D210: Representation and Reporting

Analysis of WGU Telecom Customer Churn Data

Andrew Mecchi

Masters of Data Analytics, Western Governors University

The following report covers the Performance Assessment for D210 Representation and Reporting. This document is categorized by the questions defined in the rubric.

Part I: Interactive Data Dashboard

A1. Provide *both* data sets that serve as the data source for the dashboard.

See Attached: wgu_telecom_churn.csv, kaggle_telecom_churn.csv

A2. Provide step-by-step instructions to guide users through the dashboard installation.

The interactive analysis of customer churn between two Telecom companies has been made available to all through publishing the dashboard on Tableau Public, a free platform for users to access and examine data visualizations. The following instructions will guide the user to the dashboard.

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1) Please enter or click the following link to view the Tableau Public dashboard.

    a) Link: WGU and Kaggle Customer Telecom Customer or

    b) Enter the following into the URL:

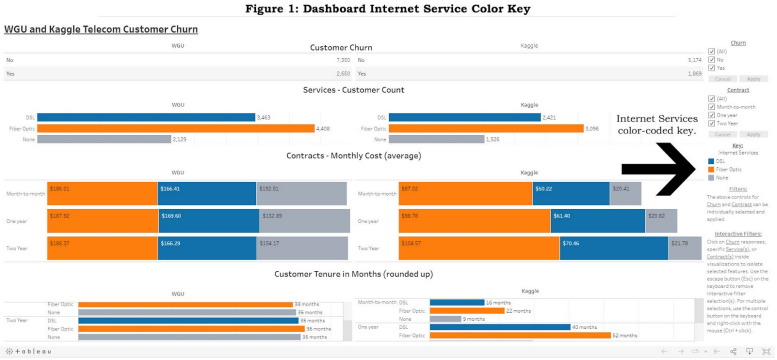
    https://public.tableau.com/views/WGUandKaggleTelecom_CustomerChurn_Mecchi_WGU_D210/Final?:language=en-US&publish=yes&:display_count=n&:origin=viz_share_link

2) If the link doesn't work in section 1a, please copy the web address from 1b and paste the URL into your web browser.

A3. Provide instructions to help users navigate the dashboard.

The dashboard includes several interactive features used to explore, manipulate, and visualize customer churn habits by analyzing Internet Services, Contracts, and Tenure. There are three Internet Services offered, DSL, Fiber Optic, and None, and they are color-coded for ease of identification (DSL = blue, Fiber Optic = orange, None = gray) as seen in figure one (Fig. 1). For deeper analysis, several filters were added to provide the user(s) with individual control for refined integration.

Figure 1: Dashboard Internet Service Color Key



The Tableau dashboard has several filters for user(s) to isolate Churn, Contracts, and Internet Services. The two main filters are for customer Churn and Contracts, located along the right-hand side of the window. The user can select the desired filter with the checkbox and confirm selection by clicking “apply’ (Fig. 2). Additionally, certain attributes of the visualization itself can be used for filtering views. Similar to the Churn click-and-apply filter, the rows within customer Churn for both WGU and Kaggle can be used to isolate Churn responses (Fig. 3). If using the interactive visualization filters, simply click the selection a second time to deselect the filter, or, press the escape button on the keyboard (Esc).

Figure 2: Filter Controls

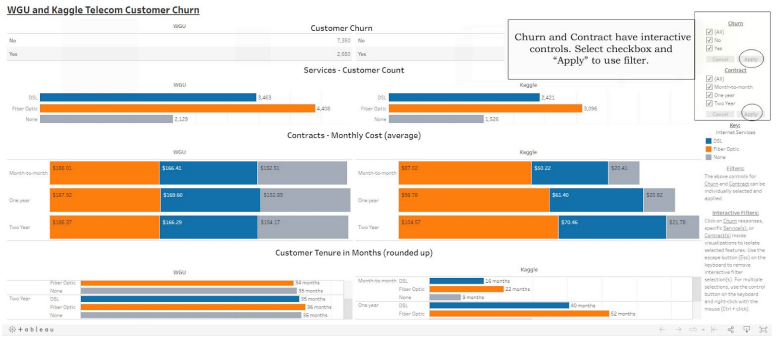
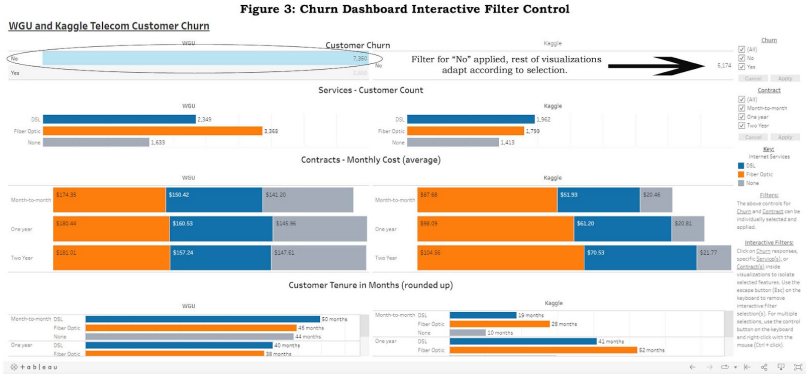


