

Understanding Customer Churn Conditions

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Introduction

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Telecommunication Situation

Telecommunication company that conducts business in the United States and Puerto Rico

Provides multiple services: Internet, Phone, Cable, Streaming Movies, Streaming TV, and more

Provides three different service contracts to clients: Month-to-month, One-year, & Two-year options

Provides services to a diverse group of customers

Collects information from customers at point of sign up for services

Customers Churn: Customers make the decision to decline future services with the Telecommunication company.

Telecommunication Data Set



The Telecommunication company has collected information about its customers and services provided at point of sign up for services and is provided as the data set `churn_clean.csv`.



This data set is composed of demographic data about the customer, the types of services that they selected, and responses to a questionnaire about service preferences.



The data set provided represents 10000 observations of 50 variables

U.S. Census Data Set

The Census Data set used was provided by the U.S. Census Bureau: <https://www2.census.gov/programs-surveys/popest/datasets/2010-2019/national/totals/nst-est2019-alldata.csv>

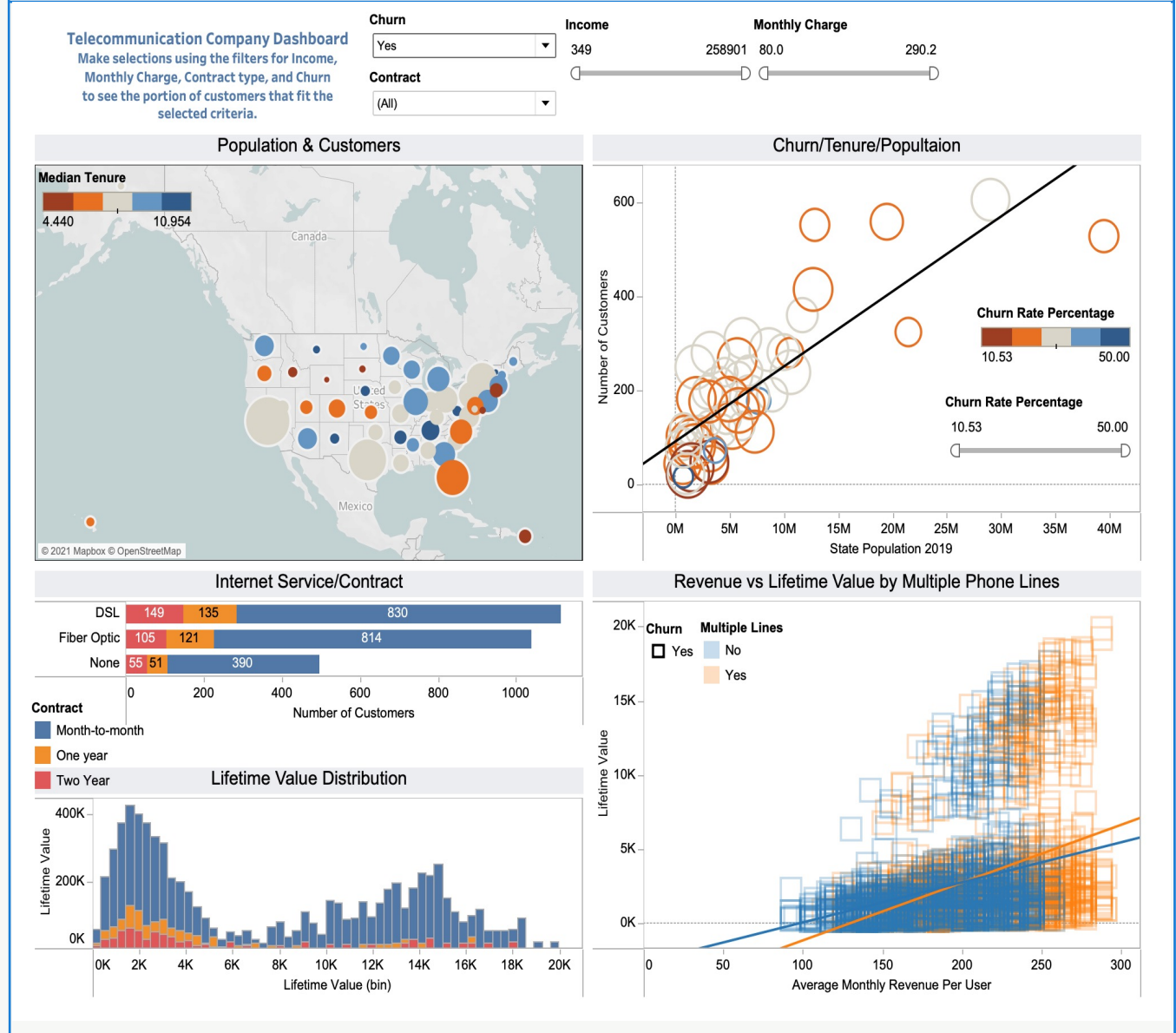
State population data was selected from the complete data set for the most recent year available 2019. This selection was made because no date time information was provided in the churn data set.

An additional feature was engineered as "state" . The observations recorded in this feature were the abbreviations for each state. This was performed for seamless joining of the two data sets.

