



Project Salus: Modeling COVID within the Department of Defense

Department of Defense
Joint Artificial Intelligence Center

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09/24/2020

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Health National Mission Initiative



Problem:

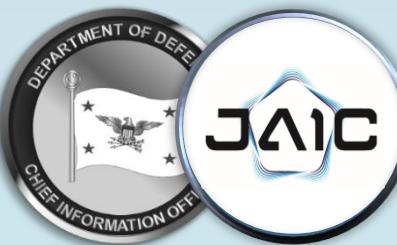
- Health records and medical images are updated and reviewed individually, neglecting population level inferences
- Medical logistics is slow, absorbs manpower and clogs supply lines
- Battlefield conditions overwhelm available medical personnel

Partners:

- Defense Health Agency
- Service Medical Communities
- Veterans Health Administration
- National Institutes of Health (Biomedical Imaging and Mental Health)

Health Mission Initiative Goals:

- Accelerate health classifications (e.g. readiness, at-risk, disabilities)
- Accelerate individual diagnoses and afford population-wide inferences
- Resilient field medicine
- Public-private partnerships



Health – Product Lines

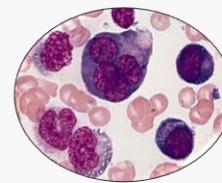
Health Records Analysis



Today: Manual, labor-intensive searching and classification of service members

Records classification
Goal: accelerate readiness determinations to allow medical providers more time with patients

Medical Imagery Classification



Today: Tissue samples are individually, manually analyzed. The world's largest sample remains inaccessible for deeper analysis

Image classification
Goal: accelerate individual diagnoses and afford population-wide inferences

Automated Medical Logistics



Today: Transport of medical supplies is slow, absorbs manpower and clogs lines of communication

Drone deliveries
Goal: Plan and execute delivery of supplies

Suicide Prevention



Today: At-risk service members and veterans are not identified for treatment and are committing suicide or performing poorly

Behavior analytics
Goal: Identify validated indicators of illness or injuries to recommend early and accurate treatment

Point of Injury Treatment Support



Today: Battlefield conditions create uncertainty and patient volumes that degrade triage

Virtual assistance
Goal: Improve sensor integration and recommend actions to emergency responders

Project Salus Overview – 12 July

- ❑ Full JADC2 support to NORAD-NORTHCOM (NNC) & National Guard Bureau (NGB)
 - ❑ Data aggregation, predictive analytics platform—initial focus on COVID impacts to medical & food supply chains, 2nd and 3rd order impacts (Flu Season, Hurricane and other natural disasters, critical infrastructure)
 - ❑ Situational Awareness Common Operating Picture (COP)
 - ❑ Uses government (DoD and interagency), commercial proprietary, and publicly available datasets
 - ❑ Anonymized data—no personally identifiable information (PII). OGC and OSD CMO review.
 - ❑ Integrates best of commercial predictive analytics, government, and academia
 - ❑ DTRA, MIT LL, USAF, MITRE, JHU APL & myriad of commercial vendors
 - ❑ IL4/IL5 government hybrid cloud (SUNet)
 - ❑ Output models and data to any existing User Interface (UI) (Palantir Vantage, Advana, Esri ArcGis)
 - ❑ Platform supports commanders, analysts, and data scientists with products and a dynamic COP
- ❑ 100 day initial JAIC funding for Phase 1 (ended 1 July)
 - ❑ NNC & JAIC cost-sharing Phase 2 (1 July – 30 Oct)
- ❑ Salus branch to IL6 to support USINDOPACOM, US Army Material Command to tackle classified non-COVID predictive analytic requirements

Data Partners	Technology Partners	End-Users
  JOHNS HOPKINS UNIVERSITY & MEDICINE 	      	  

Impact Metrics As of 12 July

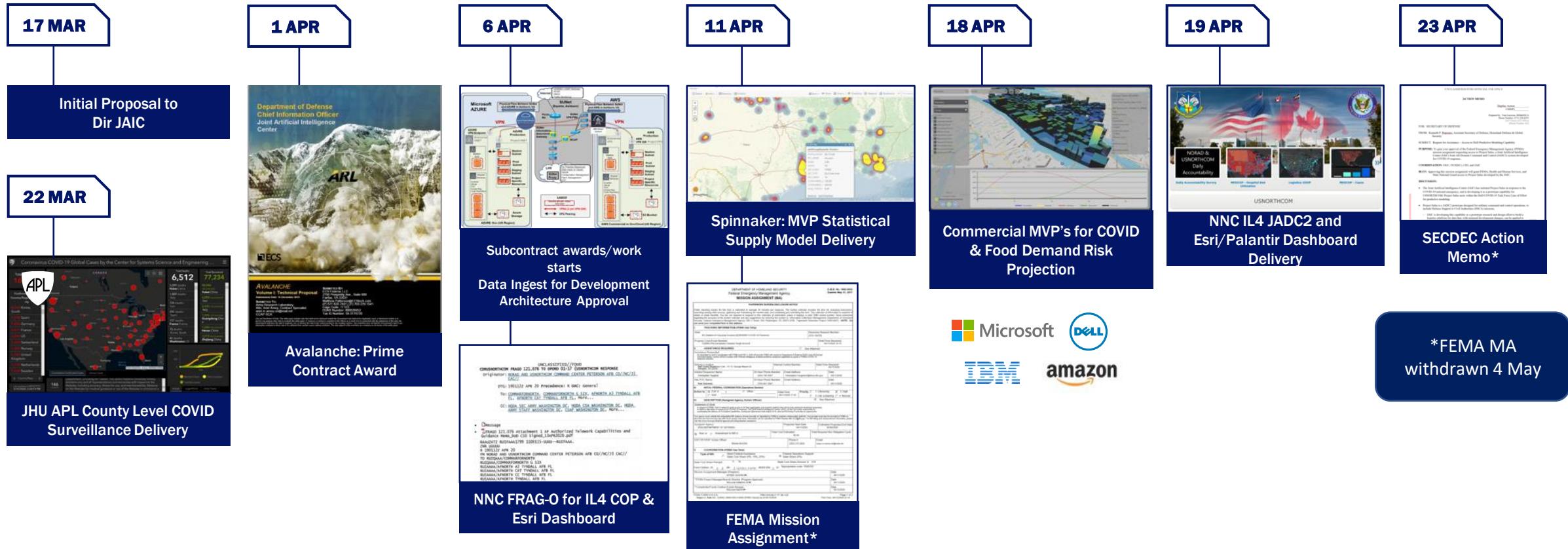
- 70+ Datasets integrated
- 150+ DoD/T10 NGB Users
- 25+ Predictive Analytic Models developed
- 34 NNC J2COVID Impact RFI's responded to, reducing analyst workload from days to hours
- First ever shared COP between NGB and NNC
- Salus model Test & Evaluation for accuracy in July
- Concept design with NNC for ensembled model/data visualization and access for development in Ph 2-3

