Impact of Covid-19 on Digital Learning

Deep dive into Analysis on inequality in accessing the digital education due to Impact of Covid-19 and providing the solutions to reduce the gap called (Digital Divide).

Presented by:

Mohammed Mutahar Shaik

Background

Before the pandemic the education sector was more focused on face-to-face learning. Due to Pandemic the educational institutions closed in more than 130 countries, effects > more than 1 billion students. Schools drive more than 56 million students transition to full time distance learning In US.

To prevent classroom disruption, schools and teachers have attempted to reach students remotely through distance learning tools and digital platforms.

This distance learning leads to inequity in accessing digital education, which affected students and teachers, described as the "digital divide."

Main Objectives for Analysis

the root cause of divide(lack of availability, affordability, and adoption)

Analysis on infrastructure conditions(

access challenges,(internet and learning devices)

divide in student segment & state-level, etc.

demographic (race/ethnicity, income, etc.) and geography (rural,..., urban) conditions.

difference in the percent of access as well as engagement index by state

Data Sources

1. National Telecommunications and Information Administration:

- https://www.ntia.doc.gov/page/download-digital-nation-datasets

2. US Census Bureau

- https://www.bls.gov/covid19/effects-of-covid-19-pandemic-and-response-on-the-employment-situation-news-release.htm
- https://www.census.gov/data/tables/2020/demo/hhp/hhp5.html https://www.census.gov/library/stories/2020/08/schooling-during-the-covid-19-pandemic.html,
- **3. US-Department of Education**
- https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2022019

4. Pew Research Center

https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption)

- 5. **Broad Band Now,**
- **6. American Community Survey (ACS):**
- *https://www.ntia.gov/files/ntia/publications/ntia-analyze-table_2020-05-15.csv*
- **7. websites of USA facts helps for vizualizations:**
- (https://usafacts.org/articles/65-of-childrens-education-has-moved-online-during-covid-19/

Project Goal:

to reduce the digital divide in the US.

Guiding questions for the analysis and finding the solutions :

What is the picture of digital connectivity and engagement in 2020?

How does student engagement with different types of education technologies change over the course of the pandemic?

How does student engagement with online learning platforms relate to different geography?

Base on the Demographic context.

Do certain state interventions, practices or policies (e.g., stimulus, reopening, eviction moratorium) correlate with the increase or decrease online engagement?

Factors considering for the Analysis:

1. Lack of Infrastructure facilities for accessing High speed internet, devices.
2. High and low income households
3. geography, race/ ethnicity etc.

Datasets considered for Project :

1. Engagement data: includes 233 school districts files with this data we can analyze the % access to all school districts in the US

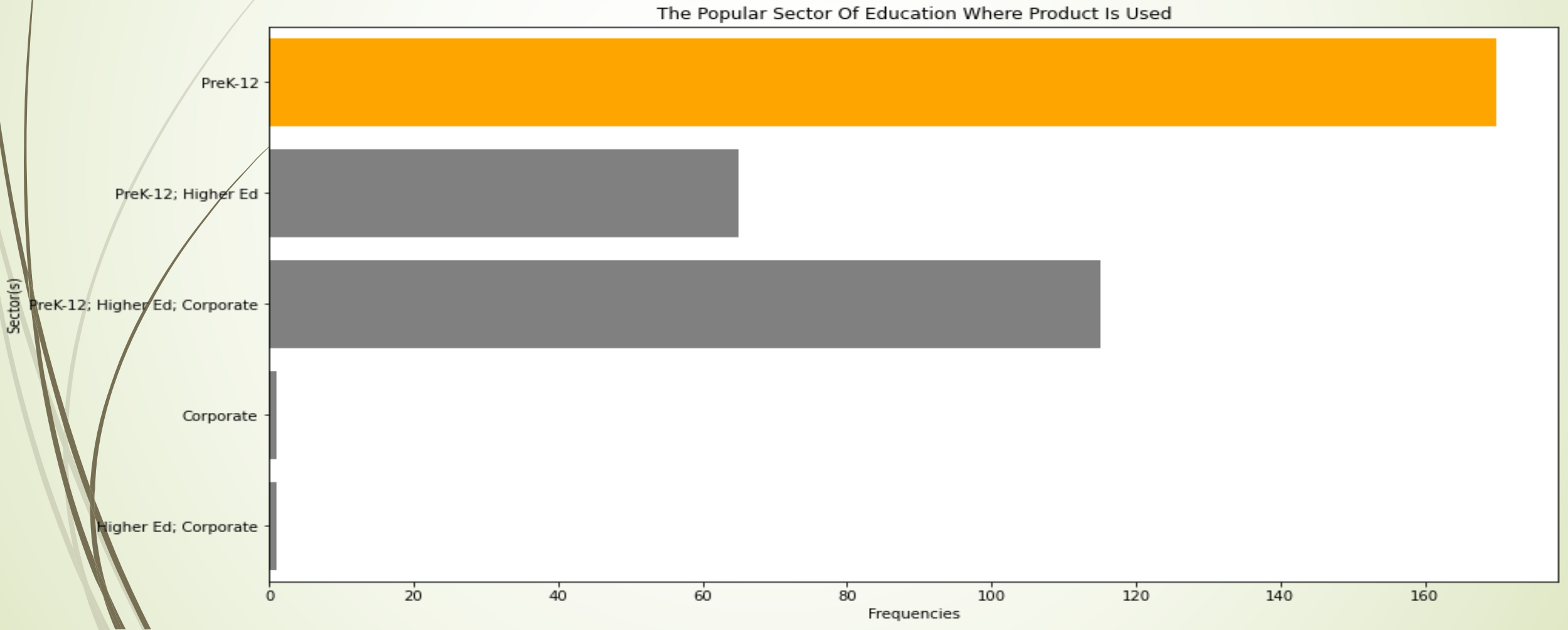
2. Districts-Info: Considered to analyze % usage of the students using the digital learning

3. Product-info: To analyze the top Ed-products used by the students.

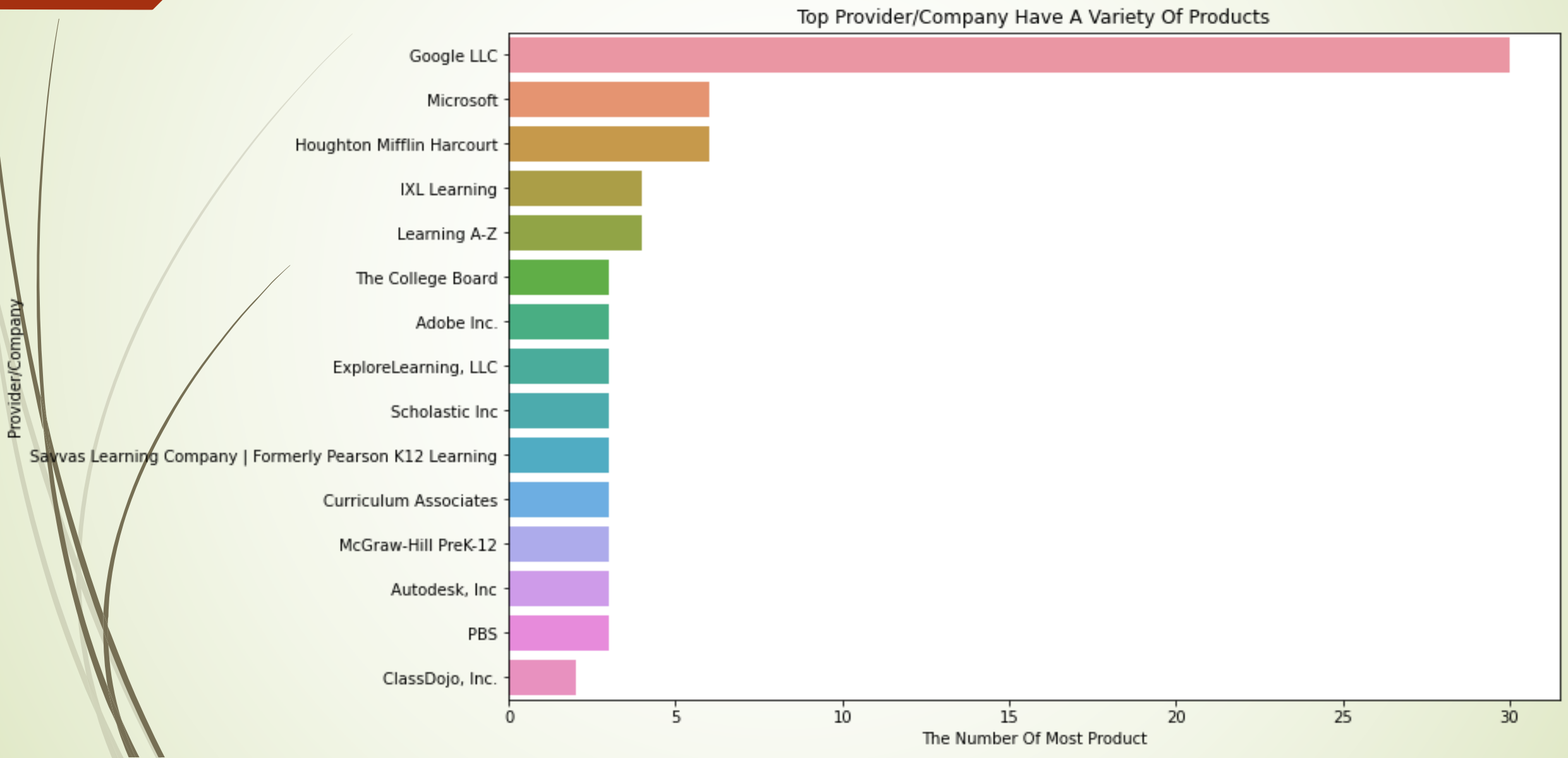
4. **ntia-data**: *Helps to analyze the reason for not having access of distance learning (*dataset, variable, description, universe, usProp)

We have done most of the visualization using the Python Script. First we focus on analyzing the Edtech products data.