The information contained is a by state population estimate for 2019 made by the U.S Census Bureau including Puerto Rico.

What is the Data telling us?

- Most customers that churn have month to month contracts
- More DSL internet service customers churn than Fiber optic internet customers
- As customers lifetime value increases the churn rate of one year and two-year contracted customers decreases
- Lifetime value of customers with multiple phone lines trends higher than customers without.
- 2 populations are captured in the telecommunication data set.
- Those with tenure below 33 months and
- Those with tenure above 33 months



Distribution of churned customers

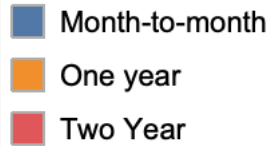
Lifetime value is an expression of the customers monthly charge multiplied by the tenure of the customer.

Month to month contracts make up the majority of churned customers

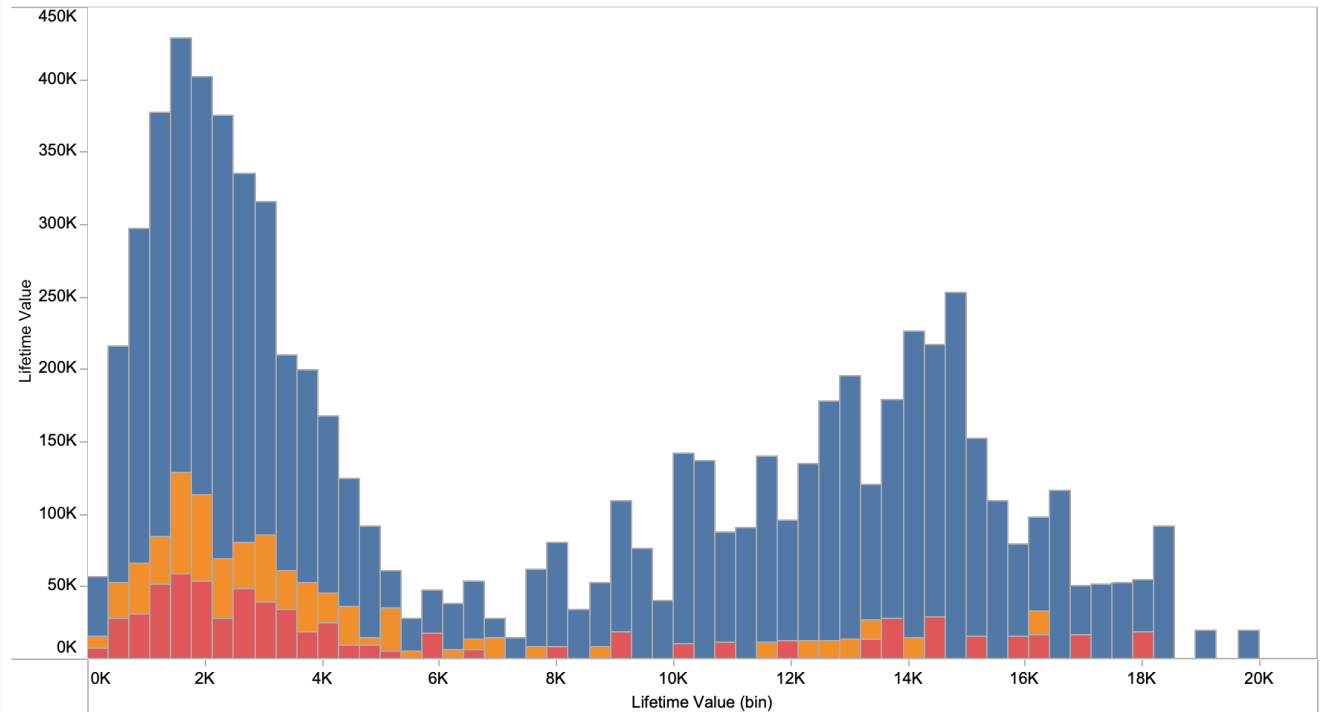
The distribution is bimodal indicating that two populations are captured by this data

The rate of churn for 1 & 2 year contracts decreases with the length of tenure

Contract



Lifetime Value Distribution



Caption

The plot of sum of Lifetime Value for Lifetime Value (bin). Color shows details about Contract. The data is filtered on Churn, Income, Monthly Charge and Action (State). The Churn filter keeps Yes. The Income filter ranges from 348.67 to 258900.7 and keeps Null values. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Action (State) filter keeps 52 members. The view is filtered on Contract, which keeps Month-to-month, One year and Two Year.

Distribution of customers who did not churn

The distribution of the lifetime values of these customers is closer to normal.