We are on model and data overload. Imagine a giant dump truck dumping garbage into a pit but replace that garbage with data. We are the guys in the bottom of the pit sorting things and extracting plastic bottles.
— USNORTHCOM J22

We've been asking anybody who'd listen for something like this.
— USNORTHCOM J22

Salus First 30 Days

Project Salus went from powerpoint to product delivery to users in 32 days. Policy, user engagement, data acquisition and processing, contracting, development, and integration occurred in tandem. The Project Team (4 core – PM, PjM, Tech Lead, Missions Lead) meshed with the Prime Integrator (ECS) to rapidly deliver.



Data & Model Tracker: Constant Updates & Iteration

Data Sources

Approved

- US Census Bureau Data
- CDC Social Vulnerability Dataset 2018
- JHUAPL COVID Surveillance Dashboard
- DoD G-BSP: HHS Geo Health
- DoD G-BSP: Red Sky
- ReposiTrak/Nielsen Consumer Good Supply Chain data
- Blue Button – Health Insurance Claims Data
- JIEE (NGB Perstat)
- DLA Retail Data (AAFES, Navy Ex, DeCA)
- BLS Weekly Unemployment Data
- USDA Food Vulnerability Index

Under Consideration

- TRAVAX Hospital Survey Data
- ASHP Drug Shortage Data
- Oxford COVID-19 Government Response Tracker (OxCGR)
- Xmode Social Mobility Data
- US Imports - Automated Manifest System (AMS) Shipments 2018-2020
- FOURSQUARE | COVID-19 Foot Traffic Data
- AWS: ALC Consumer Data for US COVID Response

Delivered

Models

- Prediction of Disease Spread: Predictive Analytics of 7-to-28 Day Case Counts by County (Lucd) – Alabama Reopening RFI for NNC J22
- Predictive Analytics (by county) for: Disease Progression Risk Model, Hospital Capacity (Beds & Ventilators), and Food Insecurity (IBM)
- Supply Chain Analytics (Microsoft)
- County COVID-19 Cases and Planning Report – Overall J2 COP Integration (Esri)
- 65+ COVID 19 Projection to Zip+5 (Humetrix)
- Nursing home Impact Projection Model (Humetrix)
- Covid – Risk (e.g., COVID Cases, Food Security, Unemployment) by County (Amazon)
- Predictive Commercial Food Shortages by Zip-code (Dell)
- Military Base Impact & Critical Infrastructure Projection (IBM)
- Hurricane Season and COVID Impact Projection Model (IBM)

Near-term delivery (14 day)

- Predictive Food Bank Shortages by Zip-code (Dell)
- Overlay of COVID on Retail Sale Spikes (Microsoft)
- Isolated Foodbanks and Vulnerable Populations (Microsoft)
- Prediction of Unemployment and Local Employment by Industry (Microsoft)
- Zip+5 65+ Hospital & PPE Projections (Humetrix)
- Threat to Public Safety 7 Day Projection (MSFT)

Long-term delivery

- Predictive Food Shortage Severity by Zip-code (Dell)
- Food Recommendations/Reallocation (Dell)

Note: Additional models are expected to deliver as gaps are identified and with future guidance

JAIC Modeling Priority Information Requirements (NGB, NORTHCOM)

