**WGU D210 TASK 1 REV 10 - MATTINSON**

Dashboard and Storytelling of Telecom Churn Data

Mike Mattinson

Master of Science, Data Analytics, WGU.edu

Task 1: Data Dashboard and Storytelling

March 10, 2022

Abstract

Contents

[Part 1: Interactive Data Dashboard 4](#_Toc97361266)

[A. Interactive dashboard 4](#_Toc97361267)

[A1. The Dashboard 5](#_Toc97361268)

[A2. Key Performance Indicators 8](#_Toc97361269)

[A3. The Data 10](#_Toc97361270)

[A4. Install (Create) Dashboard using Tableau Desktop 15](#_Toc97361271)

[A5. Navigate Dashboard using Tableau Public 15](#_Toc97361272)

[Part 2: Storytelling with Data 17](#_Toc97361273)

[B. Presentation Video 17](#_Toc97361274)

[B1. Introduction 17](#_Toc97361275)

[B2. Data Summary 17](#_Toc97361276)

[B3. Outline Key Results 17](#_Toc97361277)

[B4. Data Representations 17](#_Toc97361278)

[B5. Actionable Insights 17](#_Toc97361279)

[Part 3: Reflection Paper 18](#_Toc97361280)

[C. Reflection Paper 18](#_Toc97361281)

[C1. Explain 18](#_Toc97361282)

[C2. Explain 18](#_Toc97361283)

[C3. Explain 18](#_Toc97361284)

[C4. Explain 18](#_Toc97361285)

[C5. Describe 18](#_Toc97361286)

[C6. Explain 18](#_Toc97361287)

[C7. Explain 18](#_Toc97361288)

[C8. Describe 18](#_Toc97361289)

[C9. Explain 18](#_Toc97361290)

List of Tables

List of Figures

[Figure 1 Example from dashboard 6](#_Toc97361291)

[Figure 2 Lost Revenue Calculated Field 8](#_Toc97361292)

[Figure 3 Revenue Calculated Field 9](#_Toc97361293)

[Figure 4 Data Relationships 14](#_Toc97361294)

[Figure 5 Top 3 States Lost Revenue 16](#_Toc97361295)

# Interactive Data Dashboard

## Interactive dashboard

Provide a copy of your interactive Tableau dashboard to support executive decision-making. Your dashboard must be accessible to users with colorblindness, and must include the components in each of the following areas:

* A1. The Interactive Dashboard
* A2. Key Performance Indicators computed from both data sets
* A3. Data integrated from two (2) data sets
* A4. Instructions to install dashboard
* A5. Instructions to navigate dashboard

### The Dashboard

Dashboard. For this task, I created multiple interactive dashboards using Tableau Public 2021.4.

* Link to my profile <https://public.tableau.com/app/profile/mike.mattinson>
* Link to the Density Dashboard <https://public.tableau.com/app/profile/mike.mattinson/viz/D210_Task1_Density_11/Density>
* Link to the Lost Revenue Dashboard <https://public.tableau.com/app/profile/mike.mattinson/viz/D210_Task1_Lost_Revenue_45/LostRevenue>
* Link to the Age Histogram Dashboard <https://public.tableau.com/app/profile/mike.mattinson/viz/d210_task1_Age_6/AgeHistogram>
* Link to the Lost Customer Dashboard <https://public.tableau.com/app/profile/mike.mattinson/viz/D210_Task1_Lost_Customers_1/LostCustomers>

The figure below shows an example from the Lost Revenue dashboard (Mattinson, 2022) :

Map

Description automatically generated

Figure Example from dashboard

interactive dashboard showing number of LOST customers from NORTHWEST REGION. dashboard components are automatically recalculated when different options are selected by user.

Colorblindness. To make the dashboard more accessible to users with colorblindness, I have chosen to use color-blindness friendly palette of blue and orange. According to Shaffer (Shaffer, 2022), “one color used together in combination with another color is generally fine when one of them is not usually associated with CVD.” Common CVD color combinations are Red/Green or Blue/Yellow, with Red/Green accounting for over 90% being the most common. (Turgut & Karanfil, 2022)

Four (4) Representations. My dashboard includes the following data representations to summarize the data or display trends:

|  |  |  |
| --- | --- | --- |
| **Dashboard** | **Primary Viz** | **Secondary Viz** |
| Lost Revenue | Heatmap | Barchart |
| Density | Heatmap | Barchart |
| Age | Histogram |  |
| Lost Customer | Hexmap |  |

Two (2) Interactive Controls. My dashboard contains the following interactive controls:

|  |  |  |  |
| --- | --- | --- | --- |
| **Dashboard** | **Calculated** | **Parameter** | **Filter** |
| Lost Revenue | Revenue |  | Churn=Yes |
| Density | Density |  | Churn=No |
| Age | Age (bins) | Bin Size |  |
| Lost Customers |  |  |  |
|  |  |  |  |

In addition to the primary controls, Tableau has other built -in controls such as:

* All visualizations have tooltips that have appropriate data displayed when user mouses into or over the data elements of the visualization
* When looking at a map, the user can zoom in and out with mouse wheel or by using the map tools at top left of map.
* On the map, the user can select one or more states or regions by selecting the item in the sub-totals, or by Ctrl-clicking on an area of the map.