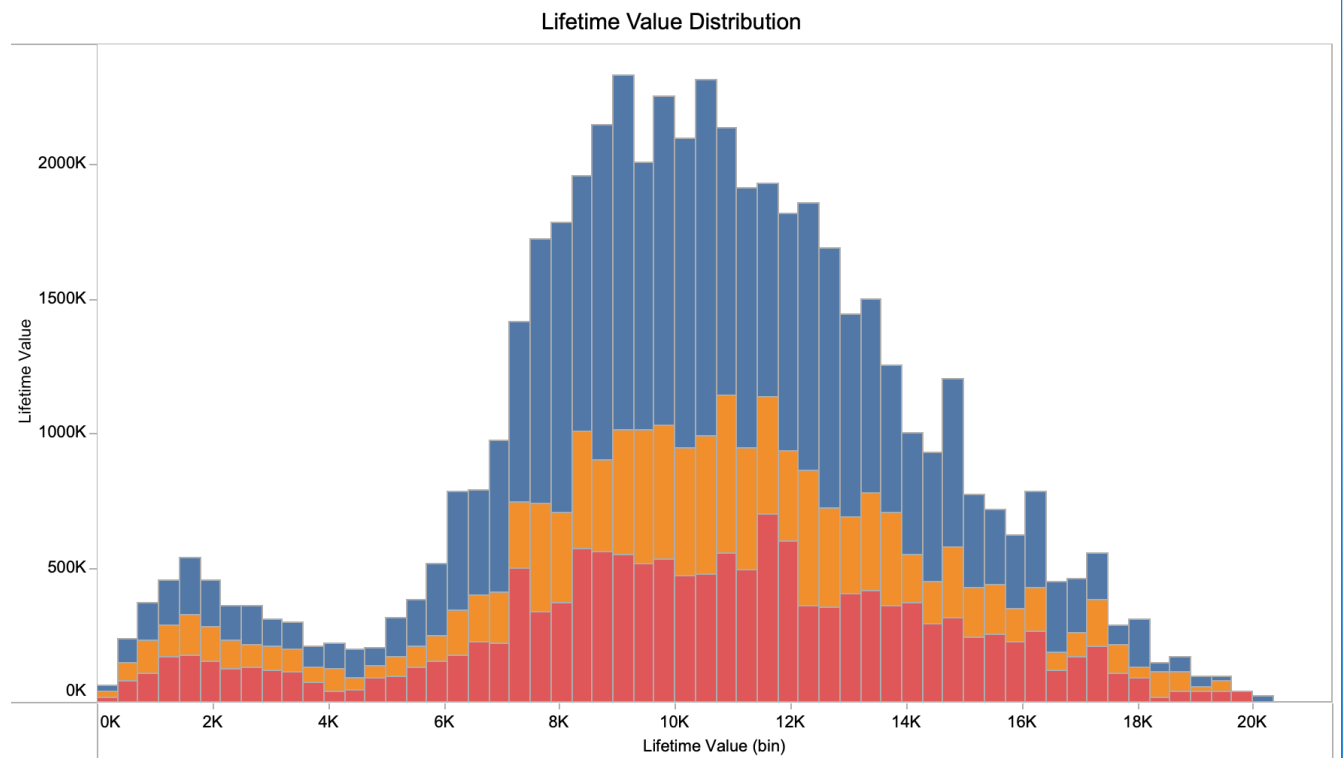
This distribution is made up of a larger proportion of 1&2 year contracts

Comparison of the two distributions indicates that there is an unknown event that takes place in the customer lifecycle between 4 & 6k lifetime value that effects churn