Type	Subtype	PIR #	User	Date	PIR	Notes
Medical	COVID	1	NGB CG	13-Apr	What are the future COVID hotzones at the zipcode or census tract level at 4 days, 7 days, 10 days, 30 days? What is the zipcode or census tract level risk on a 0-10 scale that COVID transmission is above R0 of 1.0 for all zipcodes at 4, 7, 10, and 30 days?	This was described as visualization based on predicted transmission rate; we can work with the user to determine the metric. Hotzone defined as transmission rate above 1.0. Define hotzones by blocks of predicted transmission rates (i.e. 1.0-1.25; 1.25-1.50).
Medical	COVID	2	NGB CG	13-Apr	Per hotzone analysis in PIR #1, what hotzones are of increased risk and will require potential NGB or NNC medical support intervention? NGB intervention based on population vulnerability, hospital rating, medical equipment readiness status. Increased risk is subjective but is based on demographic data.	
Medical	Resource	3	NGB CG	13-Apr	Per hotzone analysis in PIR #1, what hotzones will see first responders become mission incapable in 4, 7, 10, and 30 days? First responders are local and state medical and fire/police emergency services, hospital staff.	We will work with the user on metrics, but assume Mission Risk Low: 10-15%; Mission Risk Medium: 15-25%; Mission Risk High: 25-35%; Mission Incapable: >35%. This would be at the zipcode level
Medical	Resource	4	NGB CG	13-Apr	Based upon PIR #3 and NGB/NNC activity data, are there hotzones that will see activated response operations military personnel become mission incapable in 4, 7, 10, and 30 days?	We will work with the user on metrics, but assume Mission Risk Low: 10-15%; Mission Risk Medium: 15-25%; Mission Risk High: 25-35%; Mission Incapable: >35%. This would be per State and its activated guard members.
Medical	Resource	5	NGB CG	13-Apr	Per the hotzone analysis in PIR #1, what hospitals in the hotzone will see shortages in designated medical equipment from the sum of that location's baseline capacity and the addition of new capacity in the form of field hospitals etc (ICU beds, ventilators, ancillary equipment) at 4, 7, 10, and 30 days?	Shortage could be predicted to the number level (ie short 12 ICU beds), or visualized by a metric as a percentage of predicted need (ie red = >25% over the current supply). Users can provide designated equipment items.
Medical	Resource	6	NGB CG	13-Apr	What locations at the lowest possible level (ideally, hospital level) will see shortages in PPE (gowns, masks, gloves, face shields, sanitizer) in 4, 7, 10, and 30 days? What locations (hospital, zipcode, county, state) is burn rate per item larger than predicted replenishment rate, or from baseline?	Users can provide designated PPE items.
Medical	COVID	7	NGB CG	13-Apr	What are the zipcode or census tract level predictions for COVID positive tests at 4, 7, 10, and 30 days for CONUS, adapted as social mobility estimates change based on state policies?	
Supply Chain	Resource	8	NGB CG	13-Apr	What zipcodes will have shortages in basic lifeline consumer goods for 24, 48 and 72 hours from the current time? What zipcodes are projected to have shortages for over a 24 hour period 4 days from the current time?	See designated SKU list
Supply Chain	Resource	9	NGB CG	13-Apr	What zipcodes are projected to see greater than 80% sell through at retail locations or online locations on basic lifeline consumer goods at 4, 7, 10, and 30 days from now? What factors correlate to panic buying (ie media, social media, case count in an area, demographics, etc)?	See designated SKU list
Supply Chain	Resource	10	NGB CG	13-Apr	What zipcodes will have Food Bank shortages at 1, 2, 3, 4, 7, 10, and 30 days from now; what specific food banks are at highest risk of shortage in those times? What is the projected number of people per zipcode who will require food bank food at 1, 2, 3, 4, 7, 10, and 30 days? What is the projected delta of total required food bank meals to total number of meals able to be served per zipcode?	See designated SKU list. Risk metric is probably a combination of demographics and social vulnerability, historic food bank meal rates, unemployment rate for that zipcode.
Supply Chain	Resource	11	NGB CG	13-Apr	What producer/distributor locations of perishable goods (dairy, produce, meat) are at risk of closure or slow-down due to COVID-19 infections or state work restrictions? How are these identified locations/functions projected to impact the supply chain?	
Supply Chain	Resource	12	NGB CG	13-Apr	What are the supply-side locations/companies that could provide basic perishable goods to fill the projected demand shortages in PIR #10?	
Supply Chain	Resource	13	NGB CG	13-Apr	What are other projected supply chain vulnerabilities that impact the retail/online retail/foodbank delivery? Visualize this as risk. This could be manufacturer risk, distributor risk, transportation risk (maritime, rail, air).	
Supply Chain	Resource	14	NGB CG	13-Apr	Project when (1, 4, 7, 10, 30 day) and where (zipcode level) NGB or military transportation or other support would be required to fill a gap in the food supply chain (specifically perishable goods). This could be support to production, packaging/distribution, transportation, or delivery (food bank support).	Marketplace concept.
Situational Awareness	Unrest	15	NGB CG	13-Apr	In what zipcodes or census tracts is potential civil unrest projected in 24, 48, 72 hours and 7, 10, 30 days? What is the risk of civil disorder at the zipcode level on the same time periods for all zipcodes?	Civil Unrest defined as levels of violence. Need metrics.
Situational Awareness	CI	16	NGB CG	13-Apr	What critical infrastructure (at the specific location or zipcode level) is projected to be potentially impacted by COVID infections or state mobility restrictions in 1, 4, 7, 10, and 30 days?	Impact level metrics based upon operating capacity. CI are the 16 CI areas.
Situational Awareness	Crime	17	NGB CG	13-Apr	In what zipcodes is crime projected to be potentially higher in 1, 4, 7, 10, and 30 days? Visualize this risk based upon metrics?	Need crime metrics
Medical	Resource	18	NGB CG	16-Apr	What medicines or pharmaceuticals are projected to be a shortage at 1, 4, 7, 10, and 30 days - at the hospital level or best granularity possible.	Define shortage metrics
Situational Awareness	Quarantine	19	NGB KS	15-Apr	What are potential transmission hotspots or areas where shelter-in-place rules are not being followed (to include mission essential locations), and what is the projected potential transmission locations at 1, 4, and 7 days from the time a hotspot was observed?	requires some granularity of social mobility data; define transmission hotspot by # of people in vicinity for 30 min (proposed 10-25, 25-100, 100-250, 250-500; 500+)





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SECURE UNCLASSIFIED NETWORK (SUNET) OVERVIEW

Non-proprietary, Open Architecture System

- Government-owned, ECS-managed under contract with Army Research Laboratory

Accredited and Granted a 3-Year TEP by the DOD CIO

- Accredited to Risk Management Framework standards
- DoD Temporary Exception to Policy (GIG-Waiver) allows operations off of DOD IN (NIPR, SIPR, and JWICS)

Browser Accessible at the Tactical Edge

- Low Bandwidth options < 1-2mbps required. (Citrix)
- No special hardware/software required, just an internet connection and regular browser
- Enhances mobility and decreases tech infrastructure needed to run ops OCONUS
- Bring Your Own Device (BYOD) to reduce cost and improve access

Enterprise Capable and Scalable

- Hosted in a secure enterprise data center
- +6,000 active users across all enclaves
- 40 partner nations