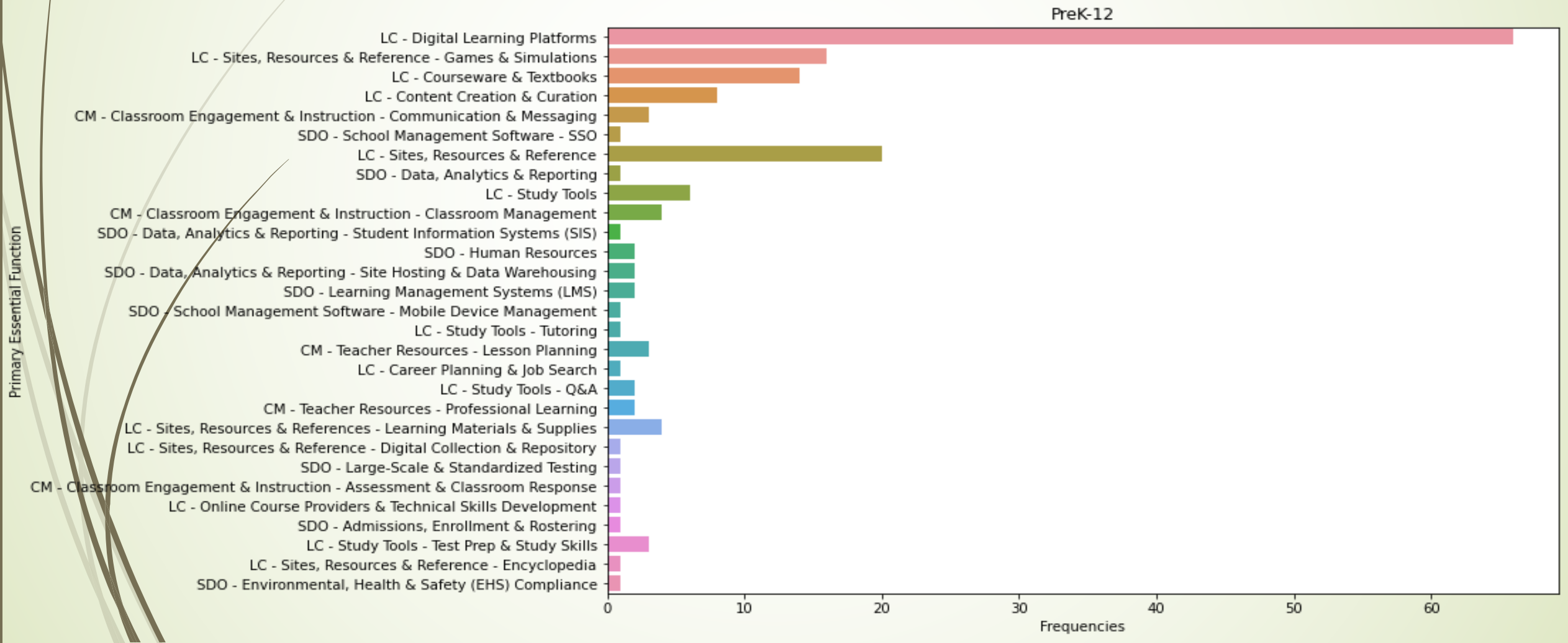
Now we are presenting all the Visualizations we got in the analysis



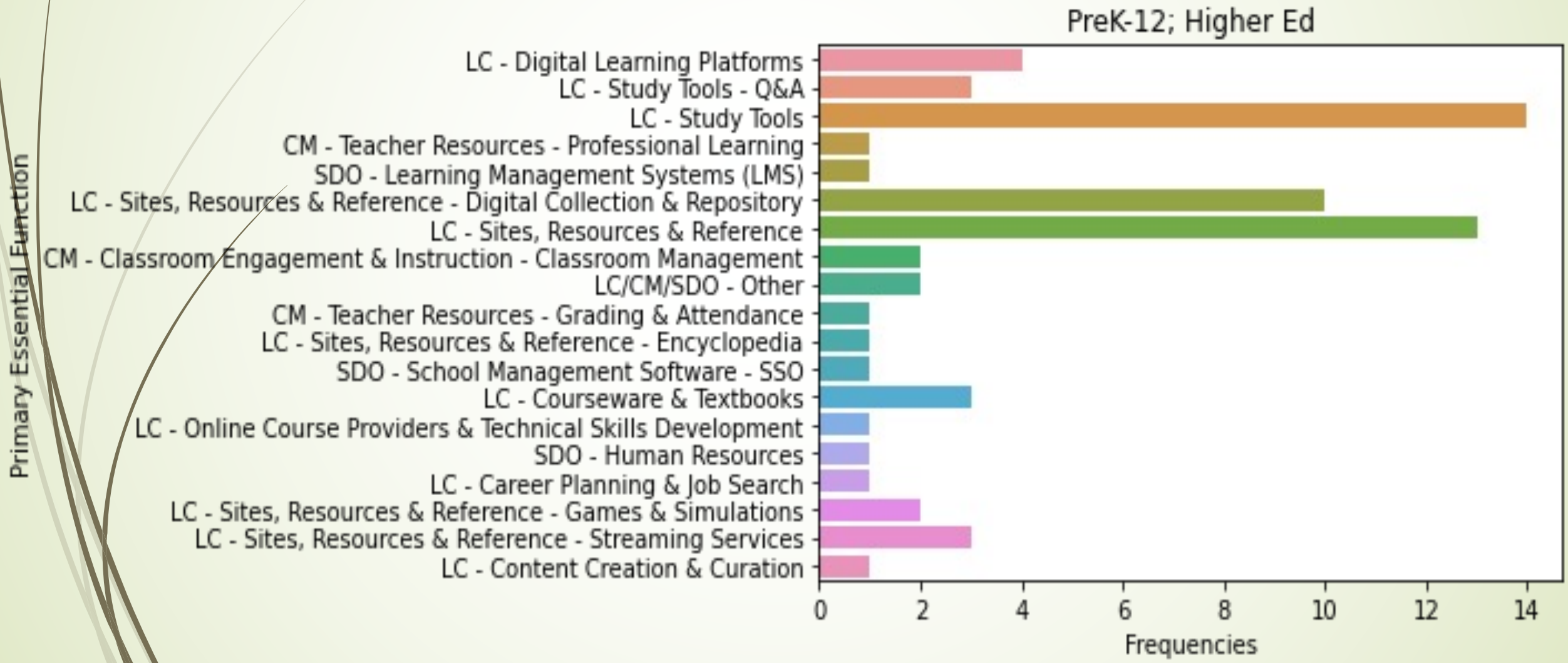
Now we want to analyze different Ed-products and their usage.



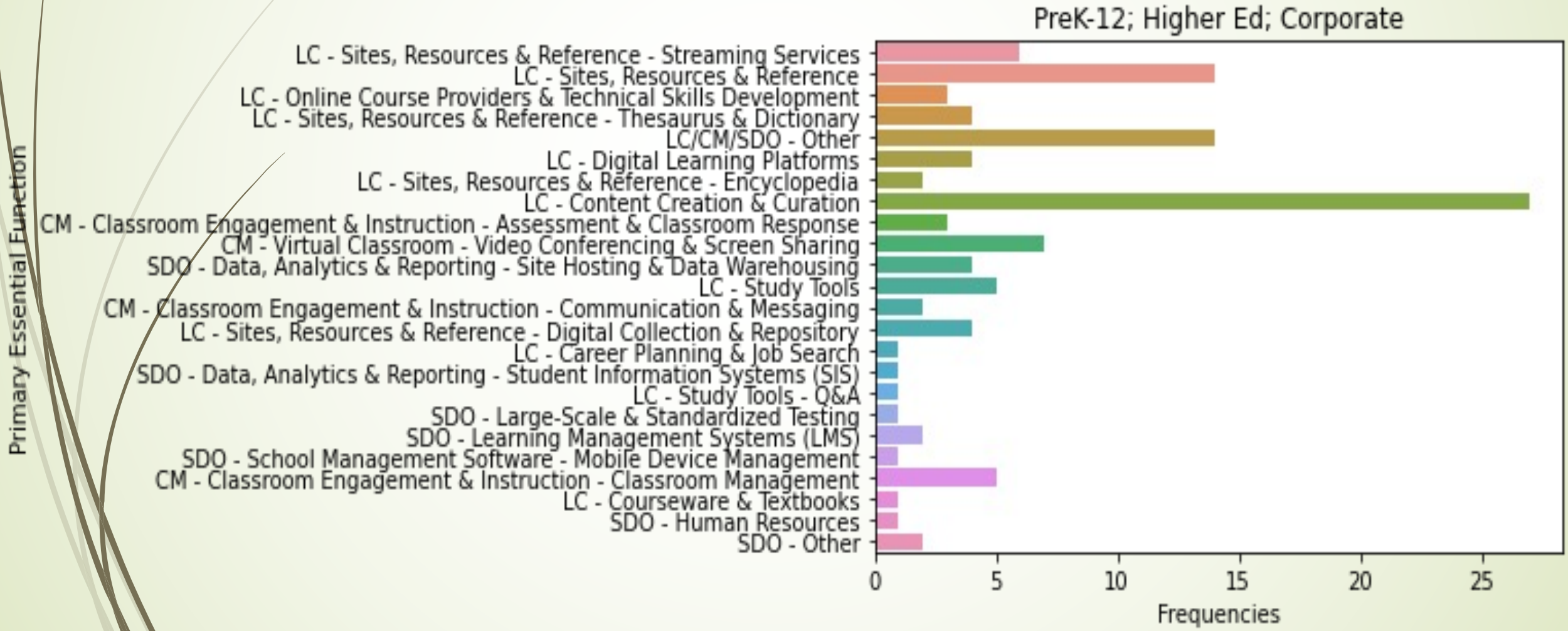
common primary essential function of product for Prek-12



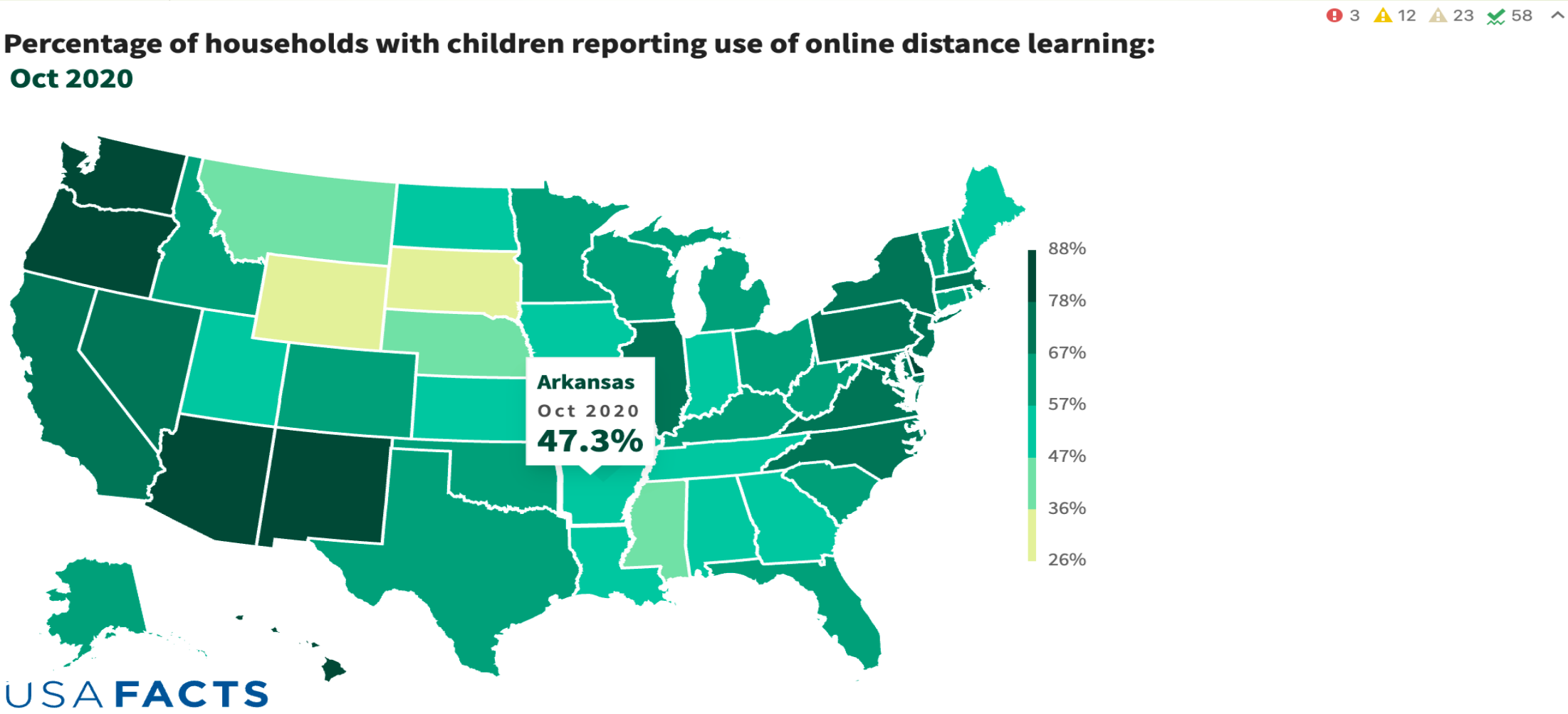
common primary essential function of product for Prek-12 and Higher Ed



