Content

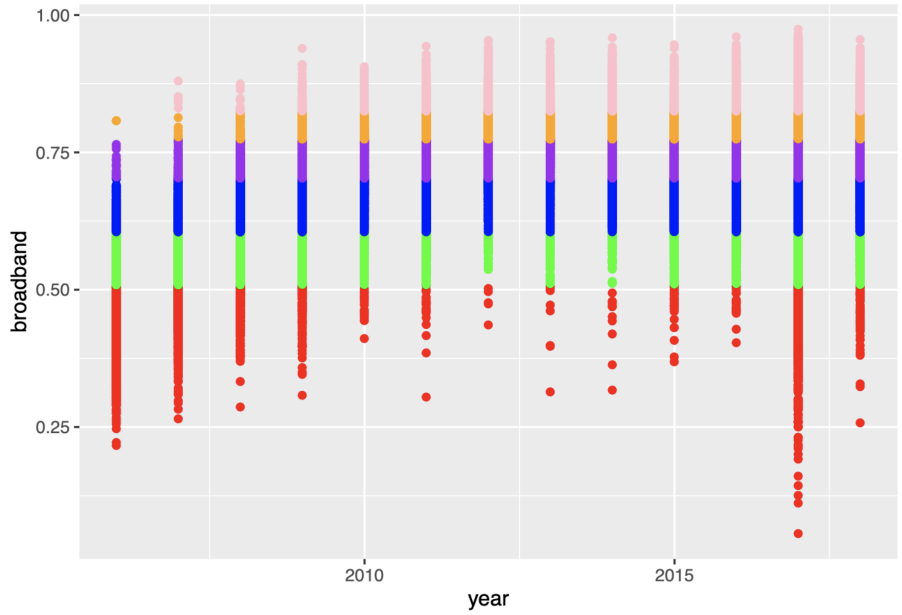
Data Visualizations:

1)Results: This scatterplot shows how the share of a particular county that uses broadband (broadband usage measured in proportion or percentages) changes over the years from 2006 to 2018.

Research purpose: It answers the research question of how technological progress over time has impacted broadband activity and provides possible future implications for how future business activity will be affected by the rise of technology.

Challenge: One challenge is that we had trouble seeing the general increasing broadband trends with the original scatter plot because we expected broadband activity to increase over time, so we graphed the trends of 10th, 25th, 50th, 75th, 90th percentiles of broadband usage instead.

Analysis: The number of counties that fall into the lower percentiles have been generally decreasing while the number of counties that fall into the higher percentiles have been increasing, which shows that broadband growth is generally positive. The exception is the sudden decrease in broadband usage in 2017 possibly due to an external reason that happened in that specific year but not consistent across all years.