Equinix Data Center 11
Ashburn, Virginia

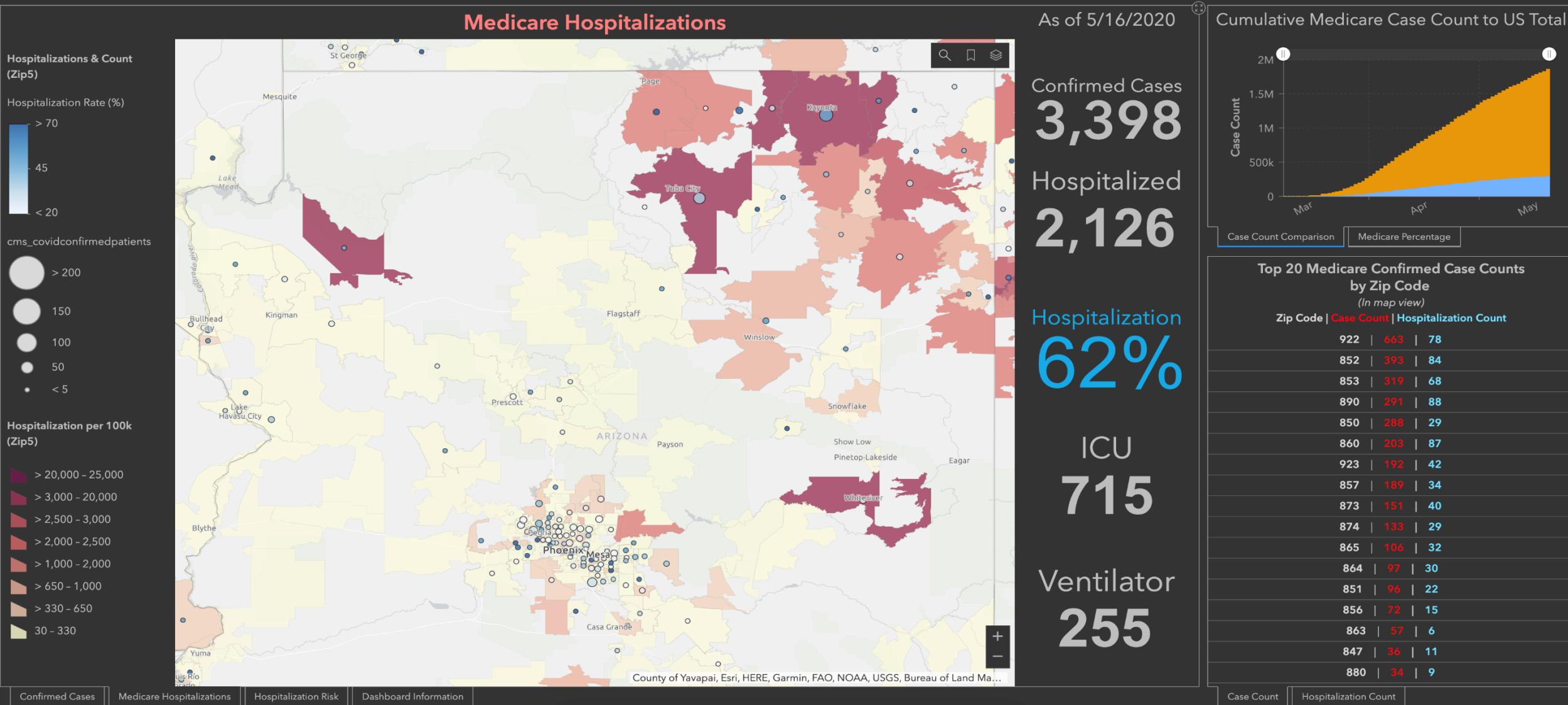
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Humetrix COVID-19 Dashboard - Arizona

Humetrix Descriptive & Predictive Analytics of COVID-19 Confirmed Cases and Related Hospital Use for the Medicare Population