Recommend a time study to further identify the issue in this area

Contract

- Month-to-month
- One year
- Two Year

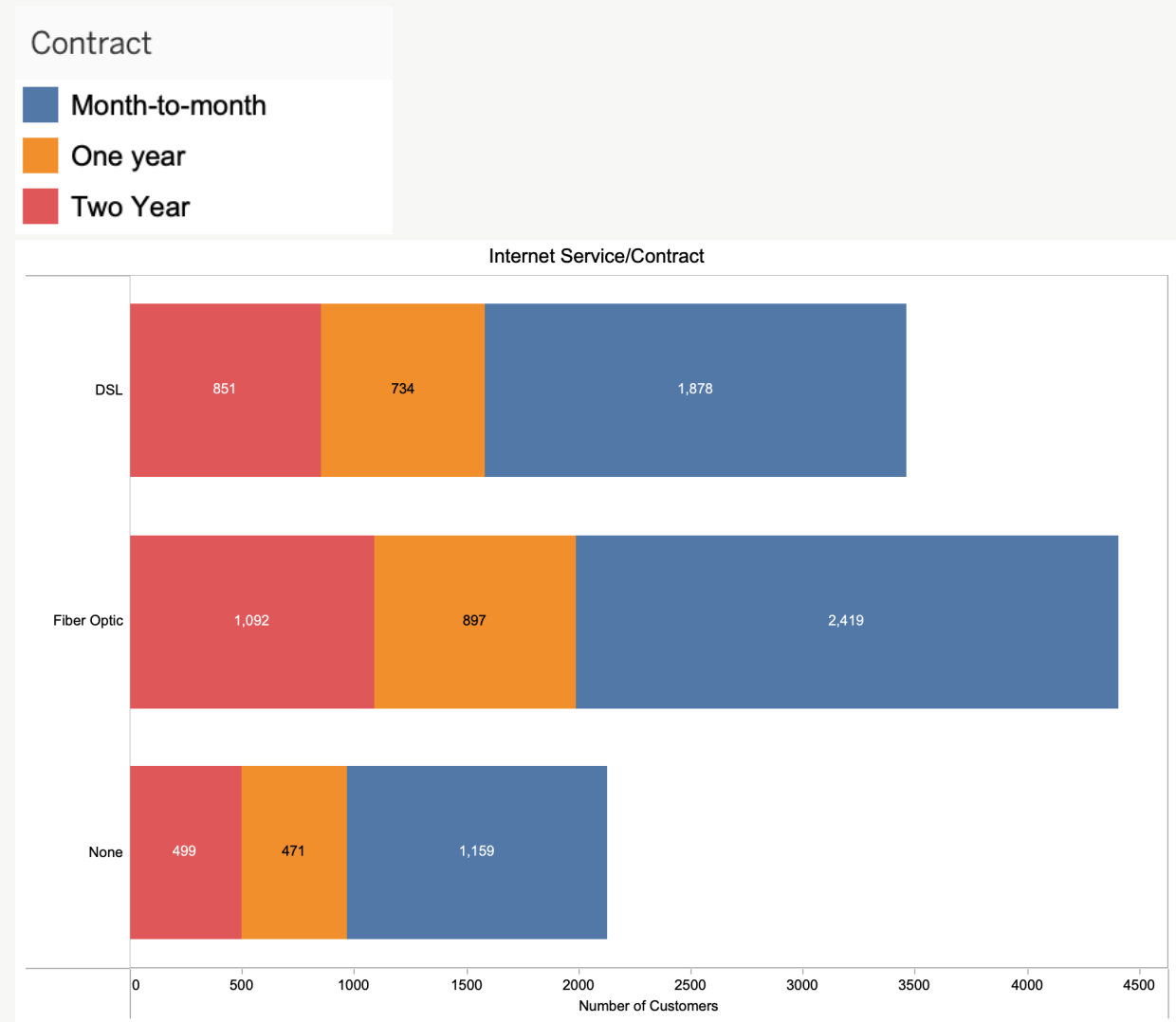


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The plot of sum of Lifetime Value for Lifetime Value (bin). Color shows details about Contract. The data is filtered on Churn, Income, Monthly Charge and Action (State). The Churn filter keeps No. The Income filter ranges from 348.67 to 258900.7 and keeps Null values. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Action (State) filter keeps 52 members. The view is filtered on Contract, which keeps Month-to-month, One year and Two Year.

Internet Service customer count by contract type

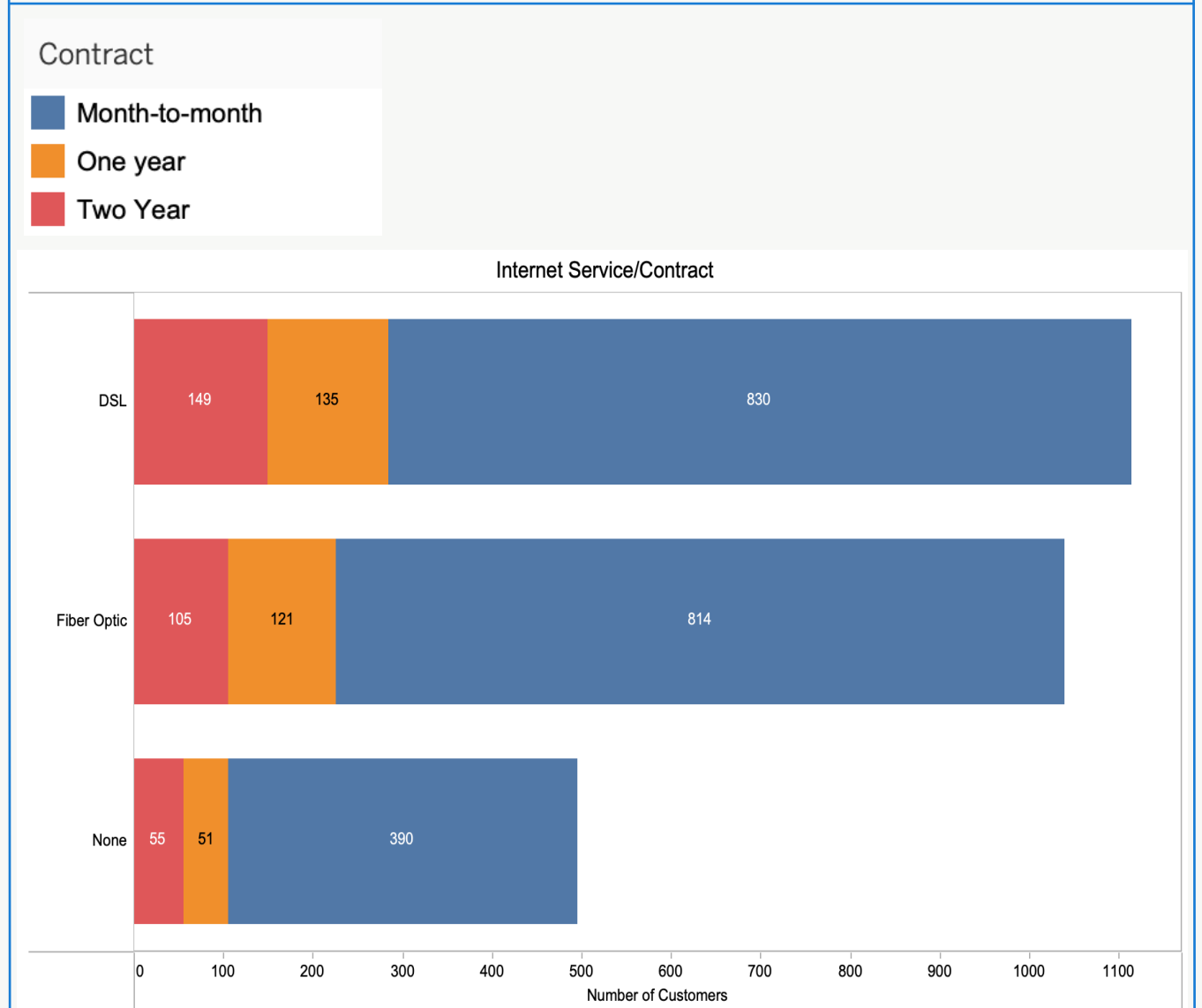
- In total Fiberoptic is the most popular choice over DSL in the sample
- Month to month contracted customers make up the majority in each internet service type
- 2129 of customers sampled do not use our internet service product or 21.29%



