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Google Trends & Covid Data Analysis Project

Outline

Motivation

Covid disrupted a lot of industries, and people ended up with lots of free time - so we were interested in what people's interests were during this time.

Project Theme

Exploration of Top Google Searches in the US between 2019-2020.

Key Questions

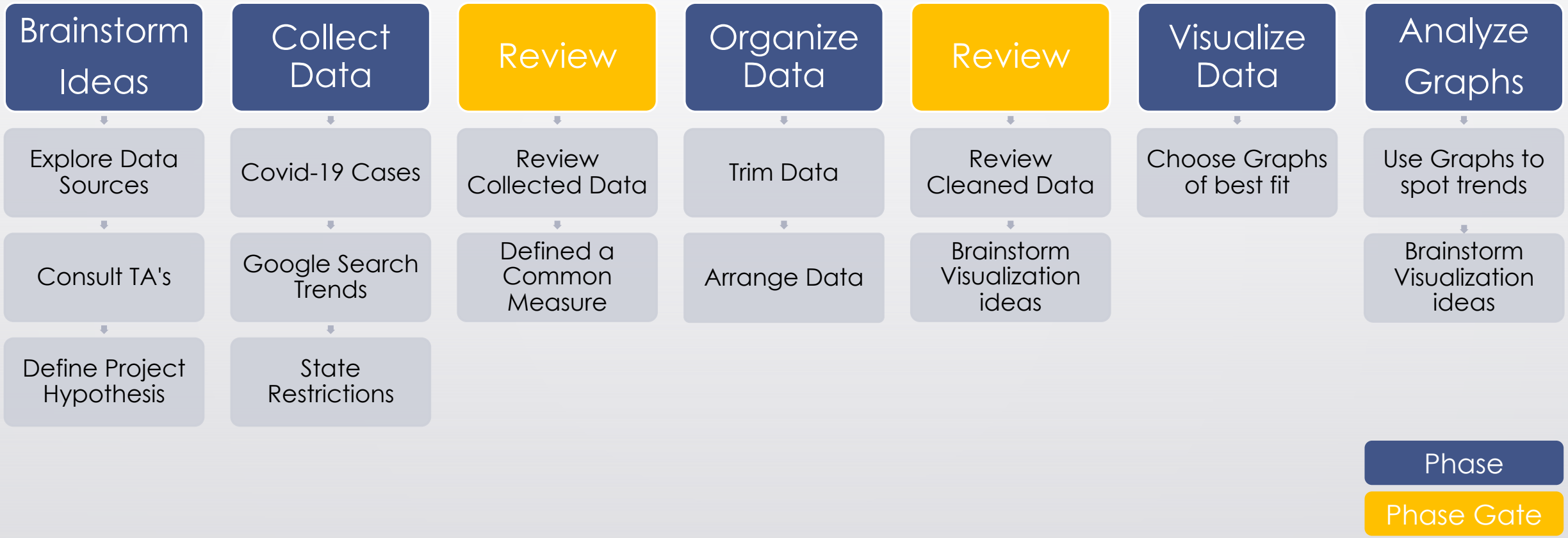
Has Covid-19 impacted Google searches in the US compared to previous years?

Did State Restrictions play a Factor?

Hypothesis

We hypothesize that states will differ in their average search interests between 2019 and 2020, and states will vary amongst themselves in their 2020 search interests.

Summary


Brainstorm Ideas
Explore Data Sources
Consult TA's
Define Project Hypothesis
Collect Data
Covid-19 Cases
Google Search Trends
State Restrictions
Review
Review Collected Data
Defined a Common Measure
Organize Data
Trim Data
Arrange Data
Review
Review Cleaned Data
Brainstorm Visualization ideas
Visualize Data
Choose Graphs of best fit
Analyze Graphs
Use Graphs to spot trends
Brainstorm Visualization ideas
Phase
Phase Gate

Questions & Data

Project Questions

Will states will differ in their average search interests between 2019 and 2020? Will states vary amongst themselves in their 2020 search interests?