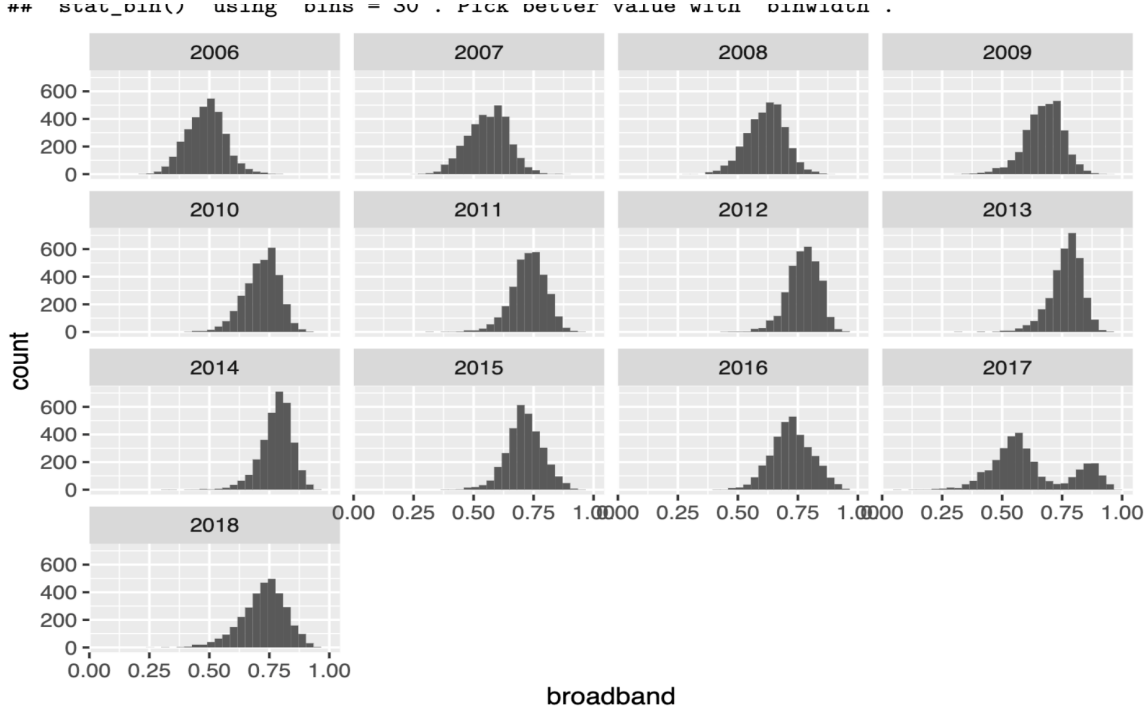


2)
Results: The histogram visualizations below describe how the distribution of broadband percentages changes over the years.

Research purpose: Main research purpose is to study whether there is increasing inequality in broadband usage across US counties as broadband becomes more popular because some US counties are quicker to adopt broadband than others due to differences in resources.

Analysis: The spread of distributions overall decreased from 2006 to 2018, which suggests increasing equality towards broadband access because counties' broadband usage are getting more similar. The exception is the bimodal distribution in 2017, which suggests larger inequality between counties with higher and lower broadband usages due to an external reason that happened in that specific year. However, increasing left skewness of the distributions over time is a continuous concern that some US counties are not increasing their broadband usage at the same rate as most US counties and are lagging behind due to socioeconomic problems.

Challenge: Some challenges associated with producing this visualization is finding a strategy that can plot multiple histograms for every year without using excess code, so we found a function named facet_wrap that can plot the graphs in one step.

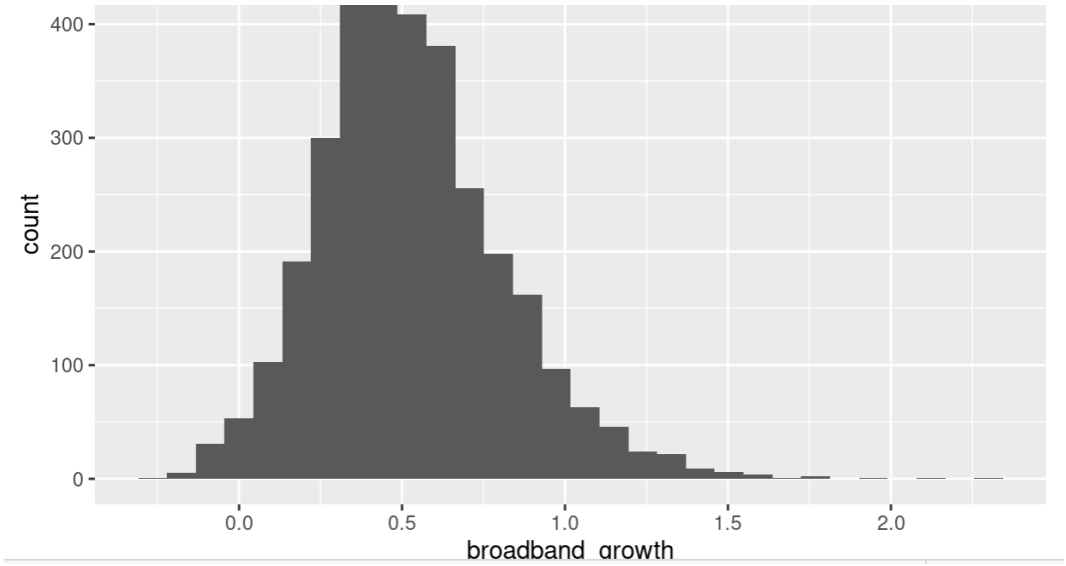


3)
Results: The histogram below shows the distribution of broadband growth rates from 2006 to 2016. Growth rate is measured as
(broadband percentage 2016 - broadband percentage 2006)/(broadband percentage 2006).

Research purpose: Main research purpose is to quantify how fast broadband usage has been growing over time, whether that growth differs among US counties, and future implications about how future business growth definitions and measures could be changed by increasing technological innovation in the future.

Analysis: The mean broadband growth is approximately 50%, which suggests that technological progress has greatly influenced broadband usage in the US, and that technological progress will affect business growth in the future. Moreover, the growth distribution is normally distributed with a slight right skew, which means that broadband usage grew relatively equally among US counties with a few counties whose broadband usage grew faster.