Count of churn_clean.csv for each Internet Service. Color shows details about Contract. The data is filtered on Churn, Monthly Charge, Income and Action (State). The Churn filter keeps No and Yes. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Income filter ranges from 348.67 to 258900.7 and keeps Null values. The Action (State) filter keeps 52 members. The view is filtered on Contract, which keeps Month-to-month, One year and Two Year.

Internet Service customers that churned by contract type

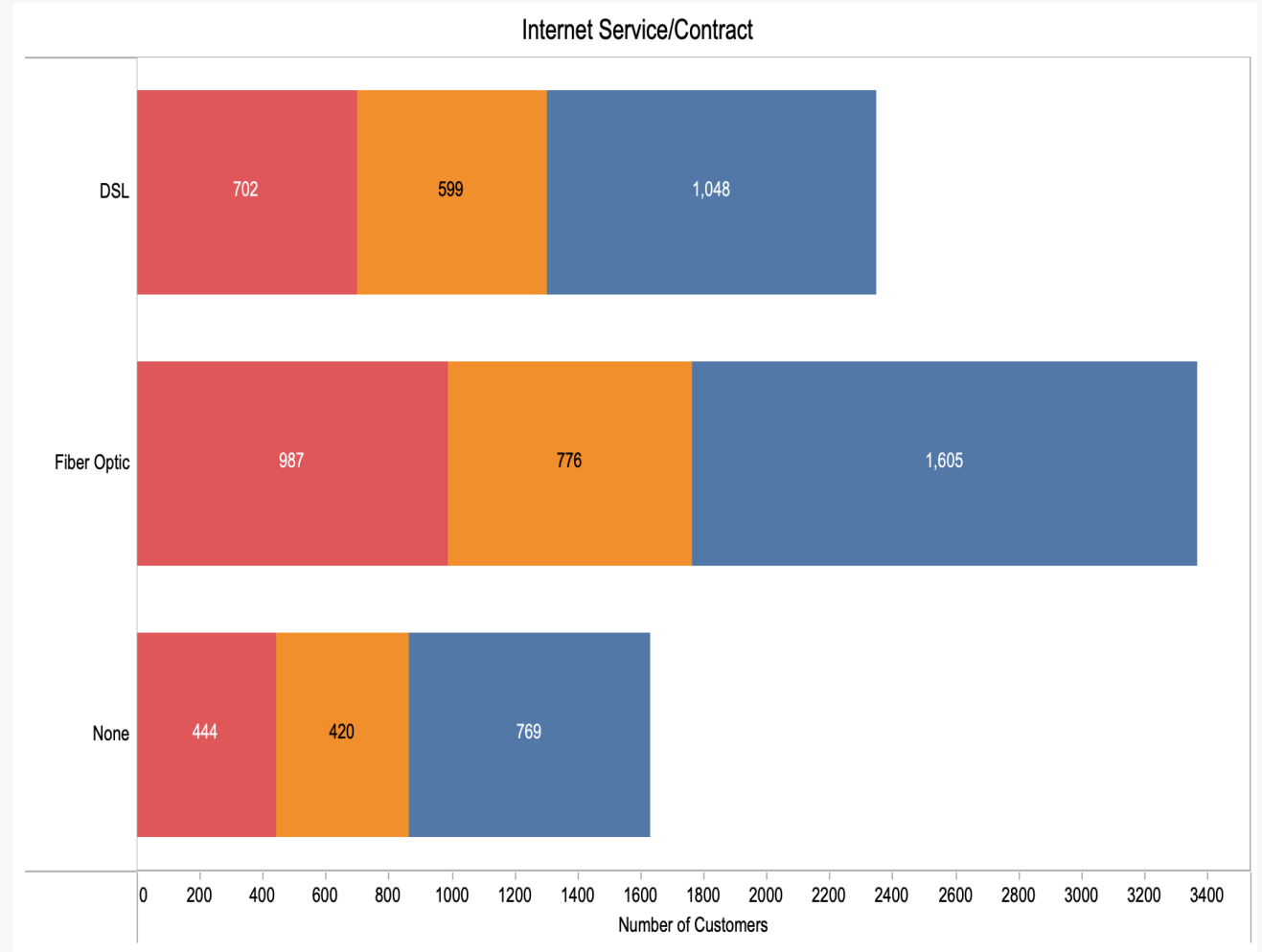
- Customers that churned used the DSL product more often than the Fiber optic product
- Most of customers that churned in each category have month-to-month contracts
- This sample indicates 18.7% of these customers do not use our internet service product.