Expectations

1) The coronavirus had shifted people's google searches, where people would probably search more for entertainment, video online communication, and health information

2) A state with strong lockdowns would have more interest in the above categories, due to having more free time

Data Sources

Google Trends API, Covid Tracking Project Data (Atlantic Monthly Group), ESRI Disaster Response Program API for Stay at Home Orders

Assumptions

1. Default search engine in the US is Google
2. States are homogeneous within themselves
3. 2019 represents a typical year

Data Cleanup & Exploration

Step 1: Collecting the Data

- Google API: conduct a Top Trends keyword search on 2018, 2019, 2020, connect those into larger categories for calling to Google Trends Interest Over Time search
- Covid Data: importing CSVs of data for all states over time
- Stay At Home Orders API: calling API for all 50 states (and DoC)

Step 2: Cleanup

- Creating CSVs for each state with Covid case numbers and stay at home orders

Two State Comparison

- California vs Wyoming
- Stringent lockdown vs. No lockdown
- Coastal vs. Midwestern
- Large population vs. Small population

Data Analysis - Visualization

Nested Pie Charts

2020 and 2019 groups, 2020 groups and categories

Popularity Graphs

For each state, for each group of categories, line graph of the popularity of each category over time, along with a bar chart of positive Covid cases

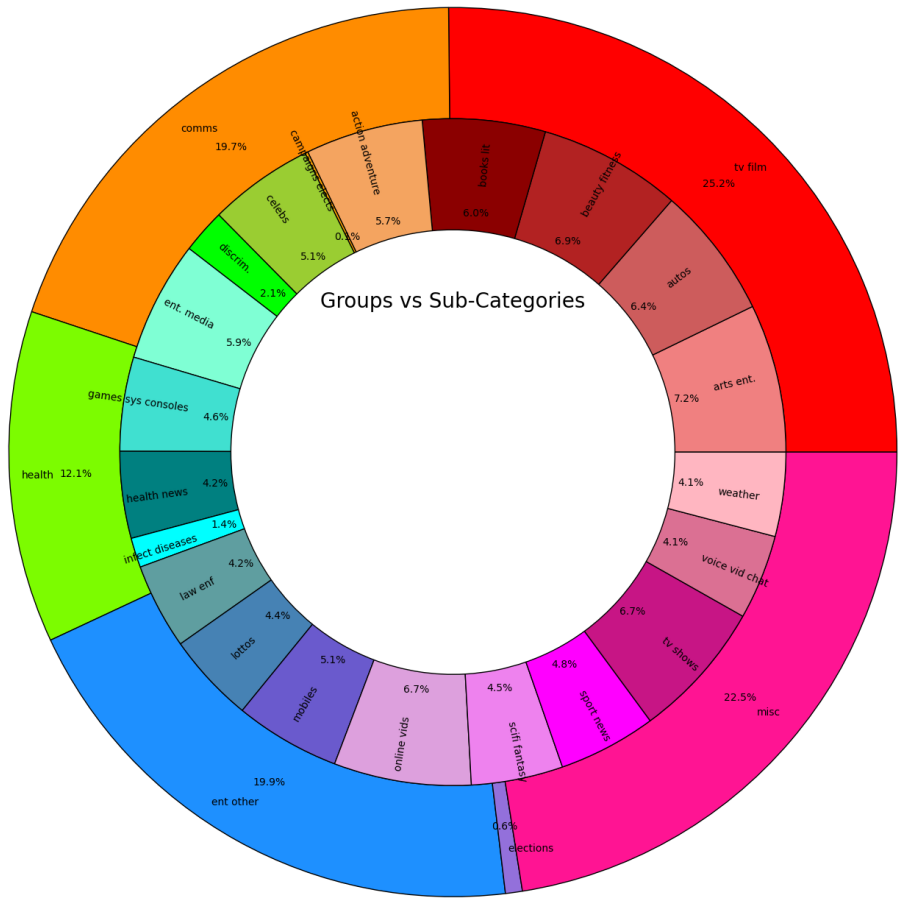
Means Comparisons

The mean percentage popularity for 2020 in that category different to the mean percentage popularity for 2019?

2020-2019 Difference Graphs

Shows difference between the 2019 search percent at any point in time and the 2020 search percent at the same point in time

Groups 2019 vs 2020



Groups v. Categories 2020

Means Comparisons: what is significant?