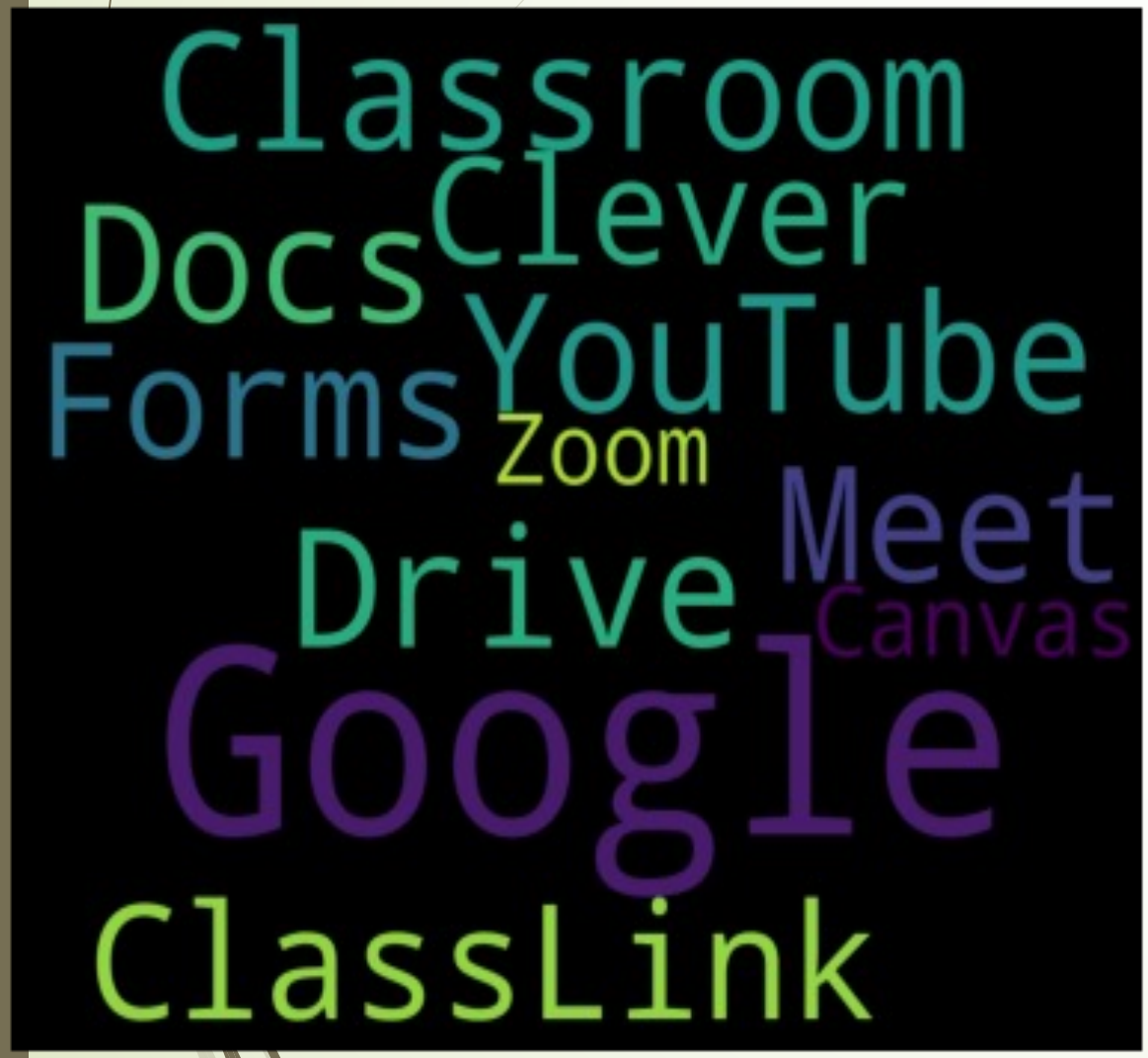
common primary essential function of product for Prek-12, Higher Ed, Corporate