Count of churn_clean.csv for each Internet Service. Color shows details about Contract. The data is filtered on Churn, Monthly Charge, Income and Action (State). The Churn filter keeps Yes. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Income filter ranges from 348.67 to 258900.7 and keeps Null values. The Action (State) filter keeps 52 members. The view is filtered on Contract, which keeps Month-to-month, One year and Two Year.

Internet Service customers that did not churn by contract type

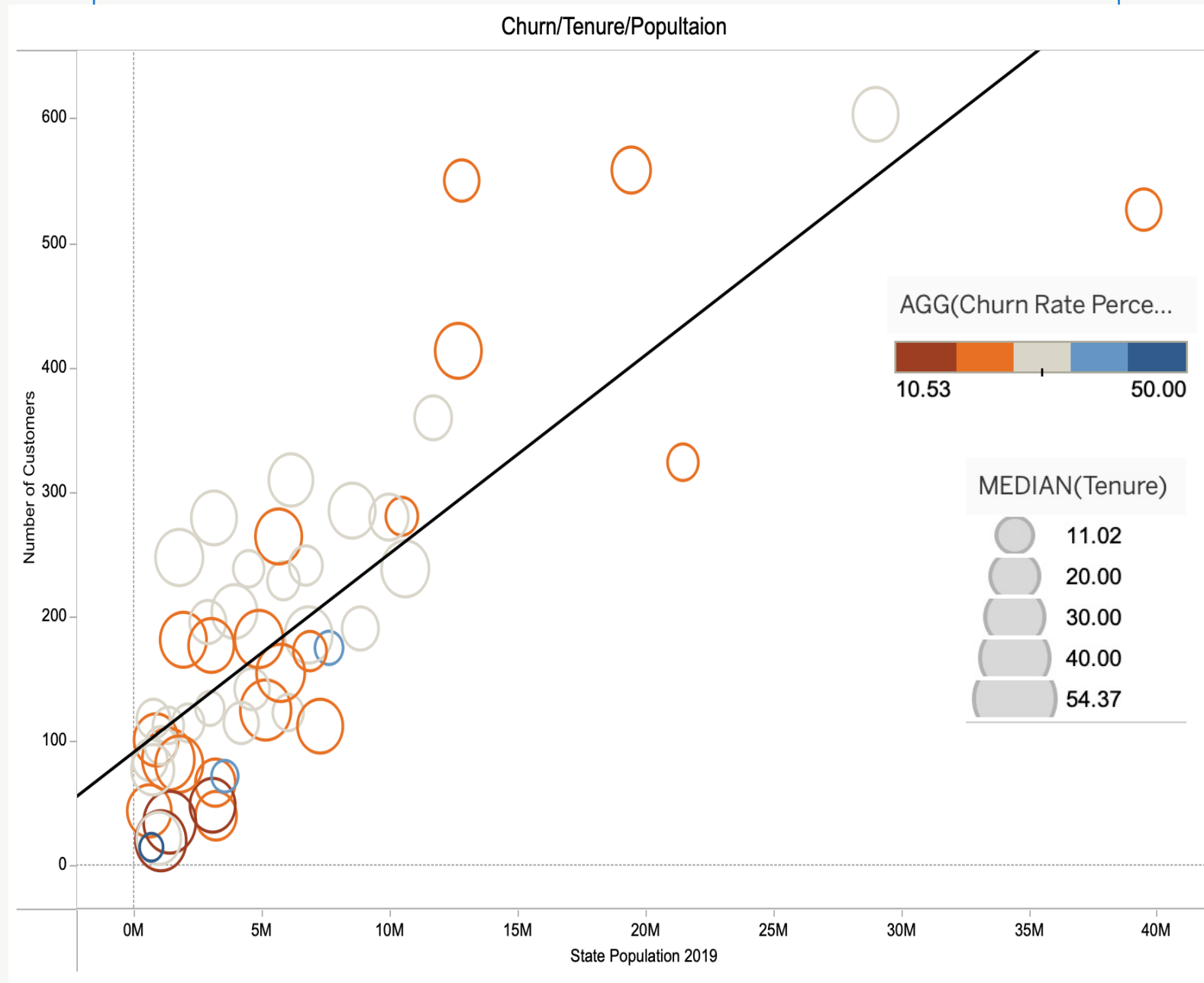
- More of the customers that did not churn use the Fiber Optic internet service
- A larger proportion of these customers have 1&2 year contracts.
- Of these customers 21.22% do not use the internet service product. The size of this customer group is closer to the original sample size of 10000 observations
- Should further this analysis by looking at a larger sample of customers that did churn using the same variables.