Filter: All States

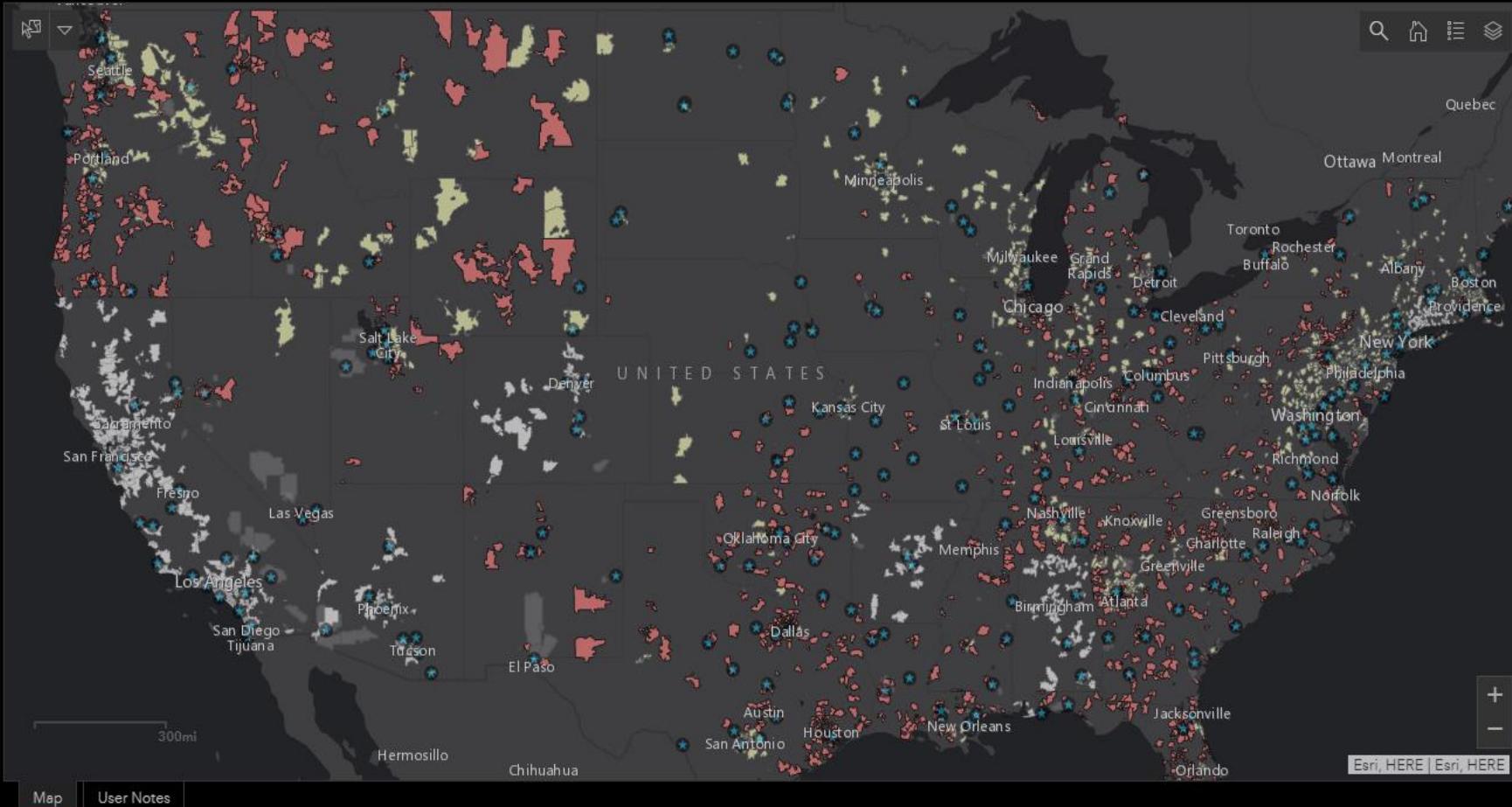


Zip Code Triage List

Zip Code: 77340	Overall Food Situation: 0.225
Zip Code: 32333	Overall Food Situation: 0.222
Zip Code: 62914	Overall Food Situation: 0.222
Zip Code: 32340	Overall Food Situation: 0.222
Zip Code: 32351	Overall Food Situation: 0.222
Zip Code: 70127	Overall Food Situation: 0.218
Zip Code: 31204	Overall Food Situation: 0.218
Zip Code: 70122	Overall Food Situation: 0.218
Zip Code: 31201	Overall Food Situation: 0.218
Zip Code: 70119	Overall Food Situation: 0.218
Zip Code: 31206	Overall Food Situation: 0.218
Zip Code: 70117	Overall Food Situation: 0.218
Zip Code: 31216	Overall Food Situation: 0.218
Zip Code: 70130	Overall Food Situation: 0.218
Zip Code: 70115	Overall Food Situation: 0.218
Zip Code: 29812	Overall Food Situation: 0.217
Zip Code: 39657	Overall Food Situation: 0.2165

Priority Zip Codes

Food Bank list

**Products Over Time****Commercial Stores**

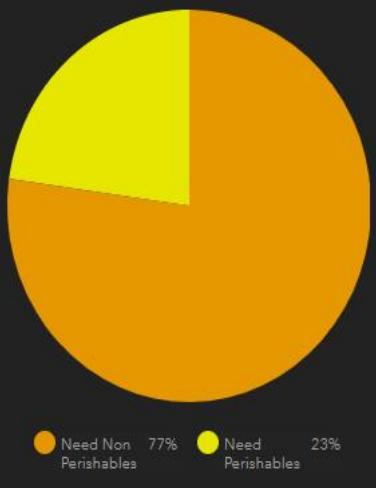
9.970012429375021
Out of 10

Overall Food Situation**0.305**

Out of 0.305

ZIP: 96712
Prediction Description: Valid prediction
Recommendation: Notify food banks.
Current As Of: 5/14/2020, 8:00 PM
4-Day Sales: 143
4-Day Deliveries: 47
4-Day Sell Through Ratio: 3

ZIP: 96786
Prediction Description: Valid prediction
Recommendation: Notify food banks.
Current As Of: 5/14/2020, 8:00 PM

Food Bank Status - Current Week

Power BI Apps > SALUS App (1)

SALUS Reports | Data updated 7/6/20

New look on Reset to default Bookmarks View

JAI SALUS App (1)

Unemployment - States

Predicted Claims Increase by County

Claims: High Low

Charlotte, Greenville, Columbia, Augusta, Macon, Warner Robins, Athens, Fayetteville, Jacksonville, Wilmington, Charleston

POWERED BY esri

SALUS COVID-19 Response

Predicted Unemployment Severity Rank by Category

Category	Severity Rank
Information	0.66
OtherServices	0.66
Education	0.65
Healthcare	0.65
Management	0.62
RealEstate	0.62
Finance	0.61
AdminSupport	0.61
Construction	0.60
AccomodationFood	0.60
ArtsEntertainment...	0.60
Farm	0.59
Federal	0.59
Manufacturing	0.59
Military	0.59