CA

categories	2019_means	2020_means	p_vals	stats_signif	2019_stdev	2020_stdev	diff_btwn_means
action_adventure	66.384615	62.450980	0.00525988	Yes	7.86461	5.84208	-3.933635
scifi_fantasy	57.230769	61.215686	0.114452	No	14.6663	10.0826	3.984917
tv_shows	84.807692	81.078431	0.00157805	Yes	5.19629	6.26801	-3.729261
online_vids	80.384615	78.725490	0.250488	No	3.42027	9.5303	-1.659125
mobiles	52.826923	48.823529	0.0059075	Yes	8.8746	4.78029	-4.003394
voice_vid_chat	58.634615	51.784314	0.00480011	Yes	9.85867	13.6171	-6.850302
infectious_diseases	9.769231	25.980392	4.73493e-07	Yes	1.01177	19.8084	16.211161
health_news	55.903846	64.372549	7.43562e-05	Yes	5.95257	12.9402	8.468703
games_systems_consoles	51.423077	62.647059	2.14724e-06	Yes	5.30365	14.2812	11.223982
arts_entertainment	91.057692	84.803922	1.44875e-08	Yes	3.35934	6.13578	-6.253771
books_lit	75.519231	68.549020	0.00126812	Yes	12.1679	8.63035	-6.970211
lottos	49.057692	36.764706	1.72109e-10	Yes	10.5874	5.40003	-12.292986
celebs	56.461538	60.745098	0.0159189	Yes	6.10316	10.7061	4.283560
entertainment_media	70.384615	71.098039	0.678035	No	4.53683	11.2324	0.713424
campaigns_elections	0.192308	3.156863	0.135203	No	0.394113	13.8002	2.964555
discrimination	24.115385	31.372549	0.0081226	Yes	8.46634	16.8929	7.257164
law_enf	37.519231	37.431373	0.957739	No	3.17739	11.2411	-0.087858
weather	43.115385	33.490196	0.00189214	Yes	19.3914	8.72763	-9.625189
autos	82.307692	77.941176	0.00366652	Yes	5.78971	8.60554	-4.366516
beauty_fitness	86.942308	83.372549	0.00194262	Yes	3.6184	6.99288	-3.569759
sport_news	77.769231	57.392157	1.95682e-13	Yes	8.23598	14.1519	-20.377074

WY

categories	2019_means	2020_means	p_vals	stats_signif	2019_stdev	2020_stdev	diff_btwn_means
action_adventure	58.538462	58.333333	0.92855	No	11.9268	10.9949	-0.205128
scifi_fantasy	45.365385	47.529412	0.552689	No	17.043	19.3627	2.164027
tv_shows	81.250000	75.588235	0.0035644	Yes	10.0381	9.00583	-5.661765
online_vids	78.615385	73.941176	0.0111616	Yes	8.28612	9.79478	-4.674208
mobiles	53.730769	51.078431	0.22755	No	12.2162	9.60156	-2.652338
voice_vid_chat	26.519231	30.196078	0.346462	No	16.5314	22.0668	3.676848
infectious_diseases	9.173077	24.725490	1.91166e-05	Yes	2.37553	23.2076	15.552413
health_news	30.615385	34.117647	0.471215	No	22.8365	25.7116	3.502262
games_systems_consoles	46.326923	53.843137	0.00981761	Yes	12.9447	15.582	7.516214
arts_entertainment	88.250000	84.490196	0.000299478	Yes	4.58205	5.44625	-3.759804
books_lit	68.692308	62.607843	0.00934249	Yes	12.9712	9.89965	-6.084465
lottos	56.884615	49.568627	0.0351317	Yes	17.091	17.3321	-7.315988
celebs	59.057692	65.196078	0.00882569	Yes	10.0564	12.8185	6.138386
entertainment_media	61.019231	63.470588	0.405385	No	14.9428	14.5418	2.451357
campaigns_elections	0.076923	2.862745	0.160403	No	0.266469	13.8224	2.785822
discrimination	16.576923	24.647059	0.0142413	Yes	12.5627	19.1176	8.070136
law_enf	51.076923	48.392157	0.358082	No	15.1097	14.1062	-2.684766
weather	52.788462	46.098039	0.0116618	Yes	15.2987	10.3984	-6.690422
autos	75.326923	73.647059	0.450444	No	10.8782	11.3928	-1.679864
beauty_fitness	86.807692	85.098039	0.251456	No	6.67671	8.12948	-1.709653
sport_news	44.288462	33.215686	0.000774639	Yes	17.4017	14.5728	-11.072775

Category Samples

- Entertainment Media
  - Book retailers
  - CD & Audio Shopping
  - DVD & Video Shopping
  - Entertainment Media Rentals / Video Game Retailers
- Health News
  - All health news
  - Health policy
  - Covid topics