Count of churn_clean.csv for each Internet Service. Color shows details about Contract. The data is filtered on Churn, Monthly Charge, Income and Action (State). The Churn filter keeps No. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Income filter ranges from 348.67 to 258900.7 and keeps Null values. The Action (State) filter keeps 52 members. The view is filtered on Contract, which keeps Month-to-month, One year and Two Year.

State Populations and Tenure

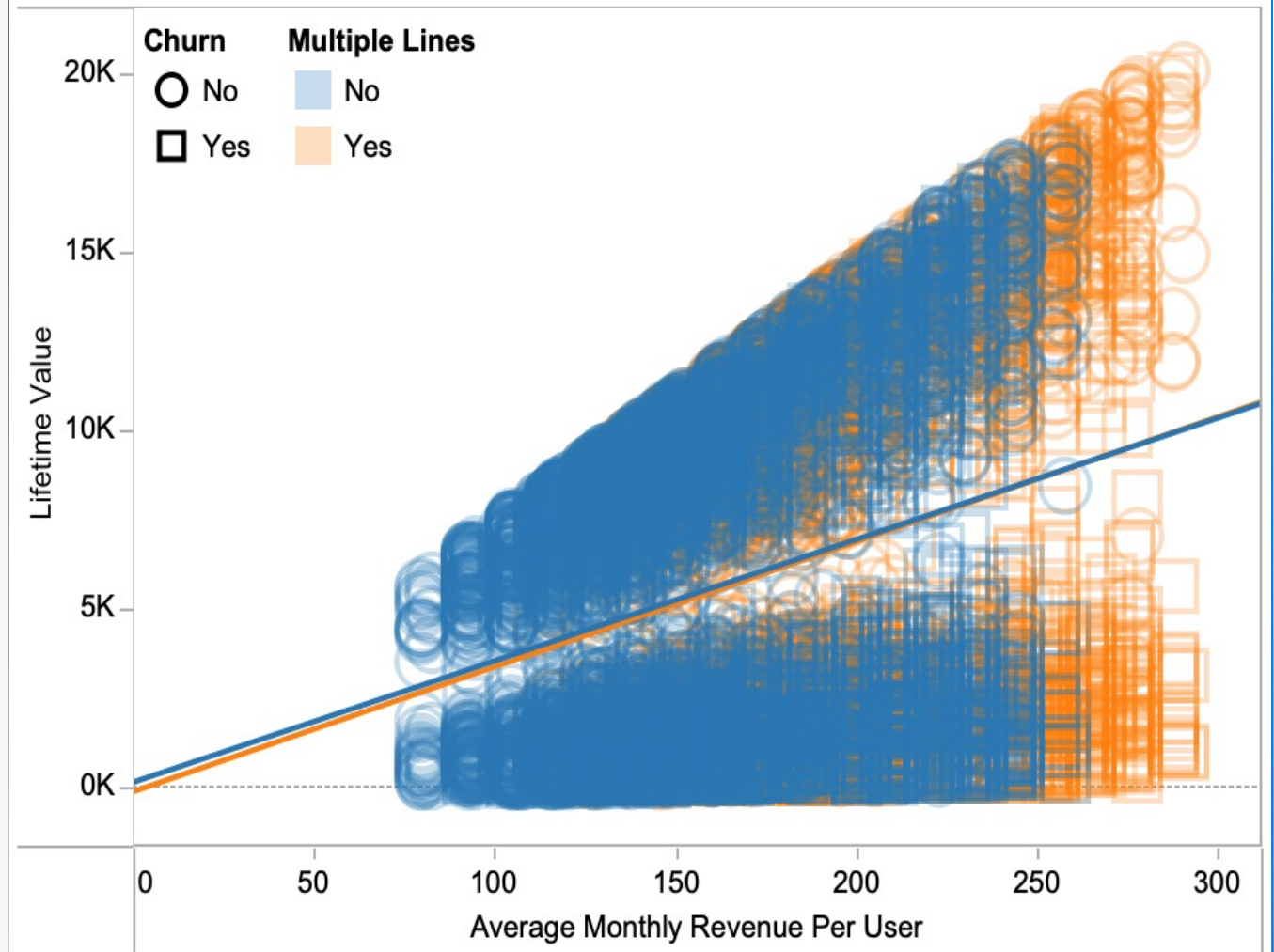
- This scatter plot shows the relationship between state population and number of customers in the sample.
- The median tenure is represented by size for each state.
- States with lower populations are shown to have a higher churn rate
- Trend line indicates the number of customers that should be in a sample that is representative of the population.
- Indicates there is a correlation between state population and number of customers in the state.
- The R-squared value is 0.67326 with a p-value < 0.0001 indicating its significance
- See story



Sum of Population2019 vs. count of churn_clean.csv (churn_clean). Color shows Churn Rate Percentage (churn_clean). Size shows median of Tenure (churn_clean). Details are shown for State.

Multiple phone lines & Lifetime Value

- Overall customers that elect to carry the service of multiple phone lines have a higher Lifetime Value than those that do not
- Overall customers that have multiple phone lines provide the company with higher average monthly revenues.
- The distribution of this data is bimodal indicating a second population is captured within the data.
- Trend lines indicate directionality of relationship only, r-squared values are low due to the nature of the bimodal data.
- See Story



Average Monthly Revenue Per User vs. Lifetime Value. Color shows details about Multiple. Shape shows details about Churn. The data is filtered on Income, Monthly Charge, Contract and Action (State). The Income filter ranges from 348.67 to 258901 and keeps Null values. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values. The Contract filter keeps Month-to-month, One year and Two Year. The Action (State) filter keeps 52 members. The view is filtered on Churn, which keeps No and Yes.