Figure 3: Churn Dashboard Interactive Filter Control



In addition to the Churn visualization filter, both Services and Contracts images can be used for adjusting analytical views. The user can elect to isolate an individual Internet Service or multiple Services can be selected by using the combination of the control key on the keyboard and a

left-click with the mouse (Ctrl+click). Contracts can be filtered individually or in multiples using the same method (Ctrl+click) and can be used in combination with other interactive controls within other visualizations (Fig. 4). Furthermore, Contracts can be isolated by selecting an individual contract option (Month-to-Month, One Year, Two Years) or the user can select a specific Contract for a type of Services (Fig. 5). If one or more filters are selected and the user wants to remove a selection, a left-click with the mouse on the selection will remove the feature highlight, or use the “escape” button (Esc) as previously mentioned.

Figure 4: Multiple Filter Selection with Visualization

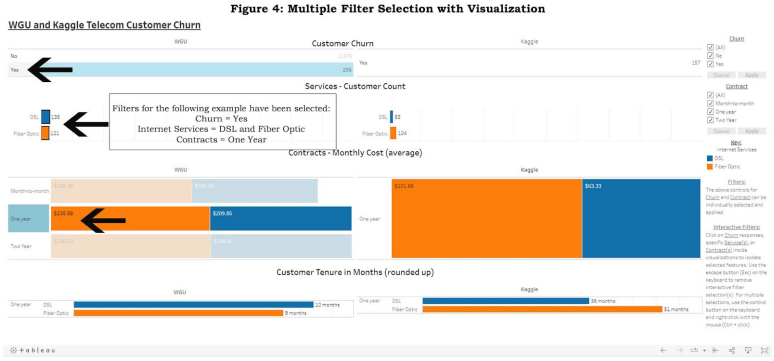
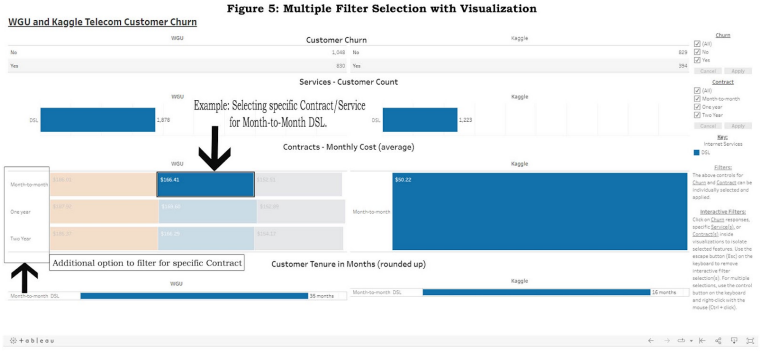
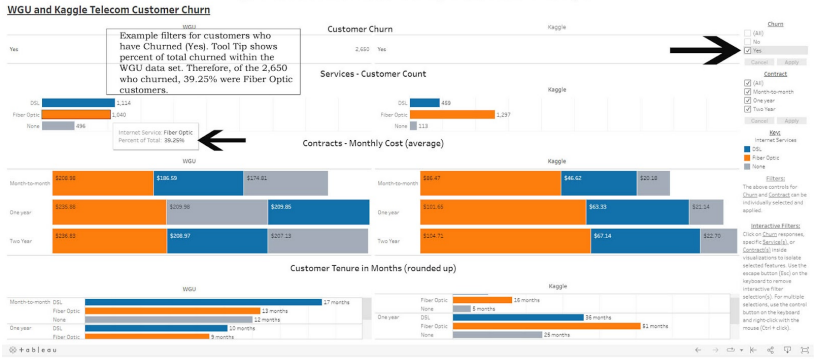


Figure 5: Multiple Filter Selection with Visualization



Between the click-and-apply filters and interactive dashboard feature selection, summary information can be easily interpreted with the on-screen visuals, or specifics can be highlighted when the mouse icon hovers over desired data. A Tool Tip provides additional information for the user to interpret data as they filter and refine visuals (Fig. 6). Each visualization provides content-specific Tool Tips, including percent of total(s) within customer Churn and Services, however, it is important to note the percentage is calculated based on the total value(s) filtered. For example, if isolating a specific Internet Service, the total will show 100% as the dashboard is filtering for an individual Service; whereas, isolating customer Churn, the Tool Tip in Services will show the percentage of those that churned within a specific Service (Fig. 7).