0.0 0.5

2.84M Employment

241.90 Avg Predicted Claims

36.21K Variance Predicted Claims

Select State

- NH
- NJ
- NM
- NV
- NY
- OH
- OK
- OR
- PA
- RI
- SC
- SD
- TN
- TX
- UT
- VA
- VT
- WA

Predicted Unemployment% Increase by County, by Severity Rank

Sev Rank: High Low

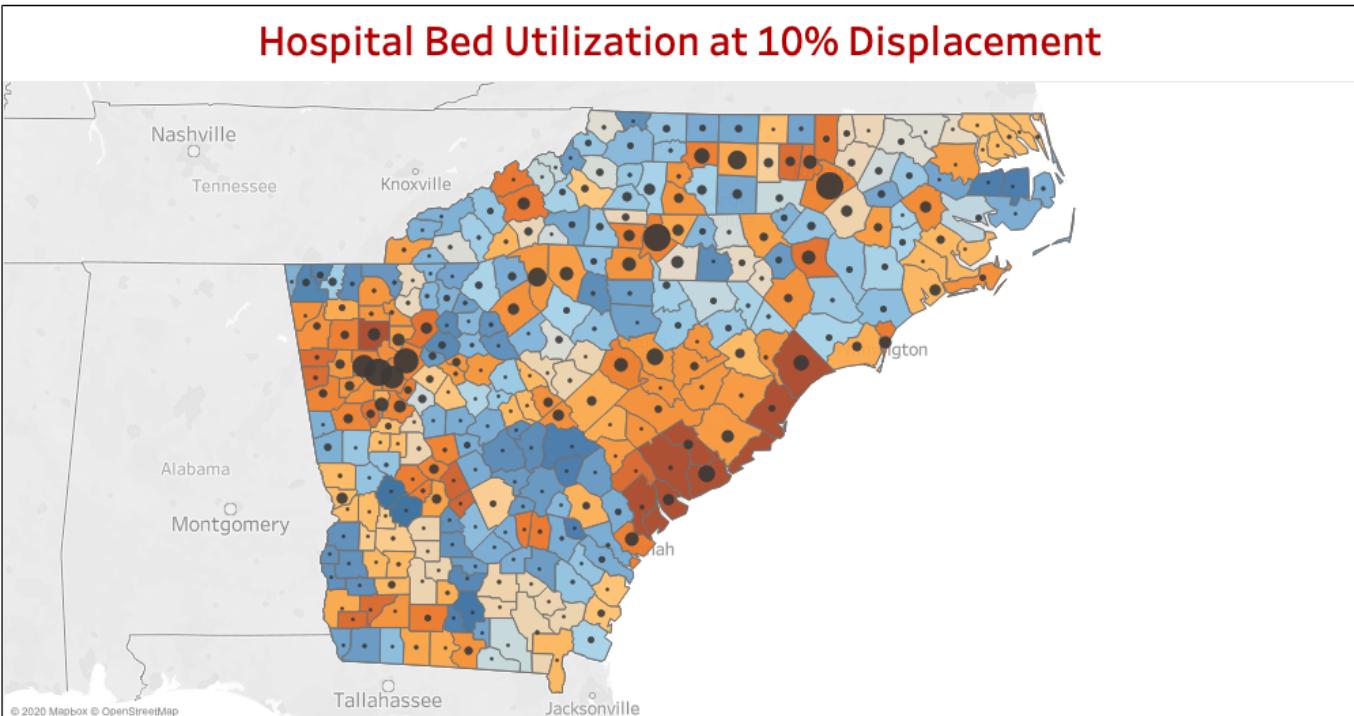
County	Sev Rank	Count
SC Beaufort, SC	590	High
SC Barnwell, SC	511	High
SC Jasper, SC	494	High
SC Sumter, SC	490	High
SC Dorchester, SC	451	High
SC Marion, SC	446	High
SC Lee, SC	439	High
SC Edgefield, SC	434	High
SC Clarendon, SC	425	High
SC Horry, SC	422	High
SC Oconee, SC	397	High
SC Pickens, SC	397	High
SC McCormick, SC	395	High
SC Orangeburg, SC	382	High
SC Berkeley, SC	360	High
SC Georgetown, SC	343	High
SC Dillon, SC	337	High
SC Anderson, SC	315	High
SC Fairfield, SC	307	High
SC Williamsburg, SC	306	High
SC Aiken, SC	288	High
SC Newberry, SC	281	High
SC Chester, SC	275	High
SC Florence, SC	257	High
SC Lancaster, SC	253	High
SC Hampton, SC	230	High
SC Laurens, SC	229	High
SC Charleston, SC	227	High
SC Greenville, SC	198	High
SC Cherokee, SC	198	High
SC York, SC	196	High
SC Lexington, SC	186	High
SC Laurens, SC	185	High
SC Richland, SC	156	High
SC Abbeville, SC	151	High
SC Calhoun, SC	118	High
SC Spartanburg, SC	109	High
SC Saluda, SC	-54	Medium
SC Lexington, SC	-71	Medium
SC Darlington, SC	-100	Medium
SC Union, SC	-100	Medium
SC Marlboro, SC	-100	Medium
SC Bamberg, SC	-100	Medium
SC Allendale, SC	-100	Medium



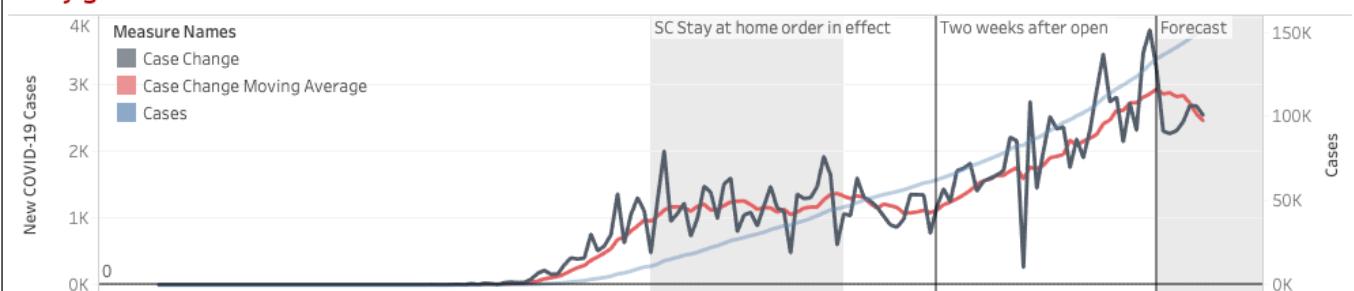
AWS: COVID-19 Hospital Analysis – Tri-State – 10% Displacement