### Key Performance Indicators

Key Performance Indicators (KPI). My dashboard includes the following key performance indicators:

Lost Revenue: Total aggregation of annual revenue lost because of lost customers.

[Monthly Charge]\*12

Revenue: Total aggregation annual revenue based on the loyal customer’s monthly charge.

count([Customer])/sum([Population])\*1000

Lost Customers: Total number of lost customers.

%Lost Customers: # of lost customers / total customers

### The Data

Provide both data sets that serve as the data source for the dashboard.

Data. This task uses one (1) primary internal dataset and two (2) external datasets.

Data set 1: churn\_clean.csv. This is the primary data provided by the telecom organization. It consists of 10,000 customer records. The data is broken down into the following attributes:

1. Customer\_id is categorical (CATEGORICAL): ['K409198' 'S120509' 'K191035' ... 'I243405' 'I641617' 'T38070'].

2. State is categorical (CATEGORICAL): ['AK' 'MI' 'OR' 'CA' 'TX' 'GA' 'TN' 'OK' 'FL' 'OH' 'PA' 'PR' 'IA' 'ME'

'IL' 'WI' 'NC' 'AL' 'NM' 'VT' 'MD' 'NY' 'WA' 'CT' 'NJ' 'DC' 'ND' 'LA'

'NE' 'WV' 'AZ' 'MO' 'WY' 'MT' 'VA' 'KY' 'MN' 'KS' 'MA' 'IN' 'SC' 'NH'

'DE' 'MS' 'ID' 'AR' 'SD' 'CO' 'HI' 'UT' 'RI' 'NV'].

3. Area is categorical (CATEGORICAL): ['Urban' 'Suburban' 'Rural'].

4. TimeZone is categorical (CATEGORICAL): ['America/Sitka' 'America/Detroit' 'America/Los\_Angeles' 'America/Chicago'

'America/New\_York' 'America/Puerto\_Rico' 'America/Denver'

'America/Menominee' 'America/Phoenix' 'America/Indiana/Indianapolis'

'America/Boise' 'America/Kentucky/Louisville' 'Pacific/Honolulu'

'America/Indiana/Petersburg' 'America/Nome' 'America/Anchorage'

'America/Indiana/Knox' 'America/Juneau' 'America/Toronto'

'America/Indiana/Winamac' 'America/Indiana/Vincennes'

'America/North\_Dakota/New\_Salem' 'America/Indiana/Tell\_City'

'America/Indiana/Marengo' 'America/Ojinaga'].

5. Children is numerical (CONTINUOUS) - type: int64.

Unique: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

6. Age is numerical (CONTINUOUS) - type: int64.

Unique: [18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89]

7. Income is numerical (CONTINUOUS) - type: float64.

Min: 348.670 Max: 258900.700 Std: 28199.917

8. Marital is categorical (CATEGORICAL): ['Widowed' 'Married' 'Separated' 'Never Married' 'Divorced'].

9. Gender is categorical (CATEGORICAL): ['Male' 'Female' 'Nonbinary'].

10. Churn is categorical (CATEGORICAL): ['No' 'Yes'].

11. Outage\_sec\_perweek is numerical (CONTINUOUS) - type: float64.

Min: 0.100 Max: 21.207 Std: 2.976

12. Email is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23]

13. Contacts is numerical (CONTINUOUS) - type: int64.

Unique: [0, 1, 2, 3, 4, 5, 6, 7]

14. Yearly\_equip\_failure is numerical (CONTINUOUS) - type: int64.

Unique: [0, 1, 2, 3, 4, 6]