Figure 7: Percent of Total Tool Tip Visualization Example



The Customer Churn dashboard is fully equipped for users to isolate metrics for their desired analytics and features both interactive and click-and-apply filters. The design of the dashboard provides the user with complete control to manipulate and explore features which will provide decision-makers with detailed information and actionable insights.

Part II: Storytelling with Data

B1. Panopto presentation

See attached Panopto video - Panopto Video

https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=55cf6fe7-c4df-4ccc-80ba-b0300012c7c5

Part III: Reflection Paper

C1. Explain how the purpose and function of your dashboard align with the needs outlined in the data dictionary associated with your chosen data set.

As an analyst in the telecommunications industry, designing a dashboard to explore customer Churn, Contracts, Internet Services, and Tenure provides executive leaders with the information necessary to observe trends while assessing key performance metrics. The data dictionary informs that annual customer churn rates may be as high as 25% and obtaining new customers can cost up to ten times more than retaining current subscribers. The potential of losing customers and incurring additional expenditures to acquire new patrons leads to a financial pitfall. The goal of creating this dashboard will lead to actionable insights on how to best maintain customer retention. The functionality of the dashboard gives decision-makers control to compare customer churn rates while assessing monthly costs and tenure. The key performance metrics gleaned from the dashboard will show executive leaders common trends of retained

patrons compared to those who have churned. Executives will be able to identify which contracts and services are most costly, if they lead to customer churn, and how long the customer is likely to stay before churn. Observing these financial comparisons will yield actionable insights that will ultimately lead to customer retention and continued success for the company.

C2. Explain how the variables in the additional data set enhance the insights that can be drawn from the data set you chose from the provided options.

The telecommunications industry is highly competitive, thus, it is imperative the additional data set augments insights learned from our company's data. Using the Kaggle Telecom data set shows customer churn rates from an industry competitor, therefore, providing a comparative analysis of common variables found in both data sets. The Kaggle Telecom data contains information on customer Churn, Internet Services, Contracts, and Tenure; the same variables evaluated by our company. Both data sets contain similar variables which establishes an immediate relationship to between sets, allowing for important insights to be learned from an industry competitor. Executive leaders have the ability to assess the services, contracts, and tenure between companies leading to the identification of key metrics for successful retention while avoiding customer churn.

C3. Explain two different data representations from your dashboard and how executive leaders can use them to support decision-making.

The Tableau dashboard provides executive leaders with two visual representations of how contract terms compare to average Monthly Charges and average customer Tenure (in months). With these visualizations, decision-makers can find differences in customer habits for those who have churned relative to those who remain loyal patrons.

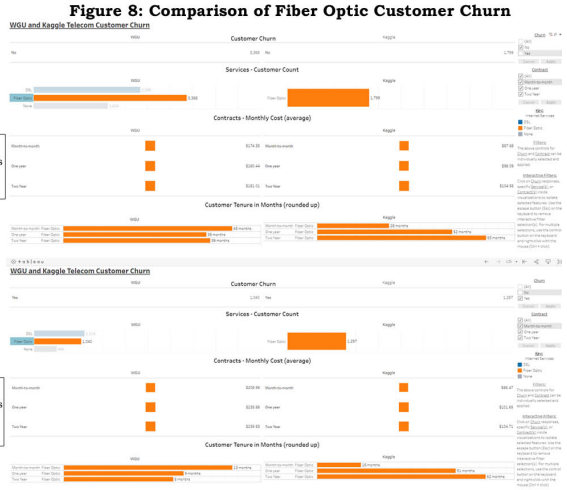
The representation of contract terms and average monthly charges provides insight into customers' monthly expenditures relative to the length of contract for a specific service. At a broad glance, monthly averages based on contract terms (month-to-month, one year, two years) show which plans are (on average) most expensive and the number of customers within each plan. Similarly, the bar chart of average tenure (in months) compared to contract terms show executives which plans lead to the longest customer tenure, or, plans with the greatest customer retention.