Data Analysis - Means Comparison

Entertainment Media

Average interest in entertainment media *stayed the same* for both states

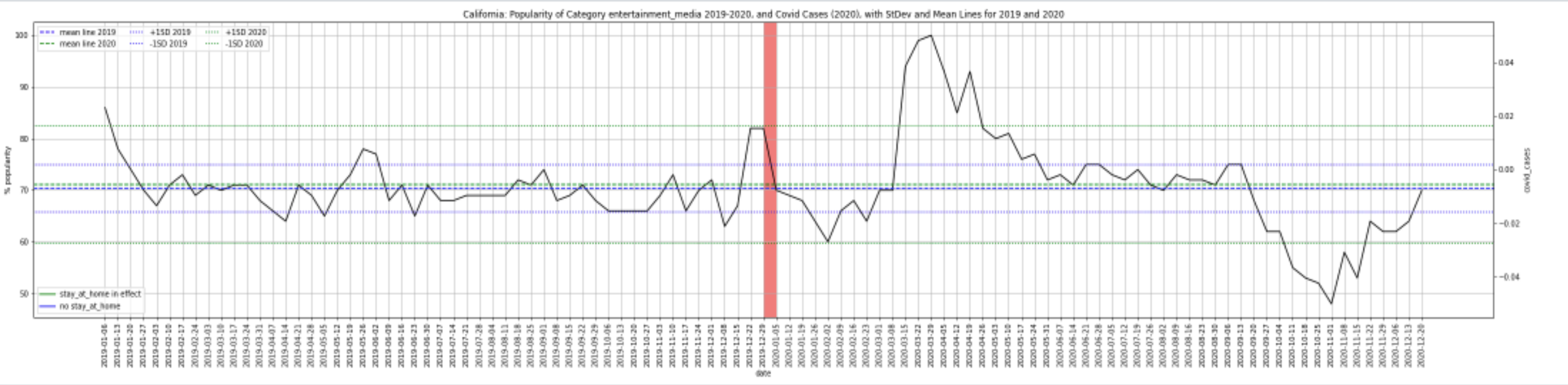
Health News

Average interest in Health News increased for California, but not for Wyoming

Do either of these sound odd? Let's look at the graphs

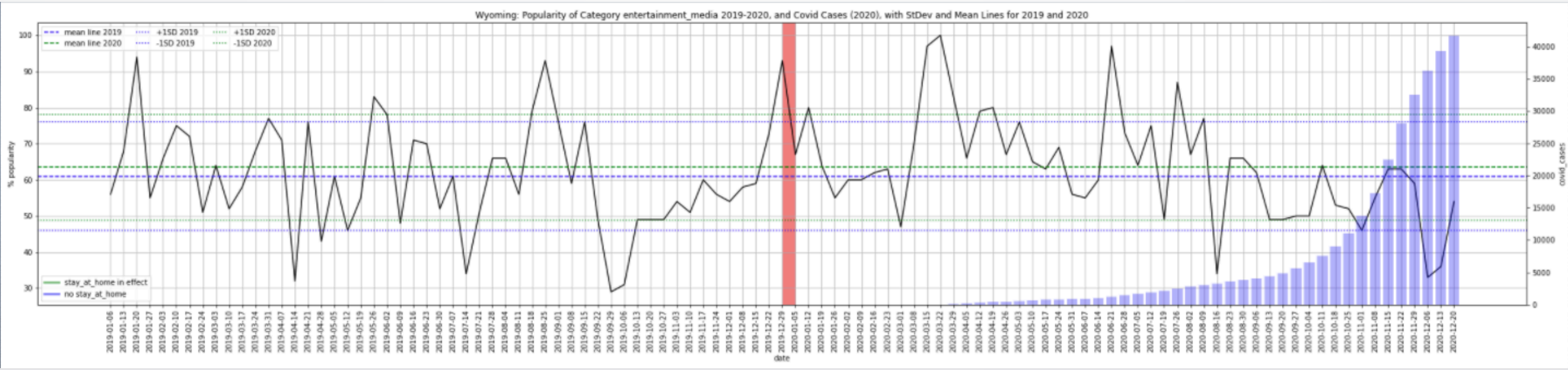
Entertainment Media, California

(YOY by Month)