15. Techie is categorical (CATEGORICAL): ['No' 'Yes'].

16. Contract is categorical (CATEGORICAL): ['One year' 'Month-to-month' 'Two Year'].

17. Port\_modem is categorical (CATEGORICAL): ['Yes' 'No'].

18. Tablet is categorical (CATEGORICAL): ['Yes' 'No'].

19. InternetService is categorical (CATEGORICAL): ['Fiber Optic' 'DSL' 'None'].

20. Phone is categorical (CATEGORICAL): ['Yes' 'No'].

21. Multiple is categorical (CATEGORICAL): ['No' 'Yes'].

22. OnlineSecurity is categorical (CATEGORICAL): ['Yes' 'No'].

23. OnlineBackup is categorical (CATEGORICAL): ['Yes' 'No'].

24. DeviceProtection is categorical (CATEGORICAL): ['No' 'Yes'].

25. TechSupport is categorical (CATEGORICAL): ['No' 'Yes'].

26. StreamingTV is categorical (CATEGORICAL): ['No' 'Yes'].

27. StreamingMovies is categorical (CATEGORICAL): ['Yes' 'No'].

28. PaperlessBilling is categorical (CATEGORICAL): ['Yes' 'No'].

29. PaymentMethod is categorical (CATEGORICAL): ['Credit Card (automatic)' 'Bank Transfer(automatic)' 'Mailed Check'

'Electronic Check'].

30. Tenure is numerical (CONTINUOUS) - type: float64.

Min: 1.000 Max: 71.999 Std: 26.443

31. MonthlyCharge is numerical (CONTINUOUS) - type: float64.

Min: 79.979 Max: 290.160 Std: 42.943

32. Bandwidth\_GB\_Year is numerical (CONTINUOUS) - type: float64.

Min: 155.507 Max: 7158.982 Std: 2185.295

33. Item1 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7]

34. Item2 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7]

35. Item3 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7, 8]

36. Item4 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7]

37. Item5 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7]

38. Item6 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7, 8]

39. Item7 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7]

40. Item8 is numerical (CONTINUOUS) - type: int64.

Unique: [1, 2, 3, 4, 5, 6, 7, 8]

Data set 2: population.csv. The original data had a population attribute, but I wanted to include population calculations based on each state’s total population. This is an external dataset from United States Census Bureau showing population data for the US states for years 2020 and 2021. The external population data is broken down as follows:

1. NAME is categorical (CATEGORICAL): ['United States' 'Northeast Region' 'Midwest Region' 'South Region'

'West Region' 'Oklahoma' 'Nebraska' 'Hawaii' 'South Dakota' 'Tennessee'

'Nevada' 'New Mexico' 'Iowa' 'Kansas' 'District of Columbia' 'Texas'

'Missouri' 'Arkansas' 'Michigan' 'New Hampshire' 'North Carolina' 'Ohio'

'South Carolina' 'Wyoming' 'California' 'North Dakota' 'Louisiana'

'Maryland' 'Delaware' 'Pennsylvania' 'Georgia' 'Oregon' 'Minnesota'

'Colorado' 'New Jersey' 'Kentucky' 'Washington' 'Maine' 'Vermont' 'Idaho'

'Indiana' 'Montana' 'New York' 'Puerto Rico' 'Connecticut' 'Florida'

'Virginia' 'Massachusetts' 'Illinois' 'Mississippi' 'Arizona' 'Utah'

'Wisconsin' 'Alabama' 'West Virginia' 'Rhode Island' 'Alaska'].

2. POP\_2021 is numerical (CONTINUOUS) - type: int64.

Unique: [732673, 29527941, 5039877, 21781128, 6165129, 19835913, 4246155, 1104271, 895376, 1441553, 6984723, 7276316, 57159838, 774948, 2115877, 5707390, 1963692, 4624047, 1782959, 11780017, 5190705, 2934582, 3143991, 9267130, 1095610, 1388992, 645570, 7738692, 3337975, 39237836, 2949965, 10799566, 3986639, 4509394, 1372247, 12964056, 6168187, 3605597, 3263584, 6805985, 670050, 3025891, 68841444, 5812069, 8642274, 5895908, 12671469, 331893745, 127225329, 6975218, 578803, 1900923, 3193079, 1003384, 10551162, 10050811, 78667134]

Source: NST\_EST2021\_POP Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia, and Puerto Rico: April 1, 2020 to July 1, 2021 (US Census Bureau, 2022)

Data set 3: states.csv. To link between churn data and the population data, I needed another indexing table. Churn data uses two (2) letter state code and the population data uses the full state name. The index table has both fields and can be used to link between tables. The external states data is broken down as follows:

1. State is categorical (CATEGORICAL): ['Alabama' 'Alaska' 'Arizona' 'Arkansas' 'California' 'Colorado'

'Connecticut' 'Delaware' 'District of Columbia' 'Florida' 'Georgia'

'Hawaii' 'Idaho' 'Illinois' 'Indiana' 'Iowa' 'Kansas' 'Kentucky'

'Louisiana' 'Maine' 'Maryland' 'Massachusetts' 'Michigan' 'Minnesota'

'Mississippi' 'Missouri' 'Montana' 'Nebraska' 'Nevada' 'New Hampshire'

'New Jersey' 'New Mexico' 'New York' 'North Carolina' 'North Dakota'

'Ohio' 'Oklahoma' 'Oregon' 'Pennsylvania' 'Rhode Island' 'South Carolina'

'South Dakota' 'Tennessee' 'Texas' 'Utah' 'Vermont' 'Virginia'

'Washington' 'West Virginia' 'Wisconsin' 'Wyoming'].