Data set is split by tenure

The telecommunication data set contains several features that have bi-modal distributions.

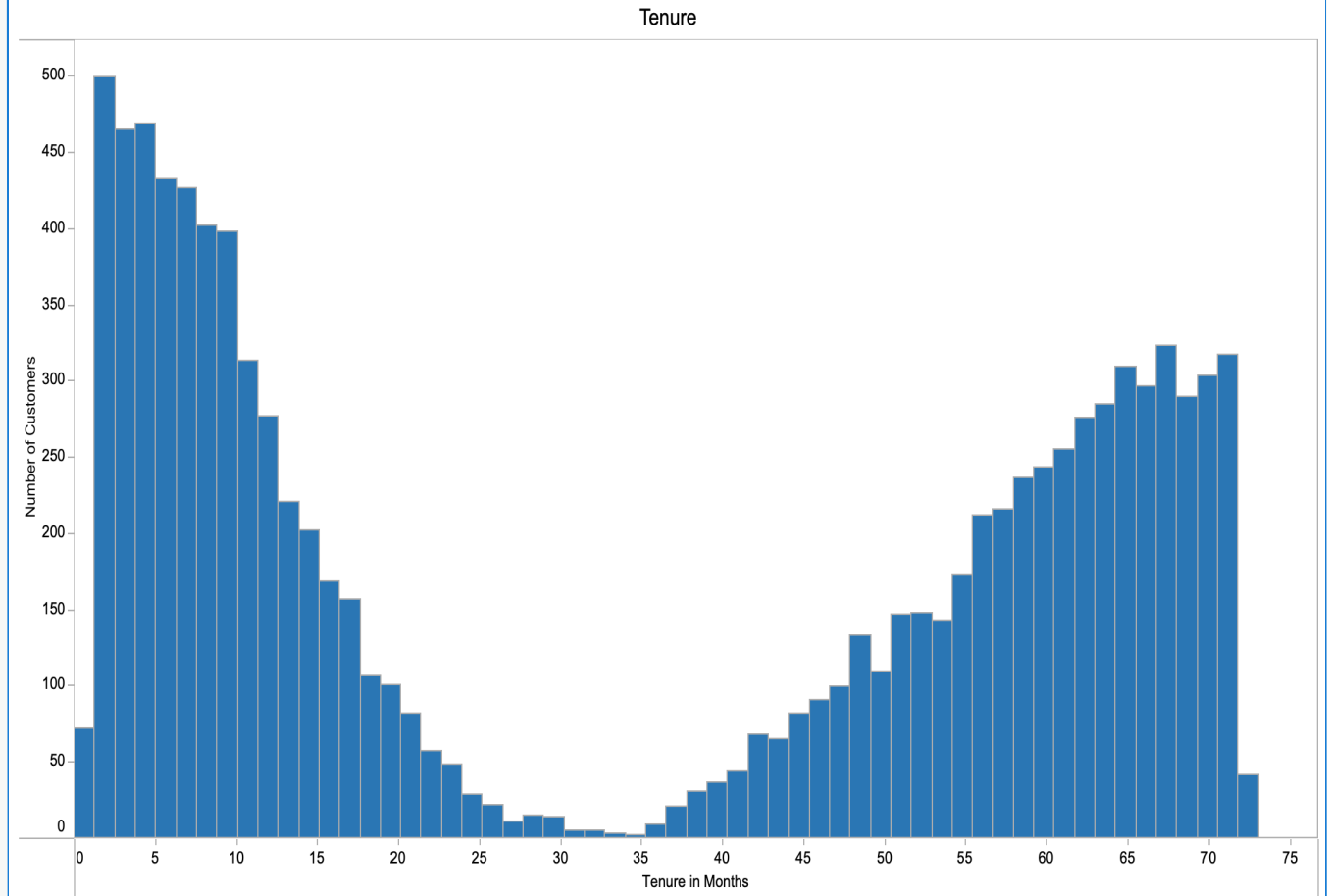
This means that there are two populations contained within the data set

These two populations are:

Customers with approximate tenure that is over 33 months

Customers with approximate tenure that is below 33 months

[See Story](#)



The trend of count of Tenure for Tenure (bin). The data is filtered on Churn, Contract, Income and Monthly Charge. The Churn filter keeps No and Yes. The Contract filter keeps Month-to-month, One year and Two Year. The Income filter ranges from 348.67 to 258901 and keeps Null values. The Monthly Charge filter ranges from 79.97886 to 290.160419 and keeps Null values.

Actionable Insights



Separate studies of the two populations captured within the telecommunications data set



Convert current month to month customers into customers with longer contracts to increase lifetime value and to reduce the churn rate



Promote the Fiberoptic Internet Service where available



Promote the Multiple phone line service where available



Investigate customer experience with DSL internet service



Average & Median monthly charge for customers that churn is higher than those that do not churn