

Poverty, Death Rate & Covid-19

By Team Oranges

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Problem Statement

- Covid has adversely affected many communities

 Attempt to determine which counties may be hardest hit in future pandemics
 - Use covid-related statistics and census data to predict covid death rates
 - Determine if Covid rates differ by poverty, which can then in turn help look for issues within counties and states to increase health care and accessibility.

Datasets

- Covid19 death rates per US county
- Census bureau acs per county
- US Healthcare Capacity per county

Exploratory Data Analysis

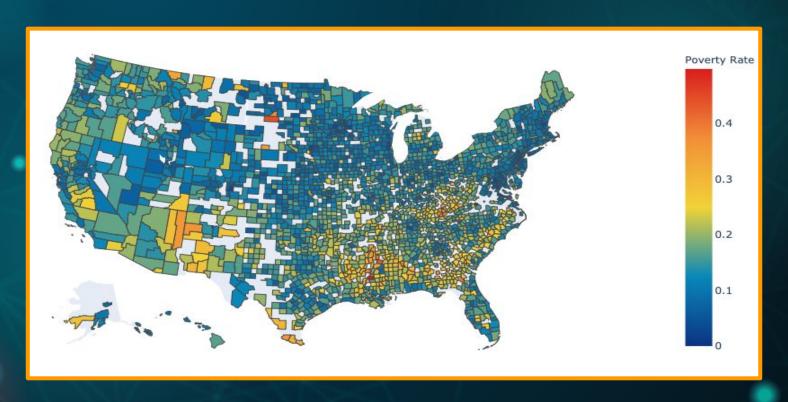
- We used 'all bed occupancy rate' from the healthcare dataset in our models so we imputed the mean and all other rows from this dataset were dropped due to high collinearity
- Create variables for death_rate, poverty_rate
- Visualized heatmap correlations
- Added leading zeros to county fips codes for use in choropleth maps

Heatmap Visualizations

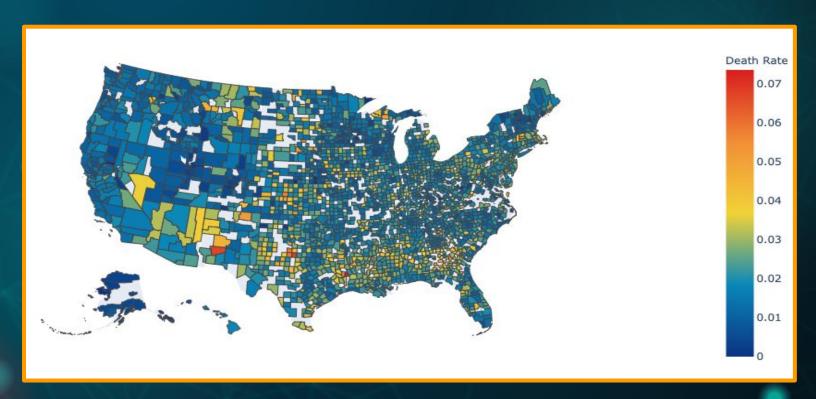
	income and deaths correlation	
percent_income_spent_on_rent -	0.17	- 1.00
median_income -	0.19	
income_per_capita -	0.2	- 0.75
income_200000_or_more -	0.83	
income_150000_199999 -	0.88	0.50
income_125000_149999 -	0.91	- 0.50
income_100000_124999 -	0.92	
income less 10000 -	0.93	- 0.25
income_75000_99999 -	0.93	
income 50000 59999 -	0.93	
income 60000 74999 -	0.94	- 0.00
income 45000 49999 -	0.94	
income 35000 39999 -	0.94	0.25
income_40000_44999 -	0.94	
income 30000 34999 -	0.94	
income 25000 29999 -	0.94	0.50
income 15000 19999 -	0.95	
income_20000_24999 -	0.95	0.75
income 10000 14999 -	0.95	
deaths -	1	
	deaths	1.00

	employ and deaths correlation	
pct_employed_education_health_social -	0.056	- 1.00
pct_employed -	0.11	
employed_agriculture_forestry_fishing_hunting_mining -	0.41	- 0.75
employed_public_administration -	0.84	
employed_manufacturing -	0.9	0.50
employed_science_management_admin_waste -	0.9	- 0.50
employed_information -	0.9	
employed_construction -	0.91	- 0.25
employed_finance_insurance_real_estate -	0.91	
management_business_sci_arts_employed -	0.91	0.00
employed_arts_entertainment_recreation_accommodation_food -	0.93	- 0.00
employed_retail_trade -	0.94	
employed_education_health_social -	0.94	0.2
employed_wholesale_trade -	0.94	
employed_transportation_warehousing_utilities -	0.94	0.5
employed_pop -	0.95	0.5
sales_office_employed -	0.95	
employed_other_services_not_public_admin -	0.95	0.7
unemployed_pop -	0.96	
deaths -	1	1.0
	deaths	-1.0