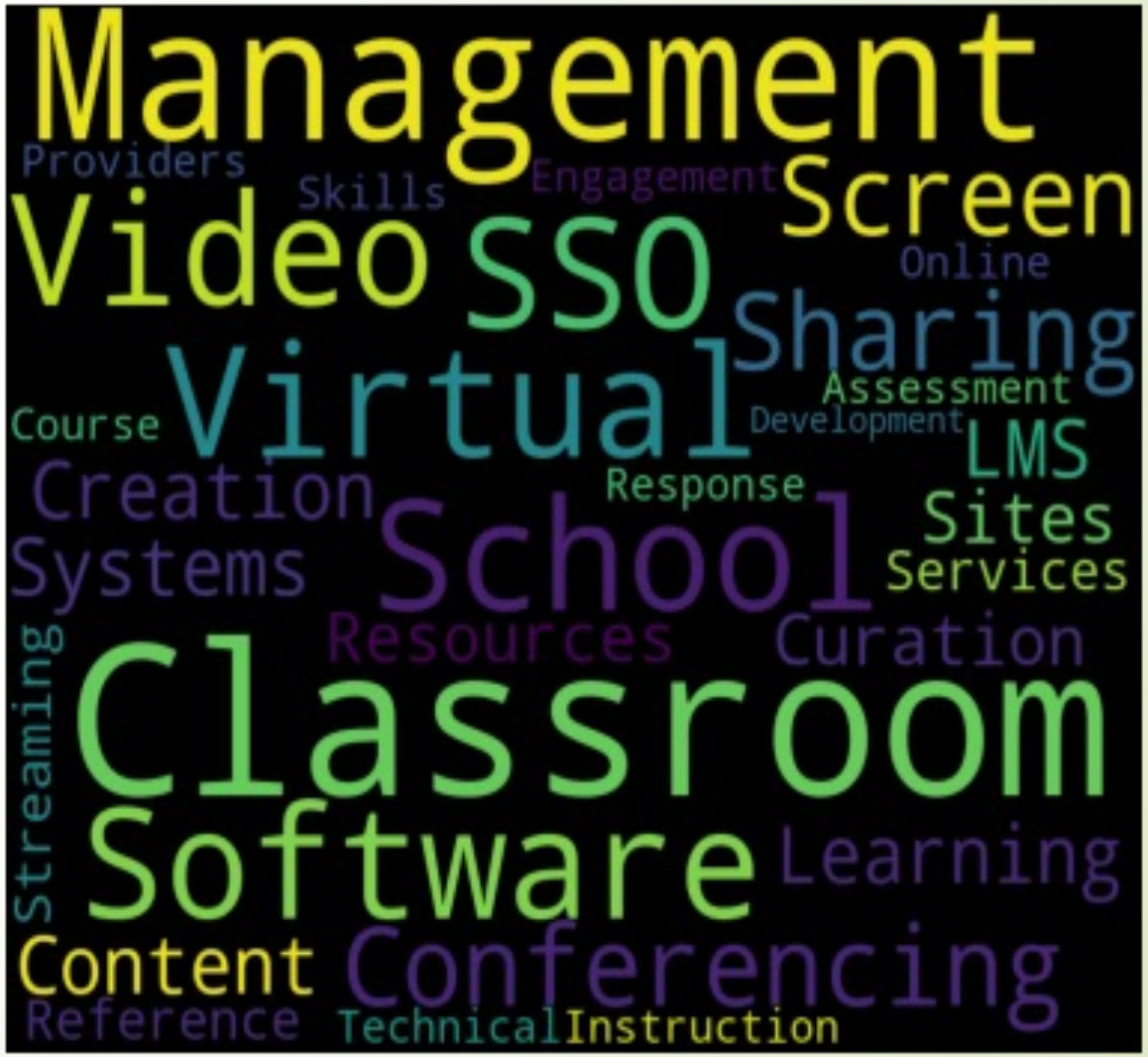


Visualizing the percentage of students using distance learning

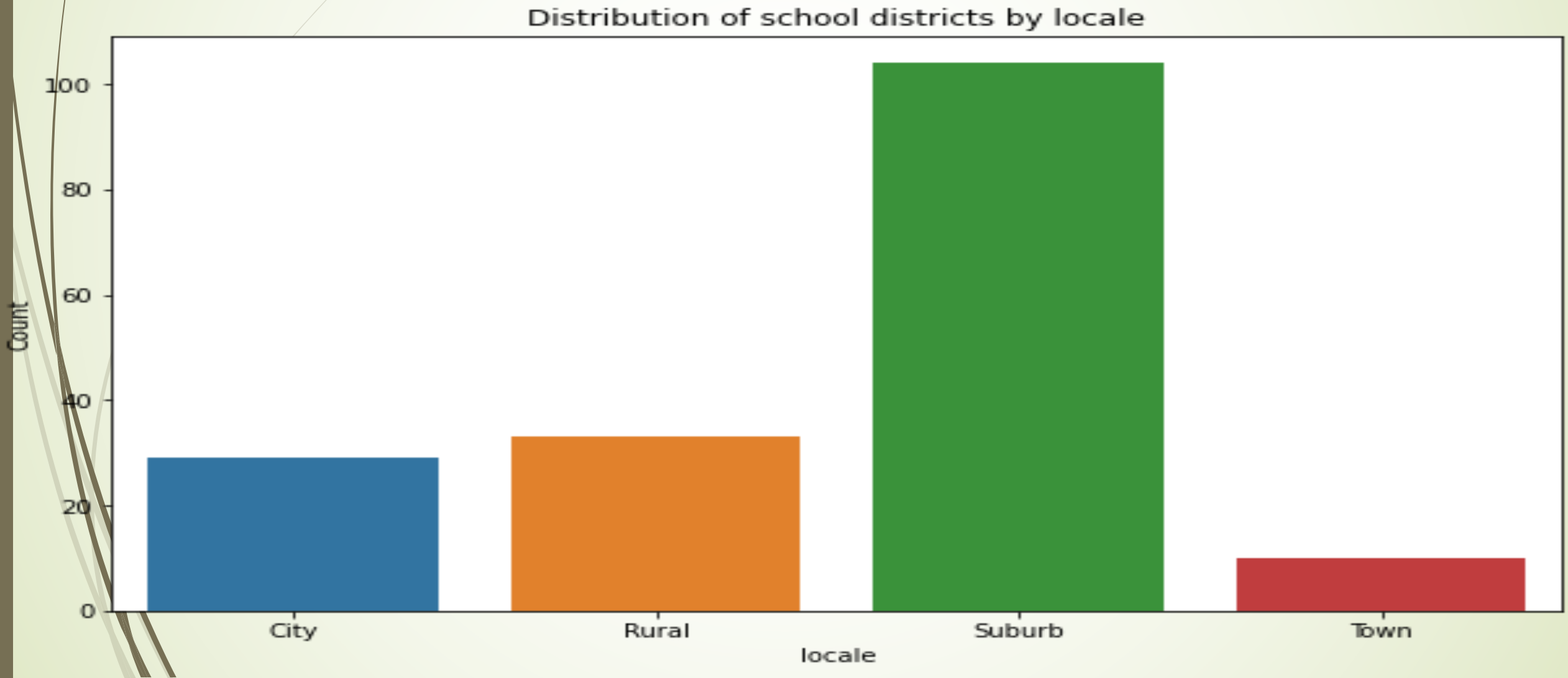


popular product and assign list top 10 products used by mostly student using NLP

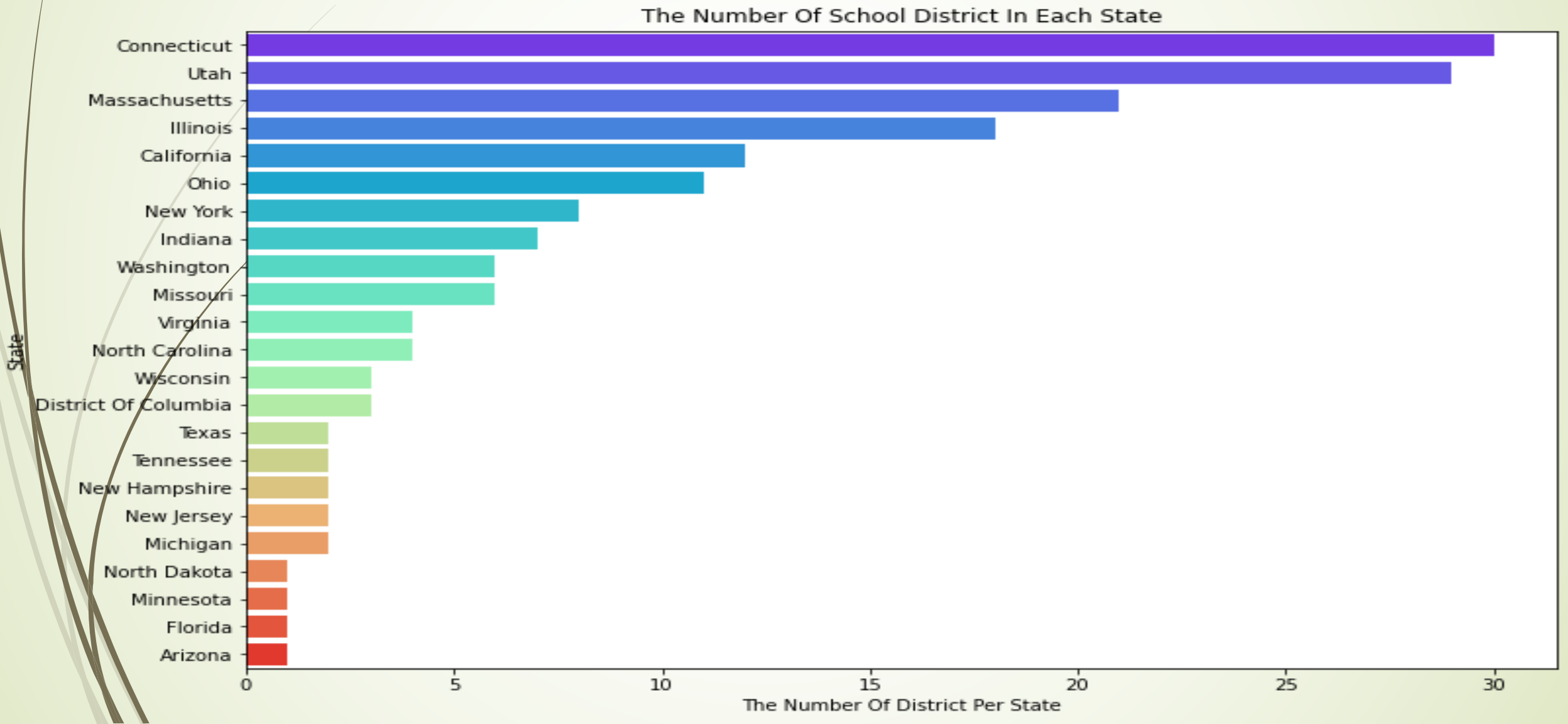




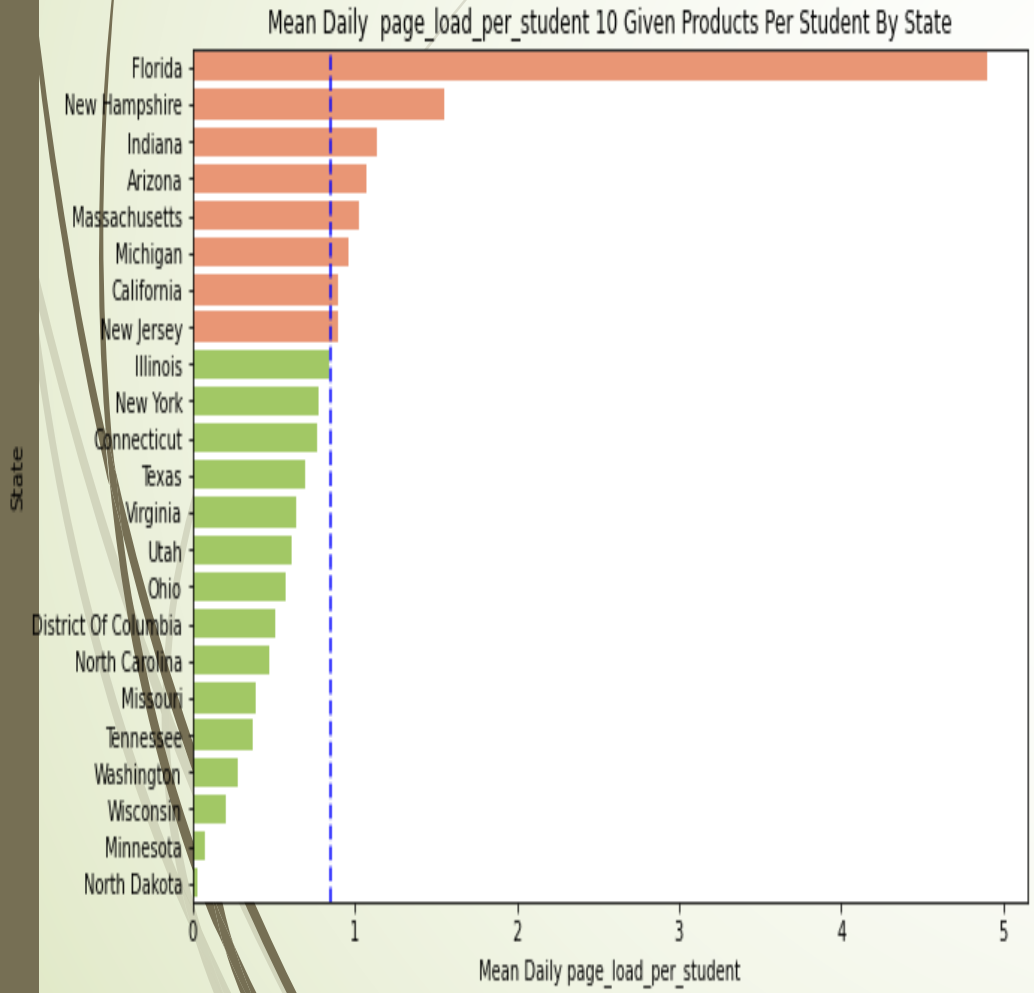
Now we focus on District info data where we can analyze the *distribution of number of school district by locale*

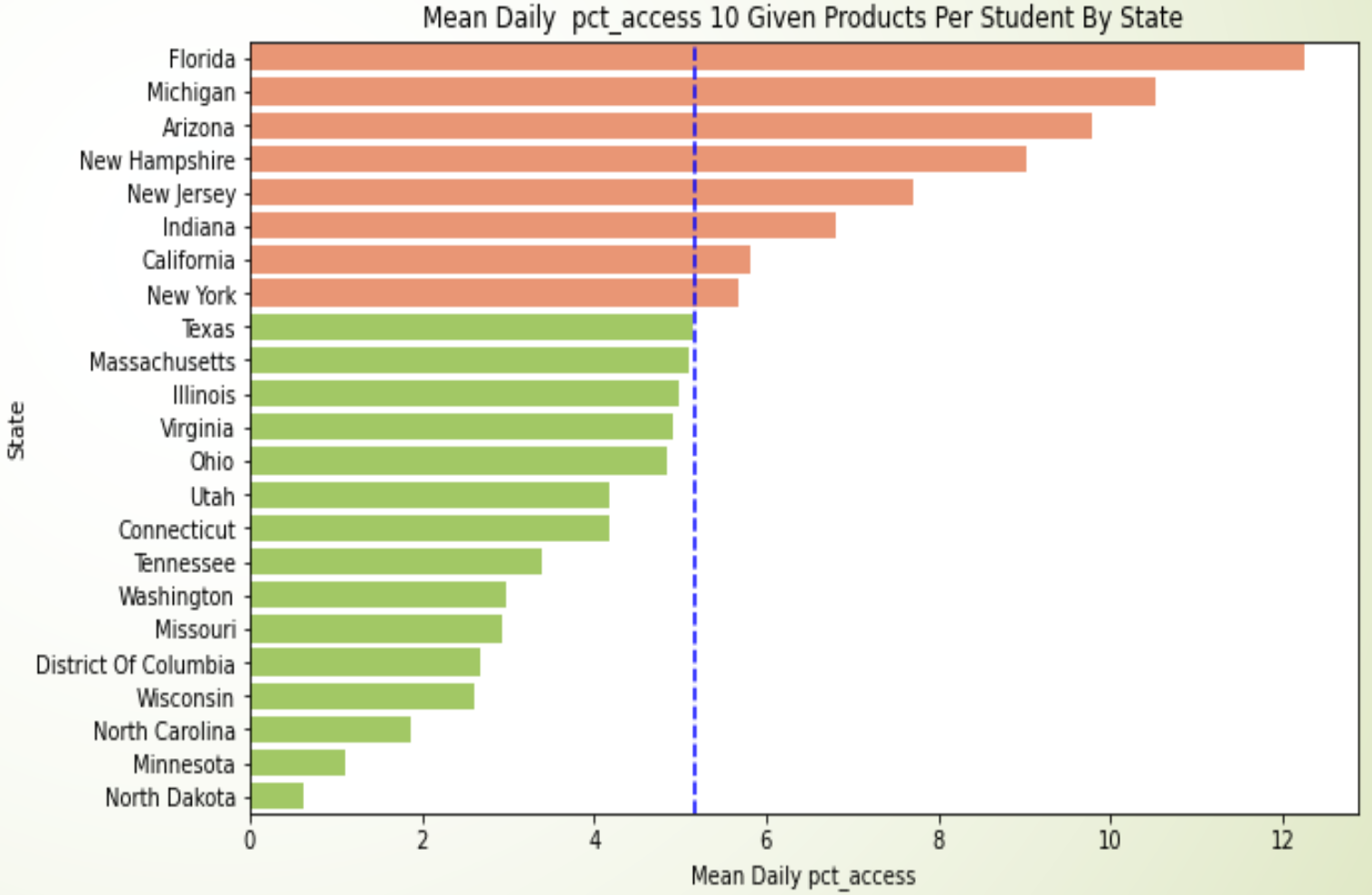


Page load by state:



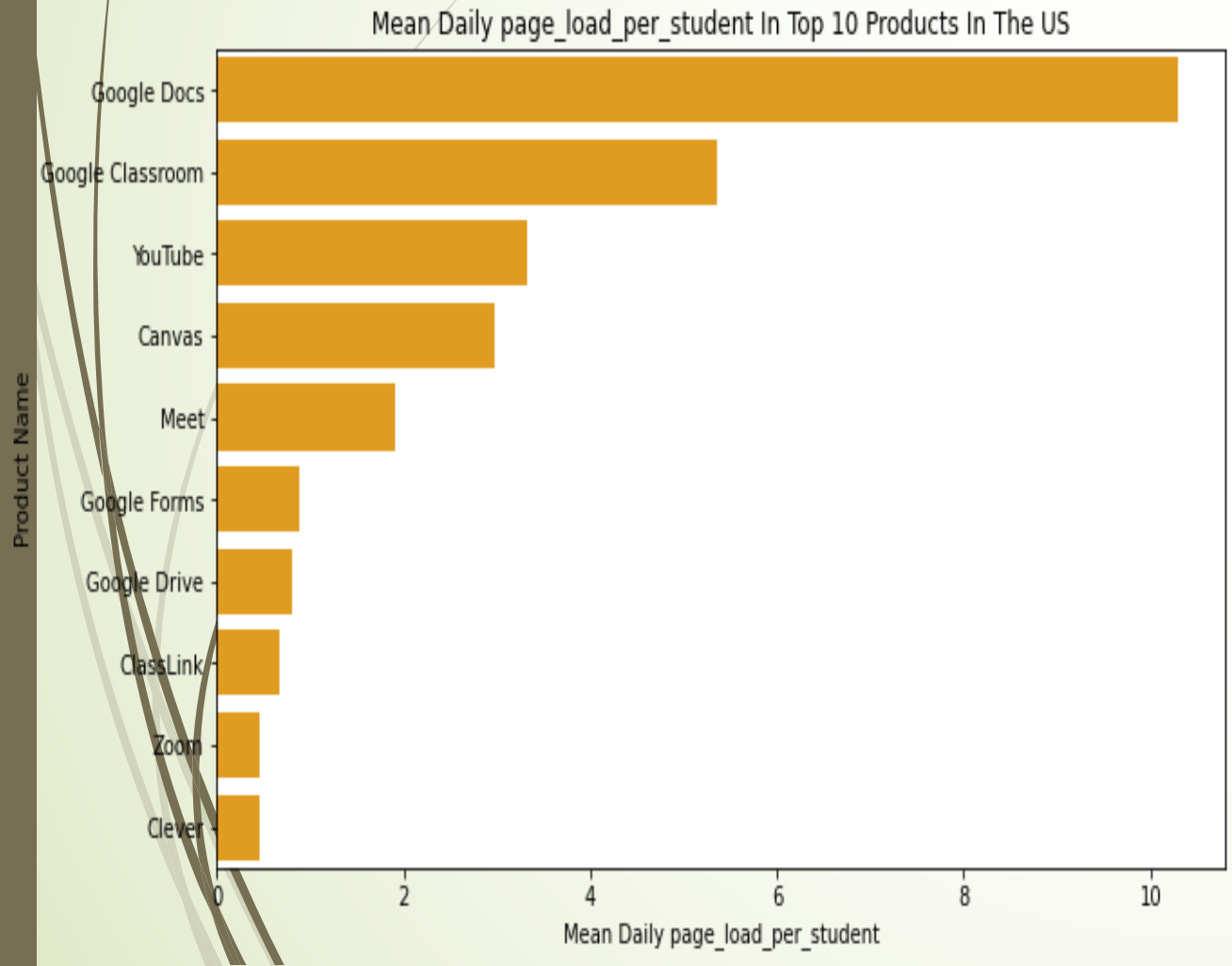
Now we want to analyze:
the mean daily page load per student for the products and the pct access **by state**.

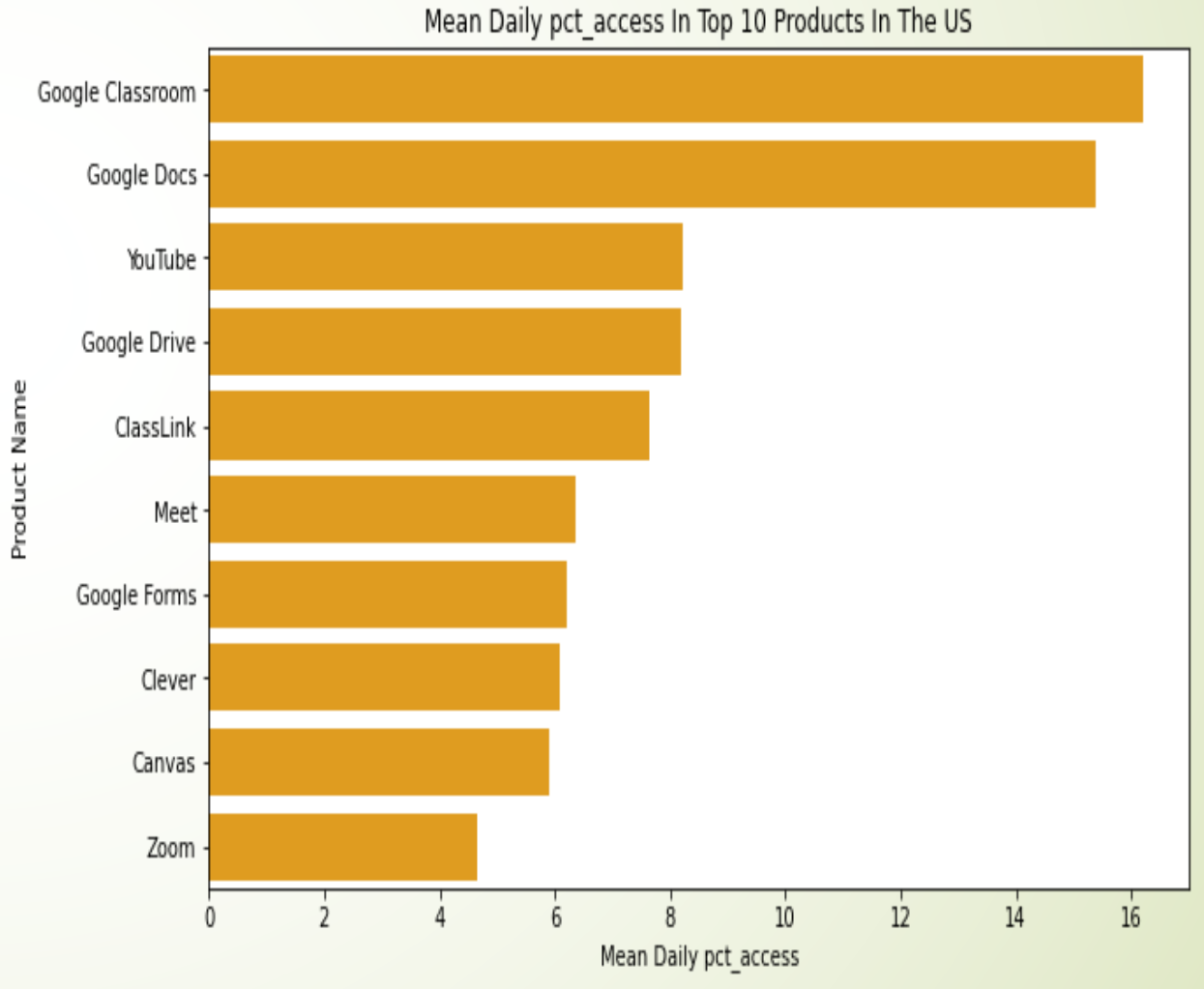




Now we want to analyze:

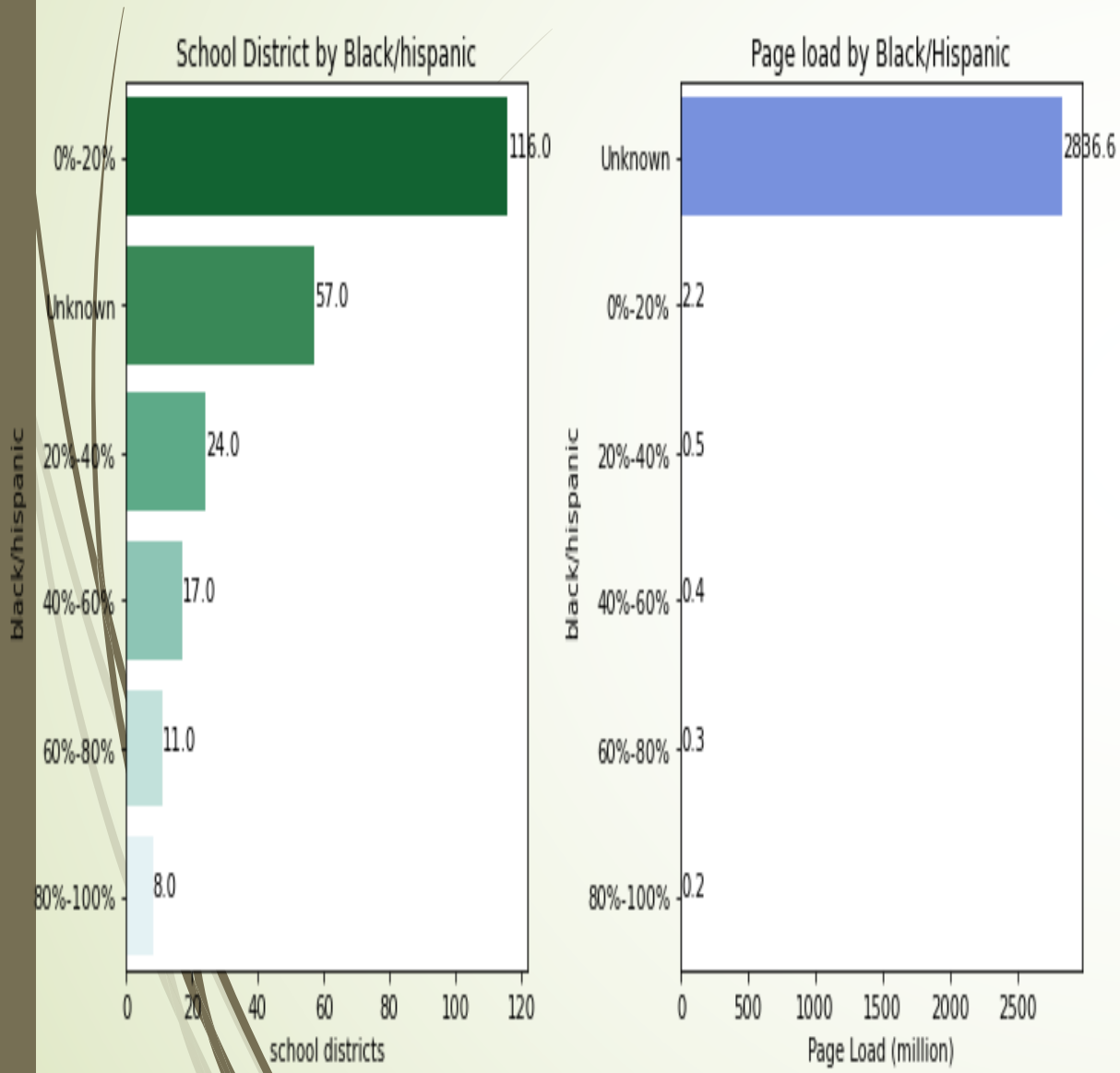
the mean daily page load per student for the products and the pct access **by top 10 Ed-product**.