These two visualizations, when used in tandem, provide a comparative analysis for customer habits who have churned and those who are retained. Analyzing monthly expenditures, contract terms, and services give executives the information necessary to garner actionable insights to improve the business. For example, executive leaders can compare our Fiber Optic service based on contract terms while assessing totals of customers who churn versus those who remain.

When isolating the relationship of Fiber Optic churn rates, decision-makers will observe a stark contrast in monthly payments for each contract type and average length of tenure (Fig. 8). Executives will see a low monthly average of tenure with customers who churned from Fiber Optic one- and two-year contracts. These customers churned within a year of signing up for the service and were paying approximately $55 more each month for the same service relative to those who remained with the company (Fig. 8). Also, of the Fiber Optic customers who remained loyal, their average monthly cost was lower than those who churned, more importantly, their average monthly tenure was substantially greater.

Figure 8: Comparison of Fiber Optic Customer Churn

WGU - Retained Customers
Month to Month - $174.35 - 45 Months
1 Year - $180.44 - 38 Months
2 Years - $181.01 - 39 Months



WGU Churned Customers
Month to Month - $208.98 - 13 Months
1 Year - $235.88 - 9 Months
2 Years - $236.83 - 8 Months

These two dashboard visualizations representing Internet Services, Contracts, and Tenure can be used to make similar comparisons of our DSL service and those who have None. Executive leaders are equipped with the tools necessary to analyze key metrics of our services from manipulating these data representations. The visualizations inform decision-makers of customer trends based on Internet Services, Contracts, and Tenure; leading to actionable insights based on the information learned when comparing customer churn to customer retention.

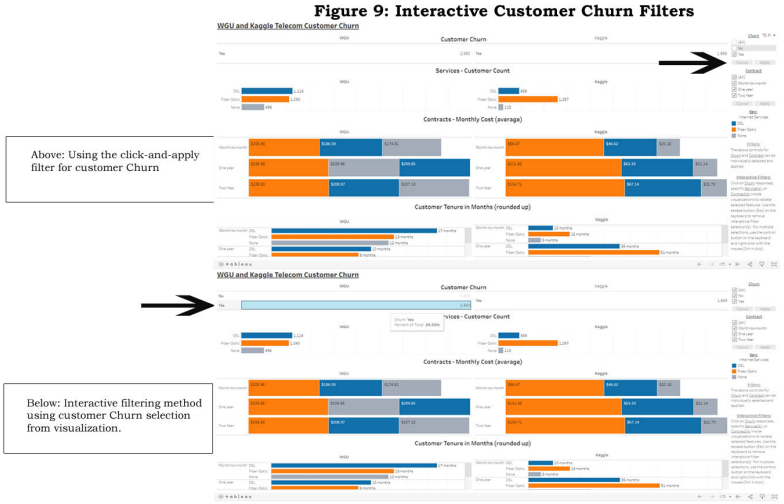
C4. Explain two interactive controls in your dashboard and how *each* enables the user to modify the presentation of the data.

The dashboard provides executive leaders with the control to explore, manipulate, and analyze performance metrics with regard to customer churn between two telecom data sets. The dashboard features both filters and interactive control to refine visualizations and glean important insight into possible business strengths or weaknesses. Two of these powerful interactive controls allow executive's to isolate customer churn and the other can configure visualizations of individual or multiple contract(s) views.

The ability to manipulate customer churn data is a great advantage for decision-makers as they can get firsthand control and knowledge of customer churn and retention trends. There are two ways to control the view of customer churn, either the click-and-apply Churn filter, or the user

can select a specific churn (yes/no) from the summary of customer churn's visualization (Fig. 9). This gives executives immediate insight into the number and percentage of patrons who have left and those who remained. Furthermore, isolating a specific churn updates the performance metrics accordingly, leading to important information necessary for actionable insight.

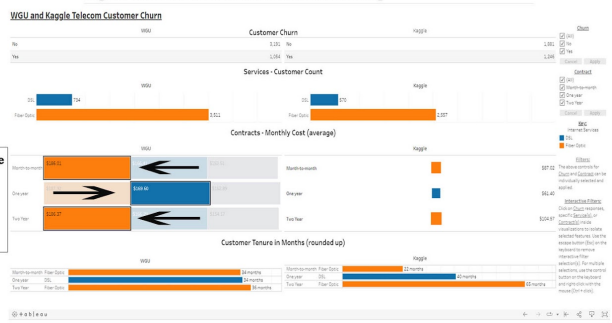
Figure 9: Interactive Customer Churn Filters



In addition to controlling the visualization's churn narrative, executive leaders can analyze contract types individually, in multiples, or as a whole. Similar to the Churn filter options, Contracts also has a click-and-apply filter as well as interactivity on the visualization itself. The user can elect to isolate a contract, by selecting month-to-month, one year, or two years on the graphic or by using click-and-apply (Fig. 10). If filtering from the visualization, multiple contracts can be selected using a combination of the control button on the keyboard and a left-click of the mouse (Ctrl+click). The graphic filtering also enables decision-makers to directly compare plans between data sets by clicking on a specific contract plan by service type (Fig. 11).