South Carolina COVID-19 Hurricane and Hospital Bed Analysis

Updated: 6/20/2020



Daily growth in COVID-19 cases



County Rank Table

County Name	COVID-19 Case Rate of Change	Hospital Bed Utilization %	Number of Licensed Beds	Adjacent County Hospital Bed Utilization %	Adjacent County Number of Licensed Beds
Horry County, South Carolina	7.3	100.0%	736	82.0%	1,939
Charleston County, South Carolina	6.5	100.0%	1,998	100.0%	2,388
Mecklenburg County, North Carolina	3.5	75.1%	2,662	67.2%	4,963
Wake County, North Carolina	3.4	73.7%	2,099	71.6%	4,803
Greenville County, South Carolina	2.9	69.0%	1,583	64.7%	3,953
Richland County, South Carolina	2.6	68.8%	1,988	68.1%	3,110
Beaufort County, South Carolina	2.4	100.0%	306	99.0%	514
Fulton County, Georgia	2.0	70.9%	4,658	72.1%	10,990
Gwinnett County, Georgia	1.9	73.7%	730	71.2%	9,116
Pickens County, South Carolina	1.9	28.7%	164	65.3%	2,729
Berkeley County, South Carolina	1.8	68.0%	25	95.5%	2,645
Gaston County, North Carolina	1.7	73.6%	435	70.3%	3,911
Lexington County, South Carolina	1.7	75.1%	630	68.8%	3,267
Lowndes County, Georgia	1.5	70.0%	443	57.0%	614
Chatham County, Georgia	1.4	75.6%	1,527	74.8%	1,618
New Hanover County, North Carolina	1.4	76.7%	861	71.6%	1,086
York County, South Carolina	1.3	69.5%	338	66.0%	4,376
DeKalb County, Georgia	1.3	73.3%	2,318	71.4%	8,597
Spartanburg County, South Carolina	1.2	67.2%	932	62.5%	2,979
Sumter County, South Carolina	1.2	70.0%	283	65.1%	3,474
Glynn County, Georgia	1.1	56.6%	401	52.6%	529
Troup County, Georgia	0.9	29.3%	276	47.7%	654
Georgetown County, South Carolina	0.8	100.0%	255	98.6%	3,138
Tift County, Georgia	0.8	62.2%	241	53.4%	564
Alamance County, North Carolina	0.8	53.4%	238	64.8%	2,948
Whitfield County, Georgia	0.8	41.5%	282	62.2%	2,558
Brunswick County, North Carolina	0.7	63.3%	139	80.1%	1,976
Anderson County, South Carolina	0.7	70.7%	721	64.1%	2,763
Lee County, North Carolina	0.7	30.7%	137	52.7%	711
Burke County, North Carolina	0.7	55.1%	746	44.1%	2,203
Cabarrus County, North Carolina	0.6	64.6%	457	67.6%	4,192
Dorchester County, South Carolina	0.6	100.0%	135	96.5%	2,419
Johnston County, North Carolina	0.6	52.3%	199	62.7%	3,849

State

Fips

Metric of Interest

Total population

Date Filter

Current Metric Color

Current Metric Filter

COVID-19 Cluster Name

Hospital Bed Displacement Scenario

Variable Key

aws machine learning

Project Salus: Deep Dive

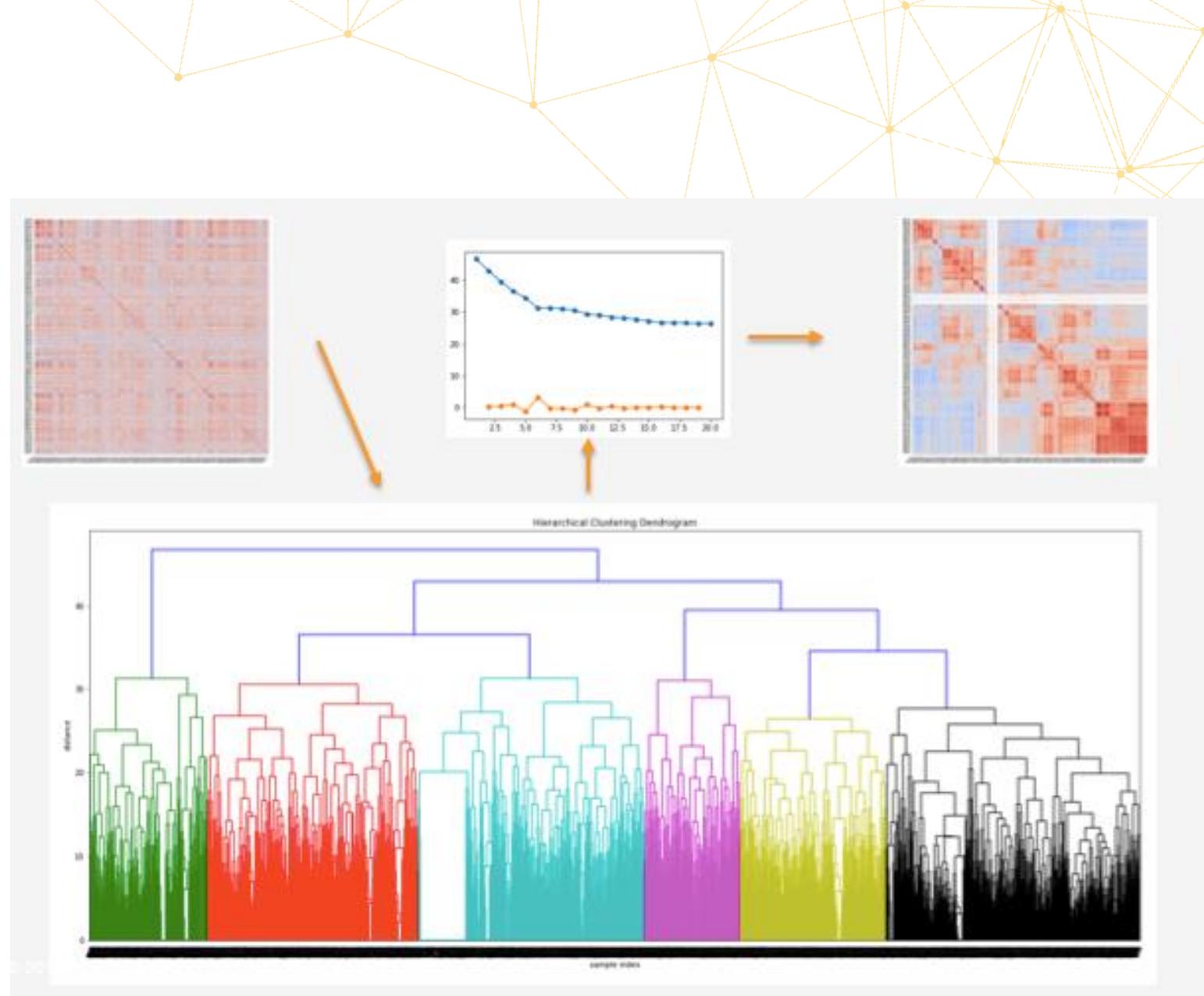
- COVID-19 has impacted our county's health, supply chain, infrastructure, and safety.
- In order to fight this virus, we must predict which regions will be impacted at least 4 weeks in advance.
- JAIC and AWS have partnered to develop a deep learning forecasting model to make these predictions

