"
        },
        "y": {
          "field": "WeekOfMonth",
          "type": "ordinal"
        },
        "text": {
          "field": "Total Quantity Ordered",
          "type": "quantitative",
          "format": ".0f"
        },
        "color": {
          "condition": {
            "test": "datum['Total Quantity Ordered'] >= threshold_value",
            "value": "white"
          },
          "value": "black"
        }
      }
    }
  ],
  "resolve": {
    "scale": {
      "color": "shared"
    }
  },
  "config": {
    "facet": {
      "spacing": 5
    },
    "header": {
      "labelFontSize": 14,
      "labelFontWeight": "bold"
    },
    "axis": {
```

```
        "grid": false,
        "domain": false,
        "ticks": false,
        "labels": false
    },
    "view": {
        "stroke": "transparent"
    }
}
```

## Explanation of Changes

### a. Added Parameter for Threshold

- Purpose: Allows you to adjust the threshold without modifying the condition directly.
- Usage: Adjust the `value` in "`threshold_value`" based on your data range.

### b. Removed `aggregate: "sum"` from Encodings

- Reason: Prevents double aggregation since your measure is already aggregated per date.
- Effect: Ensures that the correct values are used in the conditional expression.

### c. Modified the Conditional Expression in color Encoding

- Condition: Checks if "Total Quantity Ordered" is greater than or equal to `threshold_value`.
- Outcome: Sets text color to `white` if the condition is true; otherwise, `black`.

## Adjusting the Threshold Value

Since Vega-Lite doesn't support calculating dynamic thresholds based on the data directly within expressions, you'll need to set a fixed threshold.

### Steps to Determine an Appropriate Threshold:

- ① Analyze Your Data:
  - ② Determine the range of "Total Quantity Ordered" in your dataset.
  - ③ Find the midpoint or a value that effectively differentiates between light and dark backgrounds.
- ④ Set the Threshold:
  - ⑤ Replace `50` with your chosen value in the "`threshold_value`" parameter.

### Example:

- If your data ranges from **0 to 100**, a threshold of **50** might be suitable.
- If your data ranges from **0 to 5000**, consider a threshold like **2500**.

## Final Steps

### 1. Update the Measure in Your Data Model

Ensure that your "Total Quantity Ordered" measure is correctly defined:

DAX

```
Total Quantity Ordered = SUM(Sales[Order Quantity])
```

### 2. Test the Visual

- Verify Text Colors: Check that the text color changes appropriately based on the background color.
- Adjust Threshold if Necessary: If the text color doesn't change as expected, adjust the `threshold_value`.

### 3. Ensure Correct Data Binding in Deneb

- Make sure all fields used in the Vega-Lite specification are properly bound.
- Field names in the data binding should match exactly with those in the Vega-Lite code.

## Additional Tips

## Handling Dynamic Thresholds (Advanced)

If you require a dynamic threshold based on your data's median or mean:

- **Calculate the Threshold in Power BI:**
  - Create a measure or calculated column that computes the median or mean of "Total Quantity Ordered".
- **Pass the Threshold to Vega-Lite:**
  - Bind this value in Deneb and reference it in your Vega-Lite specification.

## Adjusting the Color Scale (Optional)

You can specify the `domain` in the `scale` of the `color` encoding to have more control:

json

```
"scale": {  
  "domain": [minValue, maxValue],  
  "range": ["#cce5ff", "#003366"]  
}
```

- Replace `minValue` and `maxValue` with your data's actual minimum and maximum.

## Conclusion

By implementing these changes, your "Total Quantity Ordered" text will dynamically switch between black and white based on the background color's luminosity, enhancing readability in your calendar heatmap.

---

Feel free to adjust the threshold value and other settings to best fit your data and design preferences. If you have any further questions or need additional assistance, please don't hesitate to ask!

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