Figure 10: Interactive Contract Filters

Figure 11: More Interactive Contract Filtering



Example of multiple feature selection using interactive Contract filter. Selection filters for Month-to-Month Fiber Optic contracts AND One year DSL contract.

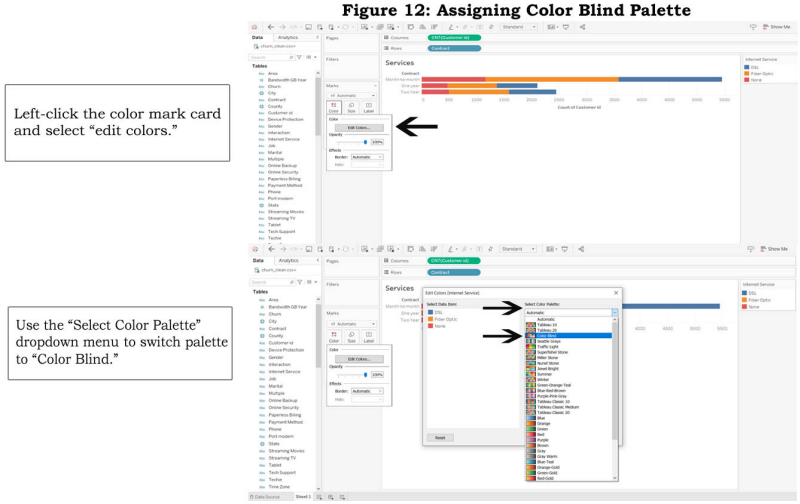
Creating a dashboard with interactive filters grants analytical power to the user in manipulating the visualization to curate a desired view. Both Churn and Contracts can be filtered using their click-and-apply options, or, the visualizations themselves can be used to alter the graphic according to the selection(s). These filters can be used individually or combined to gain knowledge from the key performance metrics revealed through filter application.

C5. Describe how you built your dashboard to be accessible for individuals with colorblindness.

During the creation of the dashboard it is imperative to be considerate of the audience who will view the presentation. Therefore, when adding dynamic color to the visualizations, making appropriate accommodations for individuals with color blindness were addressed. The dashboard tells the story of customer churn relative to Internet Service, Contract, and Tenure. Therefore, data demarcation using color helps serve as a great storytelling aid and Tableau's "color blind" palette caters to the visually impaired.

To better aid in the comprehensive analysis of data visualization, I assigned color to designate visual contrasts for Internet Services. As a telecommunications business, the internet services supplied to our customers is one of our main focuses and color-coding services draws the attention of audiences' eyes to that part of the story. When assigning color to the dashboard, Tableau's default setting auto-designates the "automatic" palette. The visuals were adjusted by left-clicking the "color" marks card and selecting "edit colors" (Tableau, n.d.). Within the "edit colors" pop-up window, the "color blind" option was selected from the dropdown menu and the identifying colors for services automatically adjusted when the palette was assigned (Fig. 12). This process was instituted for each visualization involving Internet Services and ensured the dashboard's graphic representations accommodate individuals with colorblindness.

Figure 12: Assigning Color Blind Palette



C6. Explain how two data representations in your presentation support the story you wanted to tell.

The WGU and Kaggle Telecom data dashboard tells the story of customer churn relative to average monthly costs and average contract tenure between two similar companies. The visualization for Contracts guides the user through the average monthly bill for service-specific contract term offers (i.e. month-to-month DSL, one year DSL, two year Fiber Optic, etc.). Meanwhile, the Tenure graphic adds great detail about customer tenure habits with regards to monthly payments. When visualized as a whole, the story comes together and yields attention-grabbing key performance metrics about customer churn and retention. The analysis focuses on the WGU data because the target audience is executive decision-makers within WGU’s Telecom company and the visualizations are supported in comparison to the Kaggle Telecom data.