Poverty Rate by US County as of June 2021



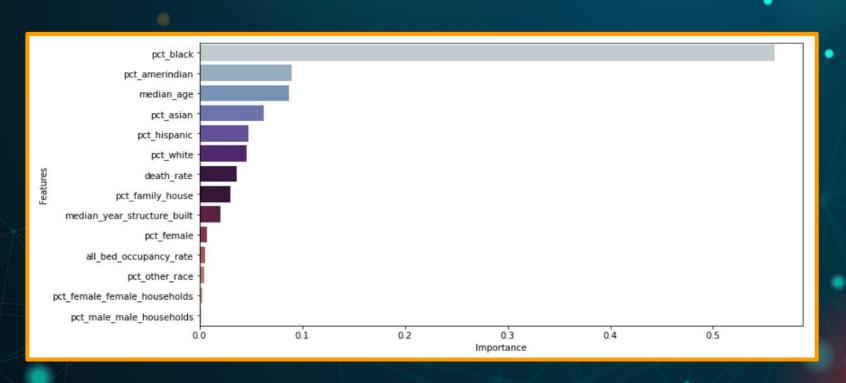
Covid-19 Death Rate by US County as of June 2021



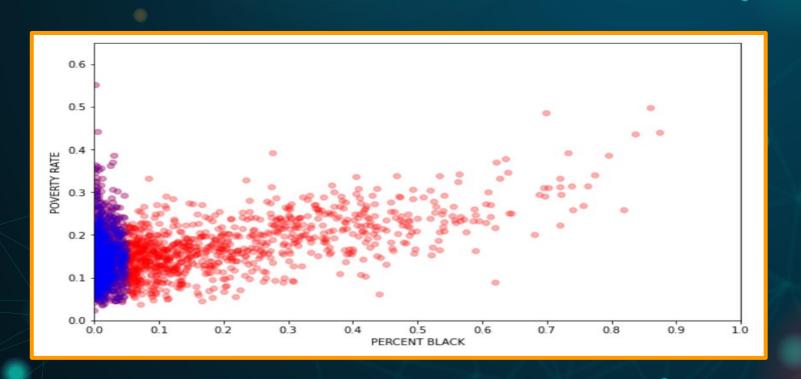
Poverty Rate - Models & R2 Scores

Model	Lasso	Linear Regression	Random Forest Regressor	Ada Boost Regressor	Gradient Boosting Regressor
Test	0.481	0.442	0.431	0.376	0.133
Cross Val Mean	0.419	0.425	0.462	0.349	0.348
Cross Val Std	0.065	0.063	0.058	0.006	0.062

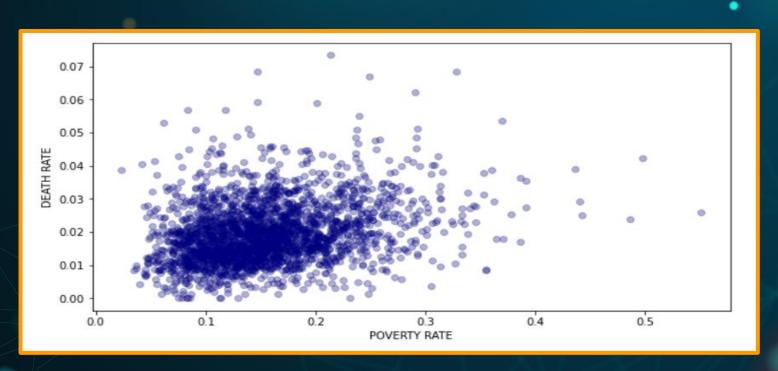
Top 20 Feature Importances for Poverty Rate



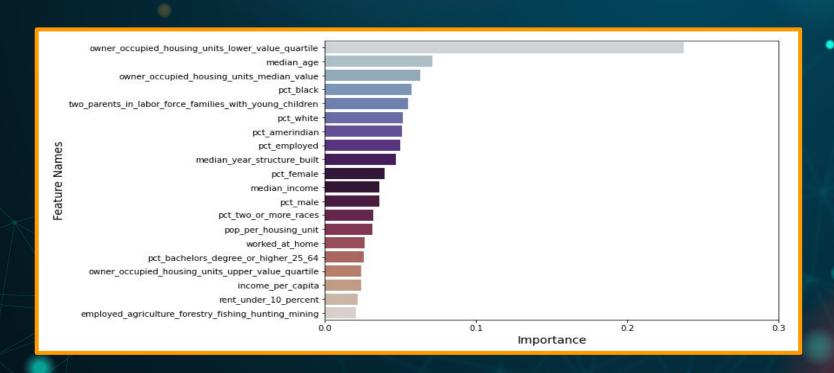
Percent Black Population vs. Poverty Rate



Poverty Rate vs. Death Rate



Top 20 Feature Importances for Death Rate



Death Rate - Models & Scores

Model	Baseline	Linear Regression	Random Forest Regressor	Ada Boost Regressor	Gradient Boosting Regressor	Voting Regressor
RSME	0.00893	0.00775	0.00715	0.00768	0.00719	0.00712
Test	-	0.246	0.358	0.259	0.352	0.364
Cross Val Mean	-	0.272	0.352	0.271	0.348	0.360
Cross Val Std	-	0.072	0.047	0.053	0.046	0.048

Results and Conclusions

Results

- Voting Regressor Model had best results
- Model RMSE: 0.00712 vs Baseline RMSE: 0.00893
- But Low R2 score 0.364

Conclusions

- Poverty rates and covid death rates are related
 - Percent of population living in low income housing
 - Median income
- > Lives can be saved if resources and funds are properly allocated to communities in need



Next Steps

- Looking at insurance rates vs death rates
- Look at percent of population working in service industry vs death rates
- Sentiment analysis of political ideations in higher death rate communities
- Look at top news outlets in communities vs death rate

THANKS!

Do you have any questions?

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