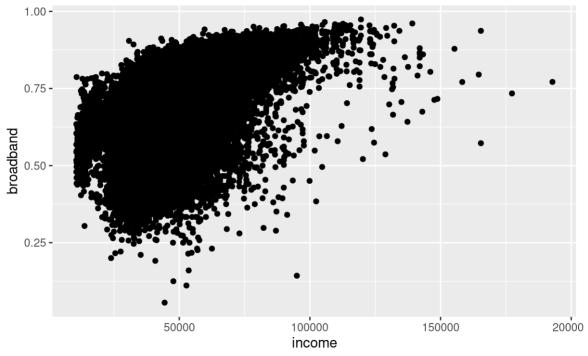
Challenges: Some challenges associated with producing this visualization is finding techniques needed to extract year columns from row columns pivot the table to calculate broadband growth

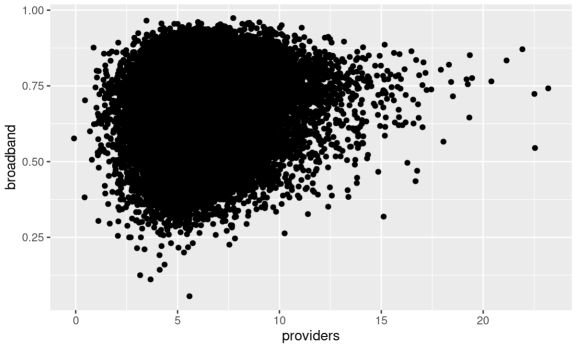


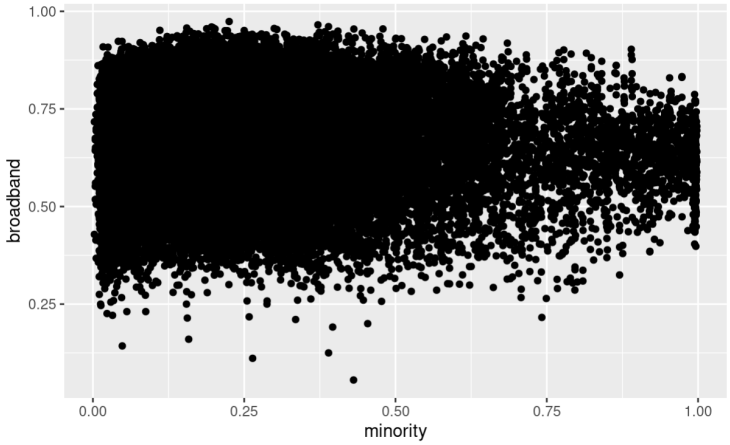
4)
Research purpose: The main research purpose of the scatterplots below is to analyze socioeconomic factors, such as income, number of providers, and minority, that could influence broadband usage in a county and help policymakers build better broadband policies centered around these factors.

Analysis: Based on the correlations below, income and number of providers are potentially useful factors that could be used in policymaking to increase broadband usage whereas the minority population has no impact.

Challenge: A limitation to making broadband decisions based on just the results plotted below is oversimplified since there may be many complex factors that affect broadband usage.