2. Code is categorical (CATEGORICAL): ['AL' 'AK' 'AZ' 'AR' 'CA' 'CO' 'CT' 'DE' 'DC' 'FL' 'GA' 'HI' 'ID' 'IL'

'IN' 'IA' 'KS' 'KY' 'LA' 'ME' 'MD' 'MA' 'MI' 'MN' 'MS' 'MO' 'MT' 'NE'

'NV' 'NH' 'NJ' 'NM' 'NY' 'NC' 'ND' 'OH' 'OK' 'OR' 'PA' 'RI' 'SC' 'SD'

'TN' 'TX' 'UT' 'VT' 'VA' 'WA' 'WV' 'WI' 'WY'].

Source: US States Names and Abbreviations data. (World Population Review, 2022)

The tables will be linked as follows:

Diagram

Description automatically generated

1 : ꝏ

ꝏ : 1

Figure Data Relationships

Churn: State has 1:Many relationship with States:Code. Population: Name has 1:Many relationship with States:State

### Install (Create) Dashboard using Tableau Desktop

Provide step-by-step instructions to guide users through the dashboard installation.

I have created a separate document titles, “Creating the Density Dashboard” which explains the details of creating the sheets and dashboards.

### Navigate Dashboard using Tableau Public

Provide instructions to help users navigate the dashboard. There are numerous ways to navigate the dashboard, the fact that it is an interactive dashboard means the user can change the look and results of each data representation, and thereby, the user can create any number of navigational sequences.

For the purpose of this paper, I will demonstrate a typical navigational sequence by answering the following question:

#### Step 1. What are the top three (3) states contributing to the highest lost revenue? That is, aggregate revenue by state, sort by aggregated revenue descending and only consider lost customers. The results should show a list of states in sorted order, and we want to consider the top 3 states in that list.

#### Step 2. Open the latest version of the Lost Revenue dashboard

#### Step 3. Make sure that you are seeing all of the domestic US states, if there were a selection filter applied, you may only be seeing a portion of the total data. Clear any of the selection filters by clicking on the blue heading to un-select it.

#### Step 4. While looking at all states, update the Top N parameter to 3, then click enter key. This will refresh the table and the heading will show “Top 3 States”

#### Step 5. Now click on the lower table where it says “Top 3 States”, the map will refresh and the upper key measures tables will refresh data based on the selection, it should look like this:

Map

Description automatically generated

Figure Top 3 States Lost Revenue

the figure shows total number of lost customers, 447. The average monthly charge for those lost customers, $201.32. The total amount of lost revenue, $1.1M. The map refreshes to show only those states, tx, pa and ny. the bottom table shows the three states ranked by highest lost revenue.

# Storytelling with Data

## Presentation Video

Text

Description automatically generated

# Reflection Paper

## Reflection Paper

Text

Description automatically generated

### Explain

### Explain

### Explain

### Explain

### Describe

### Explain

### Explain

### Describe

### Explain

References

Mattinson, M. (2022, January 30). *Mike Mattinson*. Retrieved from Tableau Public: https://public.tableau.com/app/profile/mike.mattinson

Shaffer, J. (2022, January 30). *5 tips on designing colorblind-friendly visualizations*. Retrieved from Tableau Blog: https://www.tableau.com/about/blog/examining-data-viz-rules-dont-use-red-green-together#:~:text=For%20example%2C%20blue%2Forange%20is,palette%20designed%20by%20Maureen%20Stone.

The Investopedia Team. (2022, February 1). *What Are the Best Metrics to Evaluate a Telecommunications Company?* Retrieved from Investopedia.com: https://www.investopedia.com/ask/answers/122414/what-are-best-metrics-evaluate-telecommunication-company.asp

Turgut, B., & Karanfil, F. C. (2022, January 30). *Appropriate terminology in the nomenclature of the color vision deficiency*. Retrieved from Open Access Text: https://www.oatext.com/appropriate-terminology-in-the-nomenclature-of-the-color-vision-deficiency.php

US Census Bureau. (2022, January 31). *NST\_EST2021\_POP*. Retrieved from data.census.gov: https://data.census.gov/cedsci/table?tid=PEPPOP2021.NST\_EST2021\_POP

World Population Review. (2022, January 31). *List of State Abbreviations*. Retrieved from worldpopulationreview.com: https://worldpopulationreview.com/states/state-abbreviations