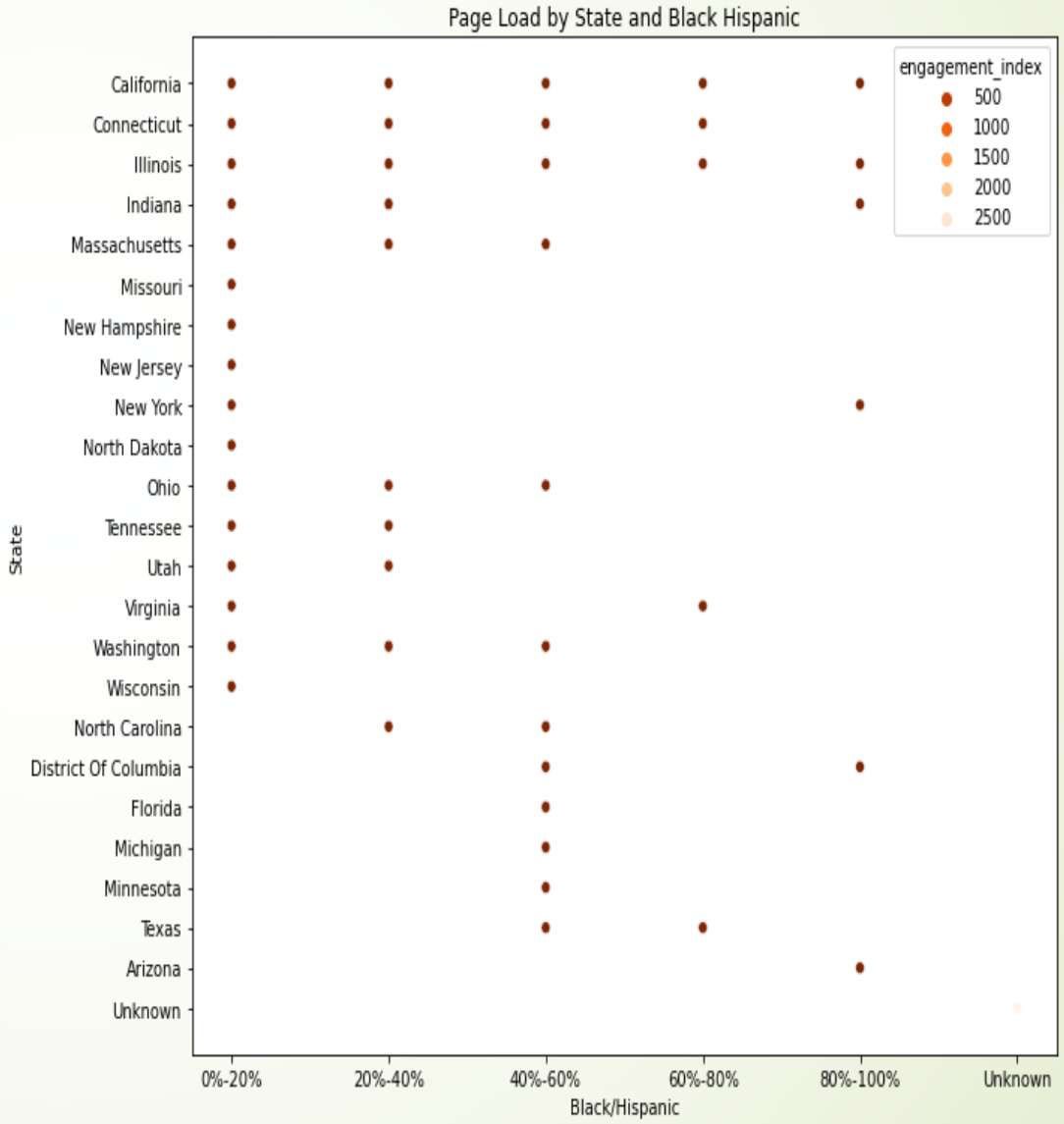




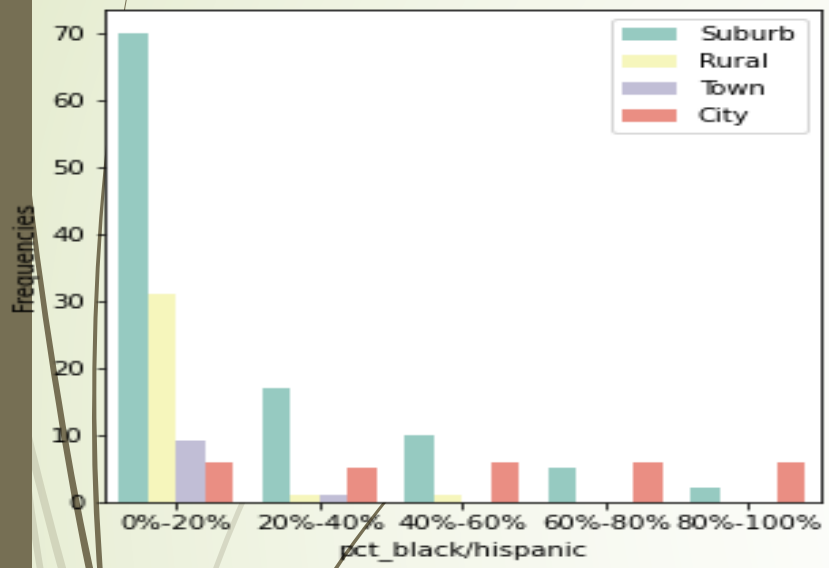
Now we want to look usage of top 10 Ed-products for the each state of the datasets

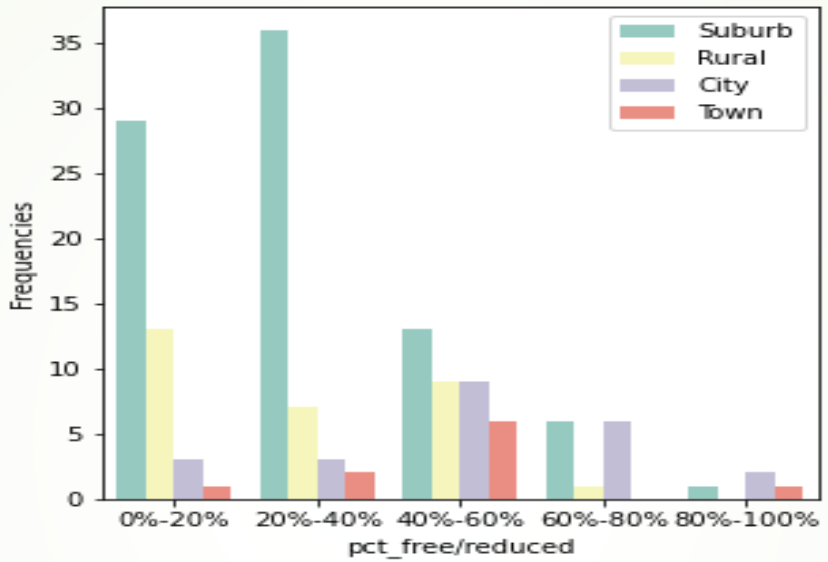
Another Factor we considered is as the digital divide is more for Black/hispanic we are going to focus on the reason behind it.