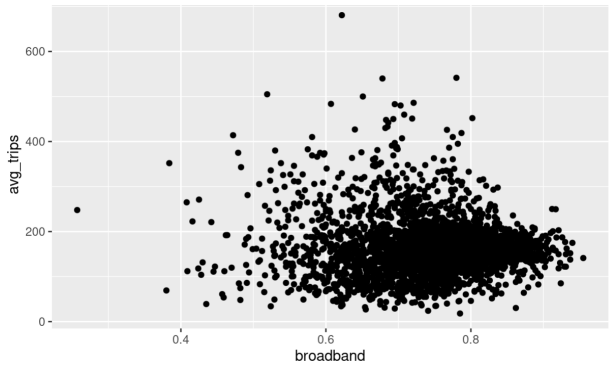


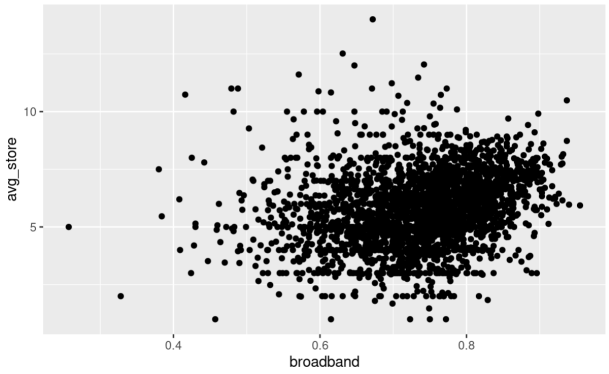


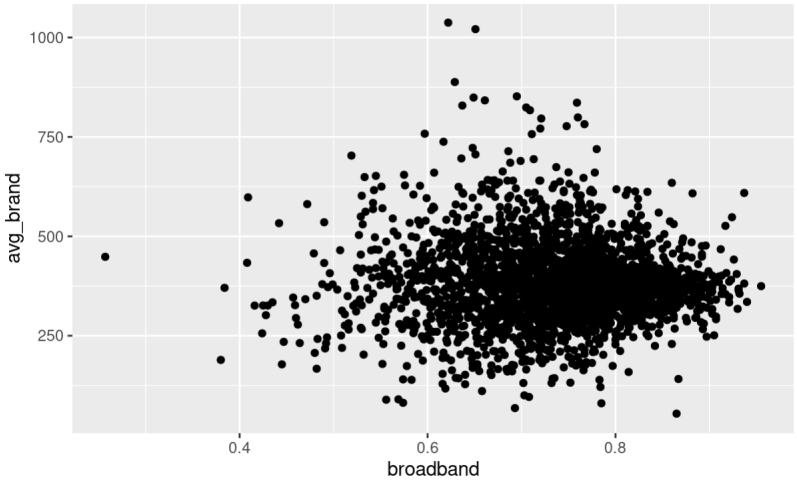
5)
Research Purpose: These scatterplots below answers our main research question of how the rise of broadband impacts metrics of consumer activity, such as average number of trips to brick and mortar stores, average number of stores/chains, and average number of brands in the recent time period and whether the results support the retail apocalypse hypothesis that brick and mortar retail is going to collapse or be negatively impacted by the rise of broadband.

Analysis: Results show little correlation between broadband and all three measures avg_store, avg_brand, avg_trips, which does not support the retail apocalypse hypothesis. Increasing broadband usage does not decrease nor negatively impact any of these brick and mortar retail measures, so people do not have to worry about the collapse of retail as broadband continues to progress in the future.

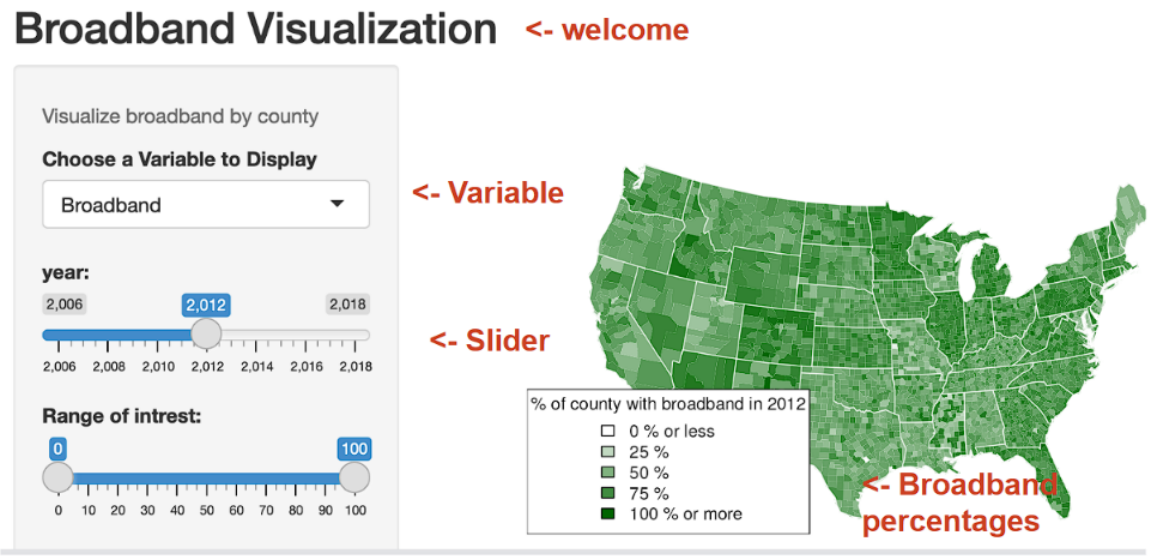
Challenge: A limitation to these visualizations is that they only include data from 2018 because of challenges loading in and putting together many separate datasets from all the years. Still, 2018 is the most recent year included in this research and thus the best indicator of business activity in future time periods, so our visualizations are still reliable. Previous years may not be as reliable because each year is always changing.







Layout



Textboxe Notes: This is the order the text boxes will appear. Hit next to proceed. Title of textbox and text is shown below.

1. Welcome: This app was created as part of a Discovery Project based on a dissertation for: “Consumer Behavior and the Rise of Broadband: A Retail Apocalypse?”. The app provides an interactive experience for users to visualize how the proliferation of broadband affected key metrics in consumer behavior.
2. Variable: Choose which variable to display from this dropdown menu. These are the key metrics mentioned before and include:

   Brand
   Broadband
   Chain
   Spend
   Trips

3. Slider : Adjust the slider to see progression in variables
4. Broadband Percentages: This variable shows a choropleth map of the US. When you adjust the slider you can see how the percentage of counties with broadband changes overtime.

The goal is to look something like this (link):