If viewing the presentation without filtering for customer churn, the story would lead WGU executives to believe the majority of our clientele to be content with moderately priced monthly charges with an equal spread of average tenure (Fig. 13). The story begins when the filter is applied for customers who have remained loyal (no churn) and the two visualizations show trends and metrics of retained patrons. When observing the WGU data, the average monthly costs slightly decreases and the average customer tenure increases for nearly all plans and services. For example, observing one-year DSL contracts without using the churn filter, WGU customers' monthly bills averaged $169.60 and the contract term averaged 34 months (Fig 13). However, when looking at the same DSL contract term with customers who have not churned, the numbers slightly improve; the average monthly expenditure dropped to $160.53 while average tenure increased to 40 months (Fig 14).

Figure 13: Untold Story of Unfiltered Data is Misleading

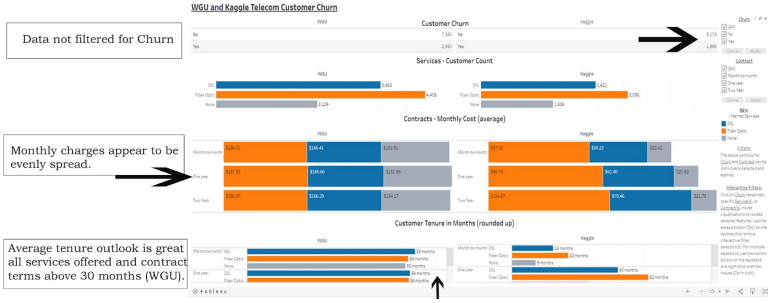
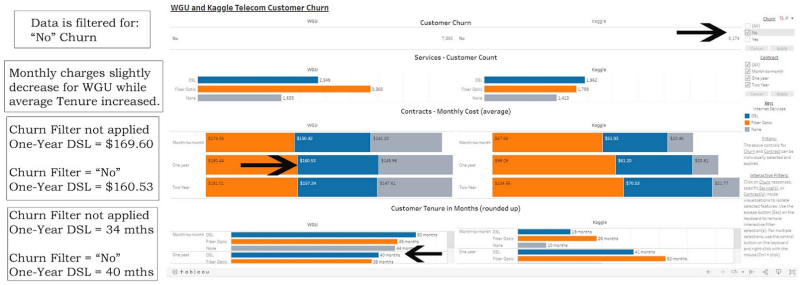
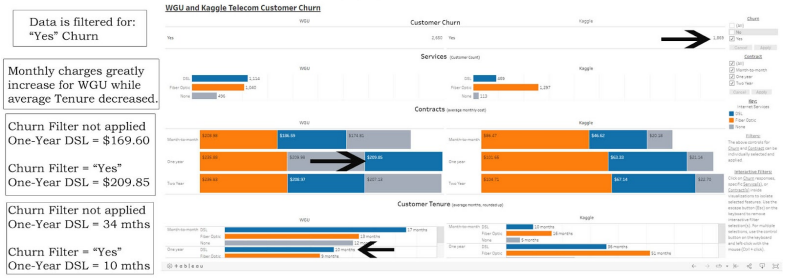


Figure 14: Applying the Churn "No" Filter



The two visualizations continue to have the story unfold when the Churn filter is then switched to "yes." The dashboard showed an improvement in numbers when comparing variables between no applied filters to viewing loyal customers (no churn). However, when examining the data for customers who have churned, the other side of the story presents itself. Following the previous example, the trends for customers who churned from one-year DSL contracts averaged monthly charges of $209.85 with an average tenure of 10-months (Fig. 15). In other words, clients with one-year DSL plans churned before the limit of their contract was reached. These diverging metrics between customers who have churned versus retained hold true for all services offered by WGU and similar patterns are observed in the Kaggle data set. These two visualizations, Services (average monthly charges) and Tenure (average months), tell the story of customer churn/retention habits and provide visual summaries with detailed key performance metrics.

Figure 15: Applying the Churn "Yes" Filter



The key detail learned from the dashboard informs executive leaders that retained customers paid lower monthly averages than those who churned, but more importantly, they stayed significantly longer than those who canceled their services (Fig. 16). With these findings, decision-makers have actionable insights into customer habits and can create new business plans to improve and maintain customer retention.

Figure 16: Analysis of Cost and Tenure Differentials for WGU Customer Churn

		Churn	No		Churn	Yes			
Contract	Service	Cost	Tenure		Cost	Tenure		Cost Difference	Tenure Difference
Month-to-Month	DSL	$150.42	50		$186.59	17		-$36.17	33
One Year	DSL	$160.53	40		$209.85	10		-$49.32	30
Two Years	DSL	$157.24	40		$208.97	11		-$51.73	29
Month-to-Month	Fiber Optic	$174.35	45		$208.98	13		-$34.63	32
One Year	Fiber Optic	$180.44	38		$235.88	9		-$55.44	29
Two Years	Fiber Optic	$181.01	39		$236.83	8		-$55.82	31

C7. Explain how you used audience analysis to adapt the message in your presentation.