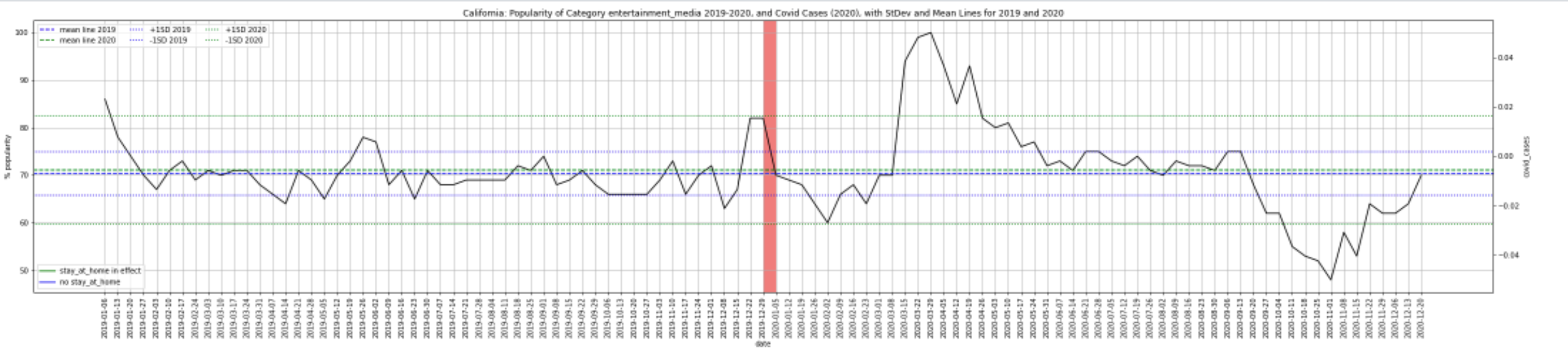
Entertainment Media, Wyoming

(YOY by Month)



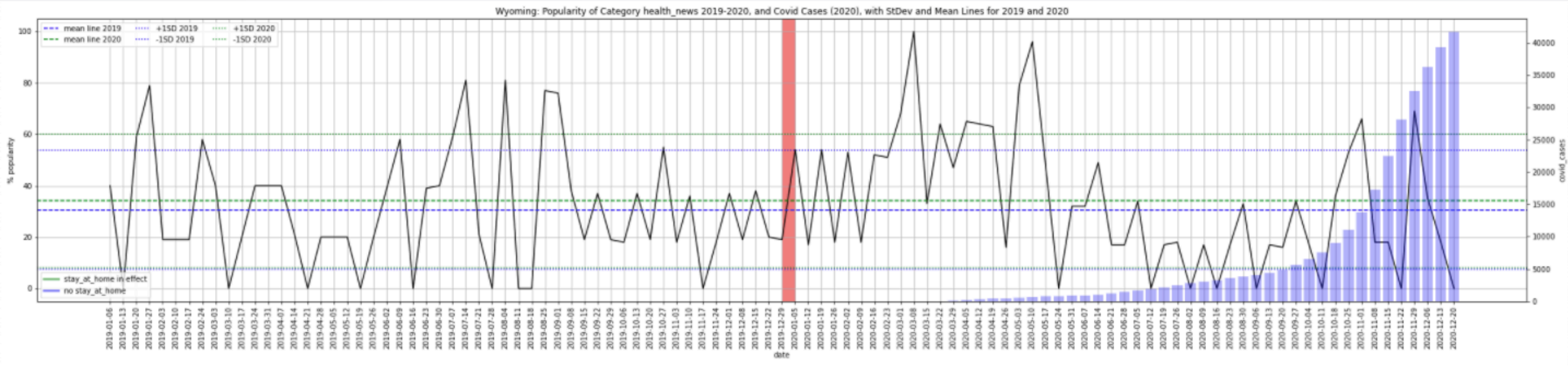
Health News, California

(YOY by Month)



Health News, Wyoming

(YOY by Month)



Discussion

Entertainment Media

- The means test is somewhat misleading
- CA: spike in early months of the lockdown - makes sense, people are looking for more kinds of entertainment to access during their free time
- WY: also a peak in early in the same months, but no lockdown. Perhaps people were in a similar mindset as the rest of country.

Health News

- Both states have spikes in interest when cases rise, but only CA maintains interest throughout the year.

Post Mortem

Conclusions

the lockdown under pandemic led people to be more interested in entertainment and health. However, a simple lockdown/no lockdown dichotomy cannot be drawn.

Problems

Google Trends scope: we wanted to try to analyse +1000 categories. Even using the sleep function, it was taking days to even create a csv for one category. Reduction to 21 categories. Additional issues with some of those categories required changing some specific categories (e.g. errors with specific television categories).

Future Research

Challenging assumption that 2019 is a typical year, comparing 2020 data with more previous years; looking into what employers did despite/in concert with lockdown orders


Questions?