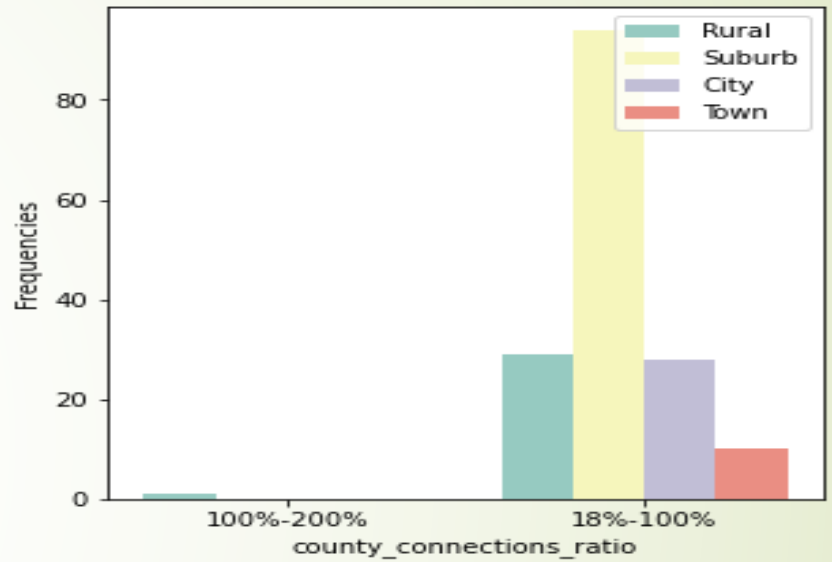


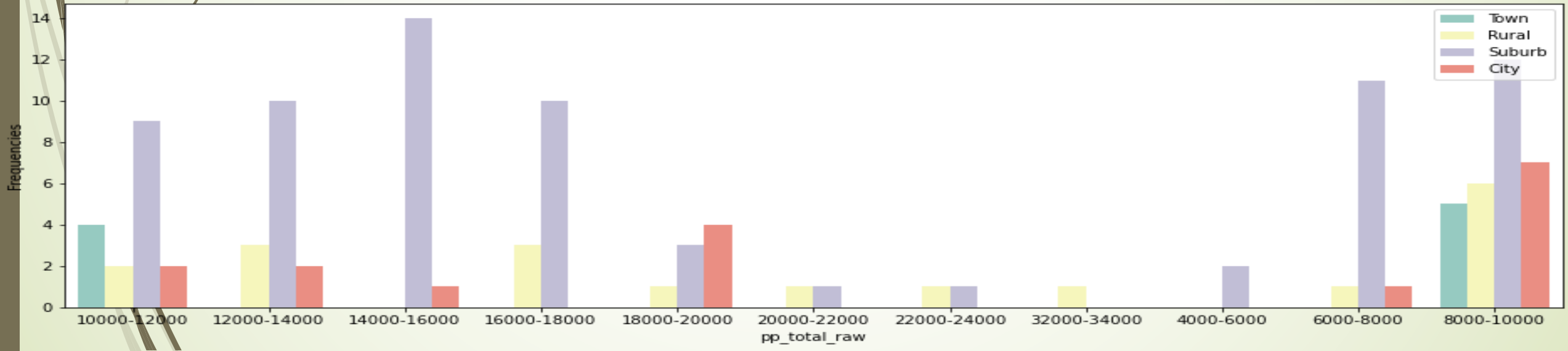


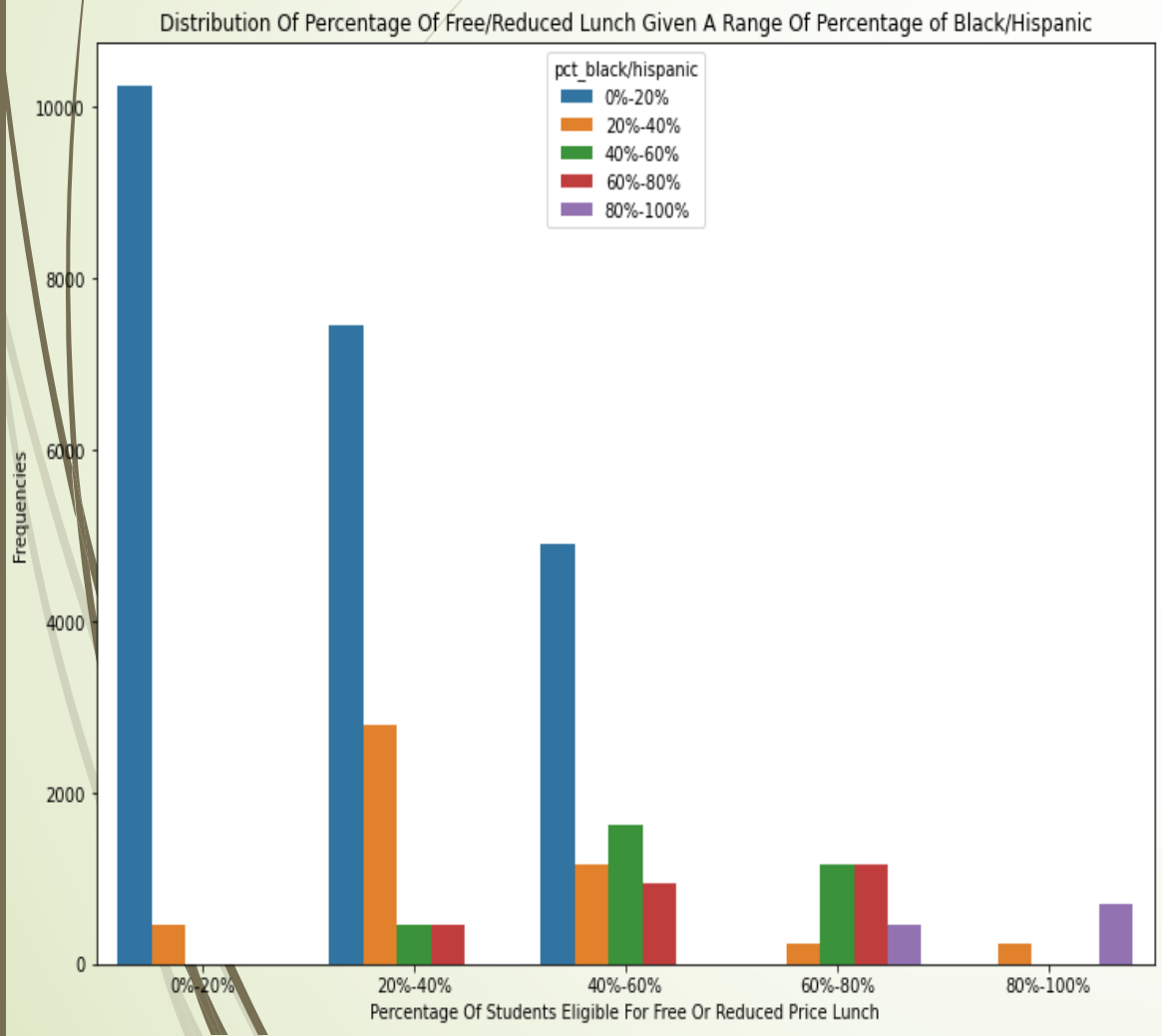
Now we wanna go some deep analysis by *plotting the multiple plot about pct_black/hispanic, pct_free/reduced, county_connections_ratio and pp_total_raw*

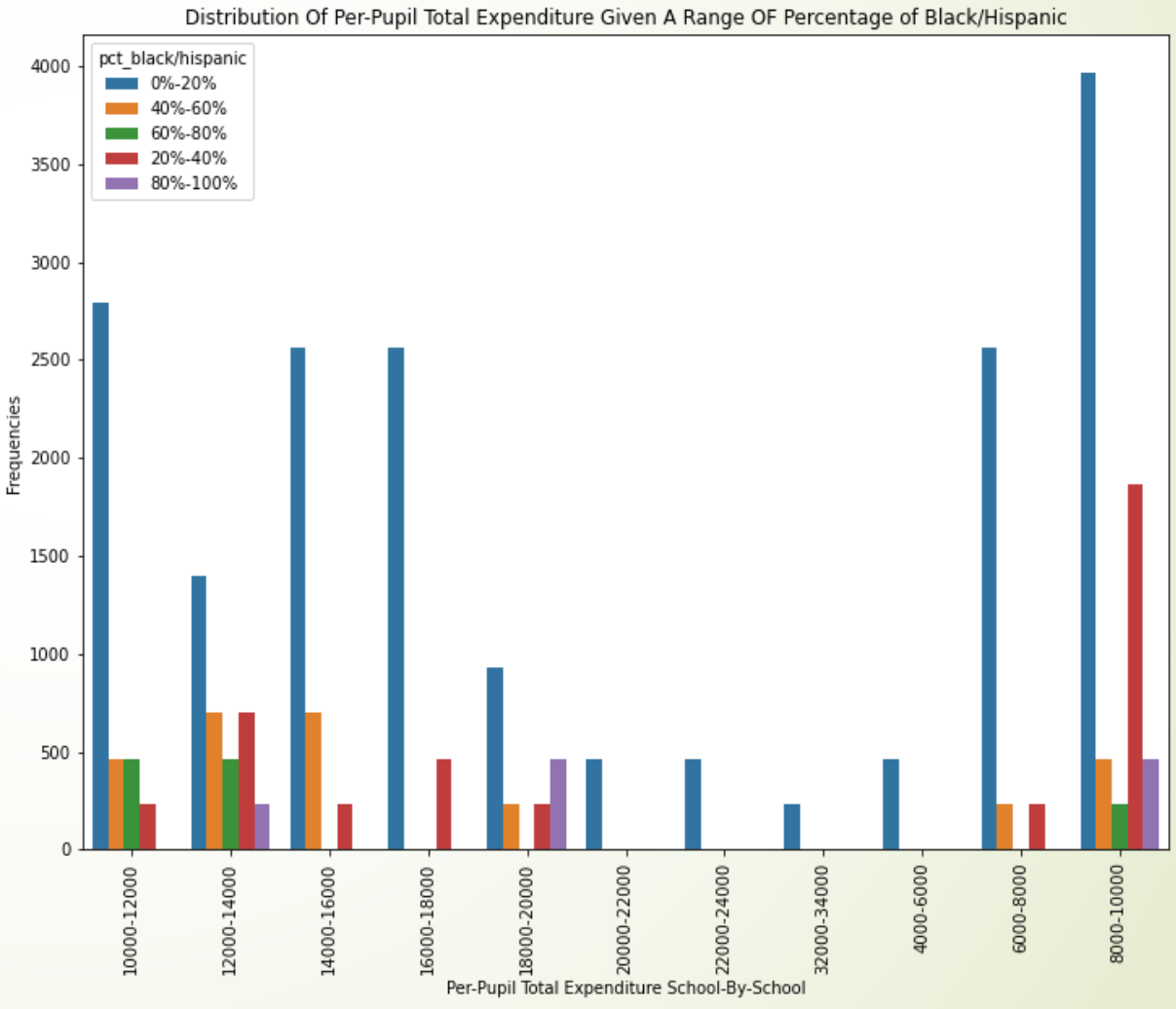









Distribution Of Percentage Of Free/Reduced Lunch Given A Range Of Percentage of Black/Hispanic
pct_black/hispanic
0%-20%
20%-40%
40%-60%
60%-80%
80%-100%
Frequencies
0
2000
4000
6000
8000
10000
0%-20%
20%-40%
40%-60%
60%-80%
80%-100%
Percentage Of Students Eligible For Free Or Reduced Price Lunch


Distribution Of Per-Pupil Total Expenditure Given A Range OF Percentage of Black/Hispanic
pct_black/hispanic
0%-20%
40%-60%
60%-80%
20%-40%
80%-100%
Frequencies
0
500
1000
1500
2000
2500
3000
3500
4000
10000-12000
12000-14000
14000-16000
16000-18000
18000-20000
20000-22000
22000-24000
32000-34000
4000-6000
6000-8000
8000-10000
Per-Pupil Total Expenditure School-By-School

County Connection Ratio:

###County Connection Ratio County Connection Ratio is residential fixed high-speed connections over 200 kbps in at least one direction/households.

North Dakhota has county connection 100%-200%

rest of the county has connection ratio 18%-100%

In 113

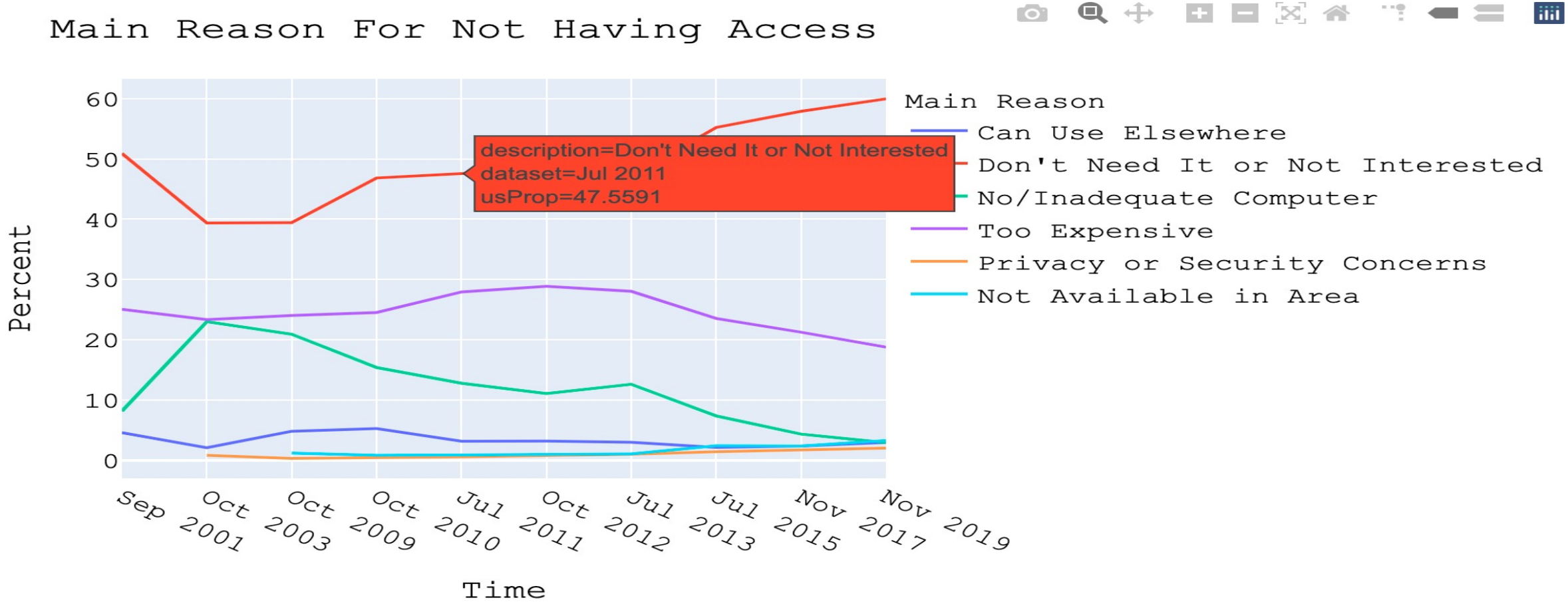
```
1 connection_ratio=pd.DataFrame(result.groupby(['county_connections_ratio'])['state'].nunique()).reset_index()
2 connection_ratio.columns=['county connections ratio','No of State']
3 connection_ratio=connection_ratio.fillna('unknown')
4 connection_ratio=connection_ratio.sort_values('No of State',ascending=False)
5 connection_ratio
```