When designing a dashboard, a major component to consider is, who am I trying to reach and how should I shape the message of the story I want to tell. The WGU and Kaggle Telecom customer churn data is used to present WGU Telecom board executives with a detailed journey of customer churn and retention metrics pertaining to Services, Contracts, and Tenure. Knowing executives are the intended audience, it was imperative to adapt the message accordingly.

The first step in audience analysis is to identify who the audience is, understand their background, know their role within the company, identify the focus of their role, and tailor dashboard content and structure to achieve the storytelling goal (LinkedIn, 2023). Knowing executives were the target audience, the focus of the story caters to their concern over customer churn numbers relative to Services, Contracts, and Tenure. The data dictionary details customer churn rates can be as high as 25% in the telecommunication industry, thus, creating a dashboard of our (WGU) customer churn data compared to another Telecom company instantly grabs the attention of executive leaders.

Additionally, it is equally important to understand some of the audience's demographics; knowledge of the topic, their technical abilities, and familiarity of the material presented (University of Minnesota Libraries Publishing Services, n.d.). With this caveat, the presentation has a targeted focus for customer churn. To grab the viewer’s attention and reiterate the focal point, customer churn numbers and filter(s) are located atop the dashboard (Fig. 17). Also, knowing executives are concerned with customer recruitment, retention, and promotions, the visualizations are curated in a fashion that targets these areas of interest. The middle of the visualization draws the audience’s eyes to financial performance metrics in services while the

lower portion covers tenure (Fig. 18). These metrics are of great interest for decision-makers who want to improve recruitment, retention, and promotions.

Figure 17: Dashboard Focus on Customer Churn

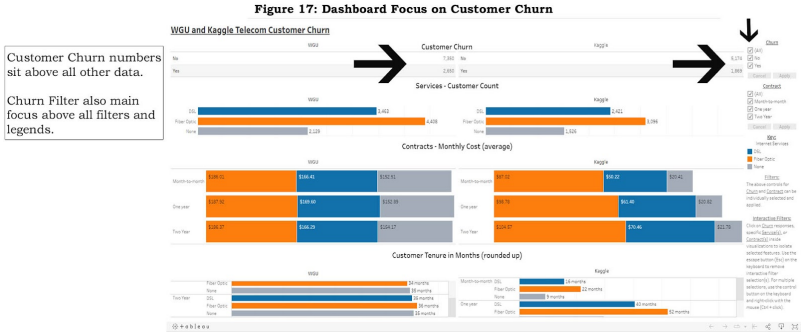
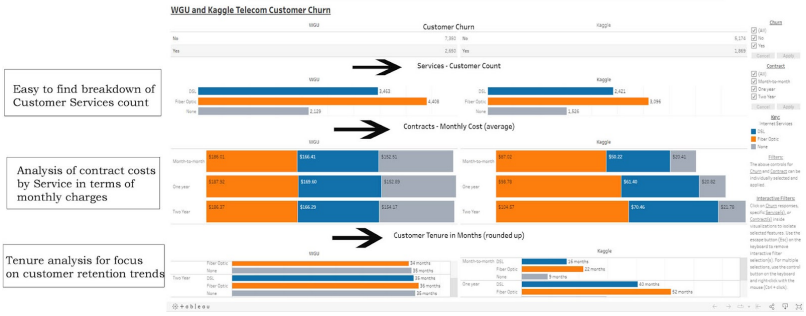
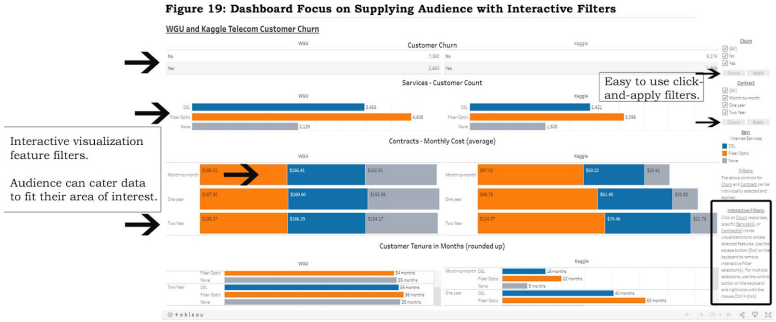