Out 113

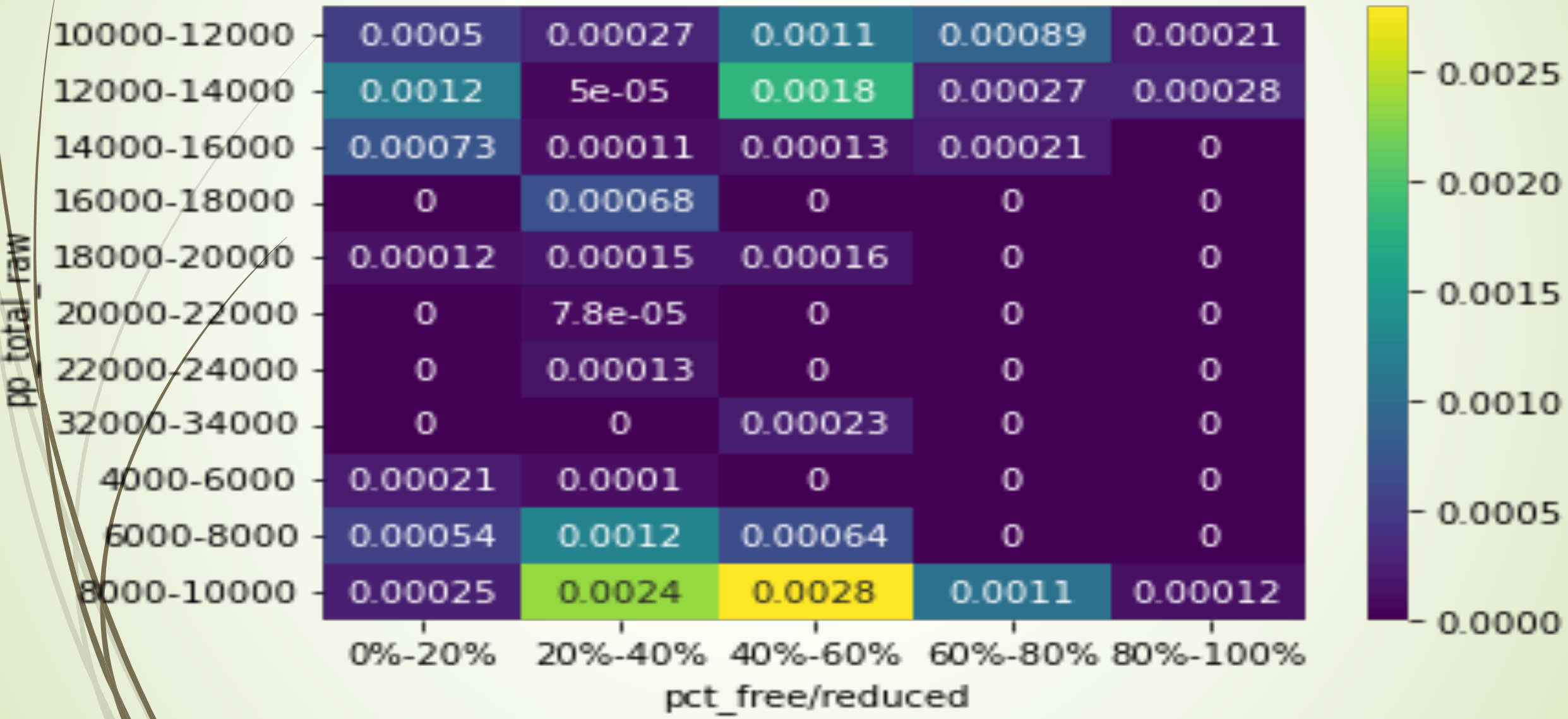
	county connections ratio	No of State
1	18%-100%	22
0	100%-200%	1

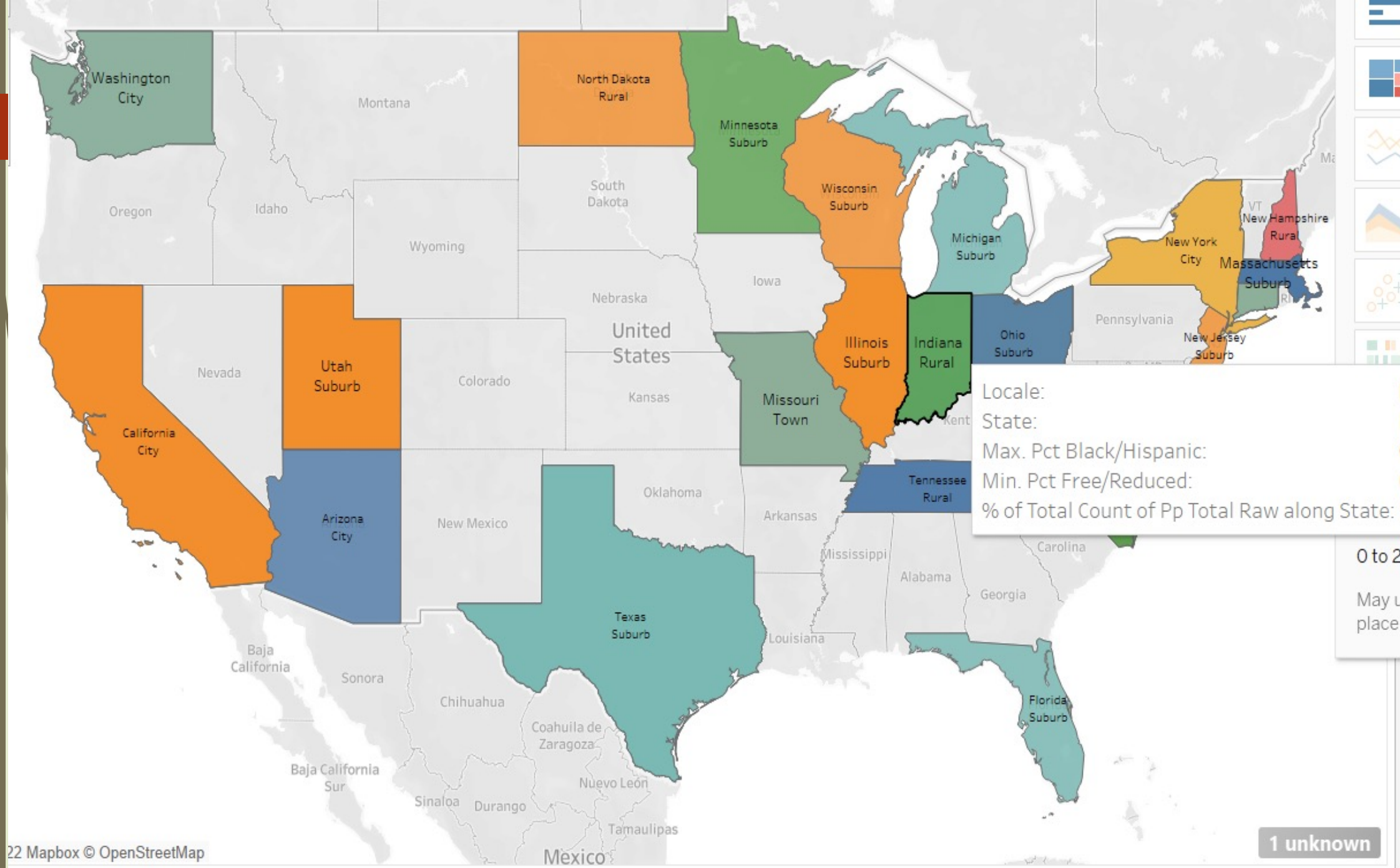
2 rows × 2 columns Open in new tab

Analysis on the reason for not having access of internet

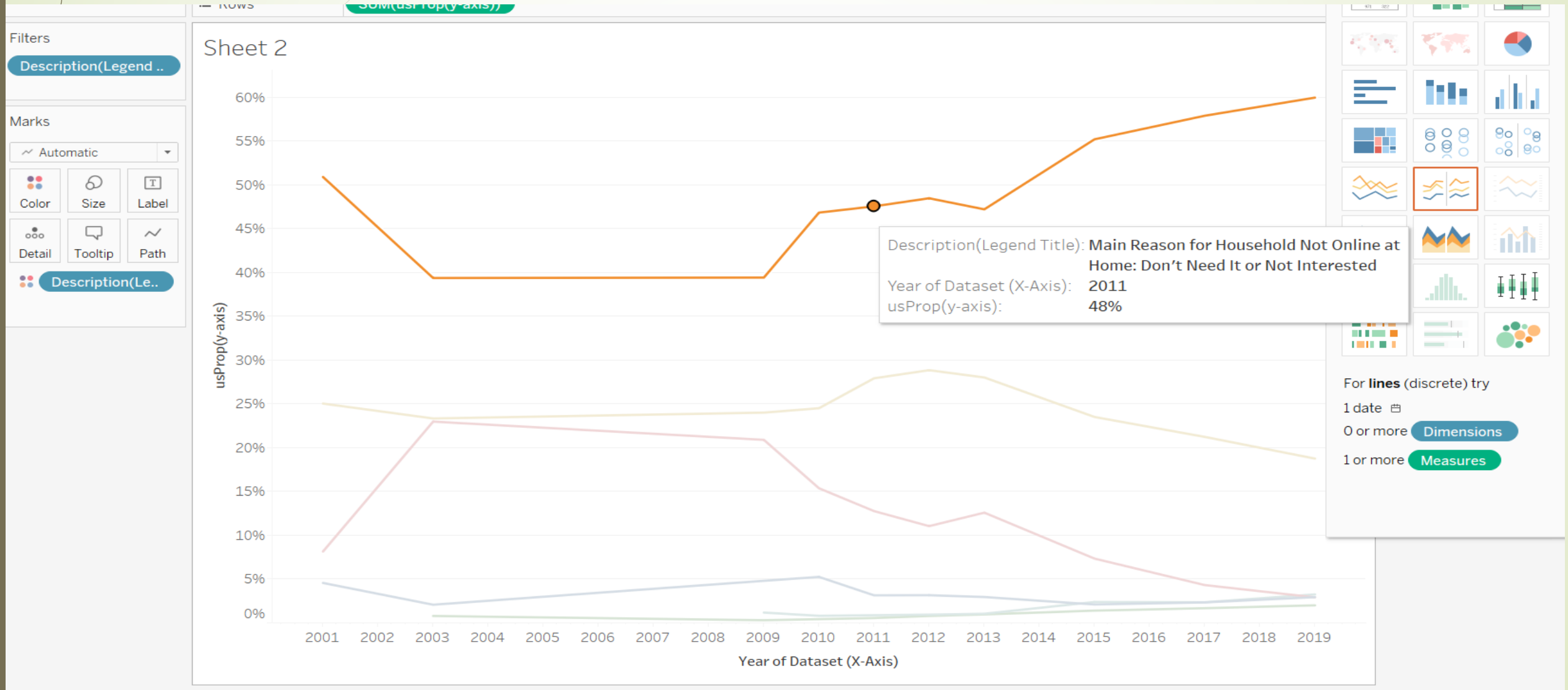


Correlation between Reduced Price and Per-Pupil Total expenditure interms of page-load




Washington City
North Dakota Rural
Minnesota Suburb
Wisconsin Suburb
Michigan Suburb
New York City
VT New Hampshire Rural
Massachusetts Suburb
Montana
Oregon
Idaho
South Dakota
Wyoming
Nebraska
Iowa
United States
Pennsylvania
New Jersey Suburb
Ohio Suburb
Illinois Suburb
Indiana Rural
Missouri Town
Utah Suburb
Nevada
Colorado
Kansas
California City
Arizona City
New Mexico
Oklahoma
Arkansas
Tennessee Rural
Mississippi
Alabama
Georgia
Carolina
Texas Suburb
Louisiana
Florida Suburb
Baja California
Sonora
Chihuahua
Coahuila de Zaragoza
Nuevo León
Tamaulipas
Sinaloa
Durango
Baja California Sur
Mexico
Locale: Rural
State: Indiana
Max. Pct Black/Hispanic: 0
Min. Pct Free/Reduced: 66.66
% of Total Count of Pp Total Raw along State: 15.8%
0 to 2
Measures
May use spatial measure in place of geo dimension
1 unknown
22 Mapbox © OpenStreetMap

Analysis on the reason for not having access of internet



Thank You