Figure 18: Dashboard Focus on Performance Metrics



Lastly, when designing a dashboard for key decision-makers, I considered the inherent egocentrism that exists in audiences (University of Pittsburgh Department of Communication, n.d.). To address any potential conflicts, simple filters were added that reveal complex scenarios and key metrics, therefore, effectively showing the audience why the presented topic is of great importance. Moreover, adding basic data manipulation tools empowers the audience member(s) with the ability to transform the data and graphics according to their strengths and interests (Fig. 19). Enforcing this audience analysis was an important process considered when designing the customer churn dashboard for WGU Telecom executives and decision-makers. These steps taken to address the the audience present a simple story with complex details that can be revealed and controlled by the user(s), thus effectively adapting my message to the intended viewers.

Figure 19: Dashboard Focus on Supplying Audience with Interactive Filters



C8. Describe how you designed your presentation for universal access by all audiences.

The design of the dashboard was inherently rooted with the target audience in mind, executive leaders. However, when it came to visuals and dashboard interactivity, designing graphics and information summaries for universal access were implemented. One such feature has been previously discussed, but assigning the palette for color blindness was a simple, inclusive design decision that caters to all audiences. While understanding the needs for graphics to be clear and concise for the audience, I also adapted the dashboard to be viewed on multiple devices.

Understanding the need for the presentation to have universal access by all audiences, I made sure the dashboard maintained integrity and functionality across the device spectrum. Tableau defaults to creating dashboards for desktop/laptop viewership, however, those who want access to the presentation may not always be at a computer. Therefore, the filters and graphics were adjusted in Tableau for compatibility with phones and tablets.

Lastly, when constructing visuals, the concept of vertical logic and influences from the Gestalt Principle of Visual Perception were used. Vertical logic indicates the information presented on the dashboard is self-reinforcing, while the Gestalt Principle influenced the proximity, similarity, and alignment of the visual elements (Knaflic, 2015). These methods are observed throughout the Services, Contracts, and Tenure graphics. Each visualization reinforces the findings established through data filtration and they are placed on the dashboard where proximity and storytelling align. The Services connect to the Contracts visualization through Internet Service breakdown, and Contracts are connected with Tenure through contract terms; guiding the viewer through each intertwined graphic. Implementing all of these methods helped convey a complex story to a universal audience.

C9. Explain two elements of effective storytelling that you implemented in your presentation and how *each* element was intended to engage the audience

When presenting the dashboard to executive leaders, creating a welcoming environment with an engaging story helps to effectively communicate the message across to the intended audience. Two elements of effective storytelling played an important role with the design and presentation of my dashboard; creating a compelling narrative that engages the audience and using relatable analogous experiences to connect with members of the audience (Rose 2017).

Creating a compelling story starts with a brief introduction to the presentation and what the general focus will outline. In my presentation, the focal point is customer churn, but is presented in a stepwise fashion. First, the audience is introduced to the data and shown performance metrics at a broad glance, including all data without targeting a specific churn. Next, the details of our proverbial protagonist, loyal customers, are introduced by isolating the features for customers who did not churn. Following a summary of our successes, introducing conflict brings

the audience’s focus to the story's plot, customer churn (Wong, 2020). Conflict is presented when the filters are adjusted for the customers who have recently churned.

With the audience introduced and involved with the story, the second element, stimulating curiosity through relatable experiences reinforces audience engagement. Presenting relatable experiences relative to the WGU customer churn story connects audience members with the data presented on the dashboard, but having analogous experiences assists with understanding of the message conveyed. For example, I summarize the difference in key metrics between customers who churn versus those who are retained as a tale of two Starbucks across the street from each other. The performance metrics show a trend where customers have prolonged tenure with lower monthly costs per service while customers who churn tend to spend more and have shorter tenure. To elucidate the trend, I use the story of two adjacent Starbucks and equate Internet Services to the coffee, or in other words, assess two different costs for the same product. Therefore, our customers are more likely to have prolonged tenure with lower costs as opposed to shorter tenure with higher costs. In terms of coffee, I explain that a customer is more likely to continue to return to the cheaper Starbucks over time because they are receiving the same product that is offered across the street, but saving money is the driving force.

Implementing these methods of effective storytelling introduce a dense topic to executives, however, through the use of effective storytelling, they maintain and engage audience members to follow the story and learn from an experience rather than a presentation. Through the use of compelling narrative creation and developing relatable connections I am able to tell the story of WGU Telecom customer churn while harnessing the power of data to tell a story and engage the audience.

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