Project Salus: AWS Model Development

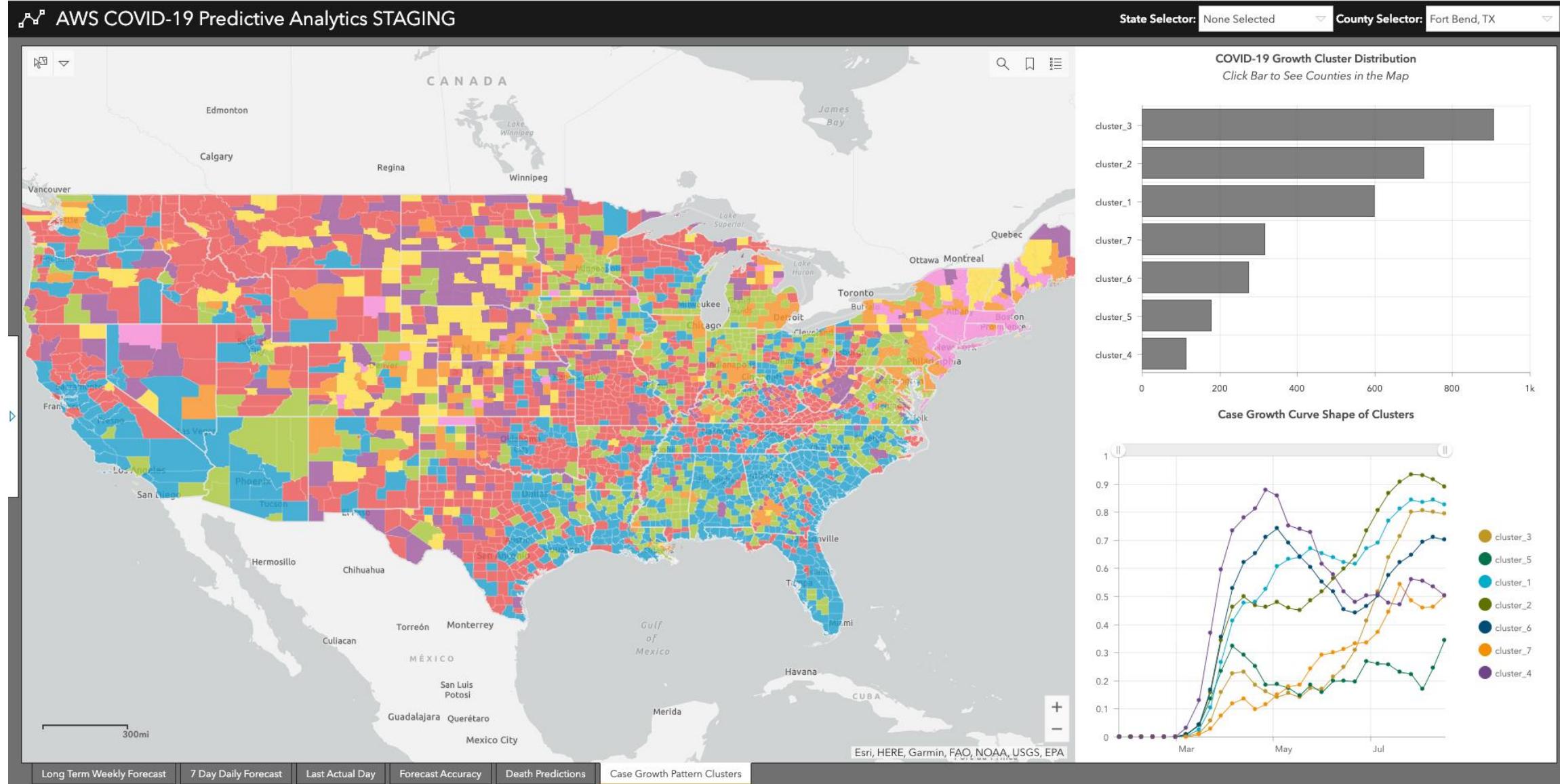
- COVID-19 Data - USAFacts (usafacts.org)
 - Historical COVID-19 positive cases and COVID-19 caused deaths
 - County population estimates
- Testing Data - The COVID Tracking Project (covidtracking.com)
 - State level testing counts
- Demographic Data - CDC Social Vulnerability Index
 - Percent of households in a county with a senior (age +65)
 - Percent of households in a county living in poverty
 - Percent of households in a county with someone from a minority class
 - County square mileage
- Stay at home orders - New York Times

Hierarchical Clustering

1. Calculate the similarity between two counties
2. Perform clustering algorithm to find groups of similar counties
3. Perform elbow-test to find an optimal number of clusters
4. See resulting clusters of similar counties



Hierarchical Clustering Analyst Dashboard



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DeepAR Forecasting

Categorical (Static) Features

- Population
- Population Density
- US State (or Territory)
- Cluster (from Hierarchical Clustering)
- % Seniors (Bucketized)
- % Minority (Bucketized)
- % in Poverty (Bucketized)

Dynamic (Time Series) Features

- Stay-at-Home Orders
- Rate of Change (day case change differentiated w/ backwards differences)
- State-Level Testing
- Covid Cases (for death model only)

Objective Metric

- RMSE

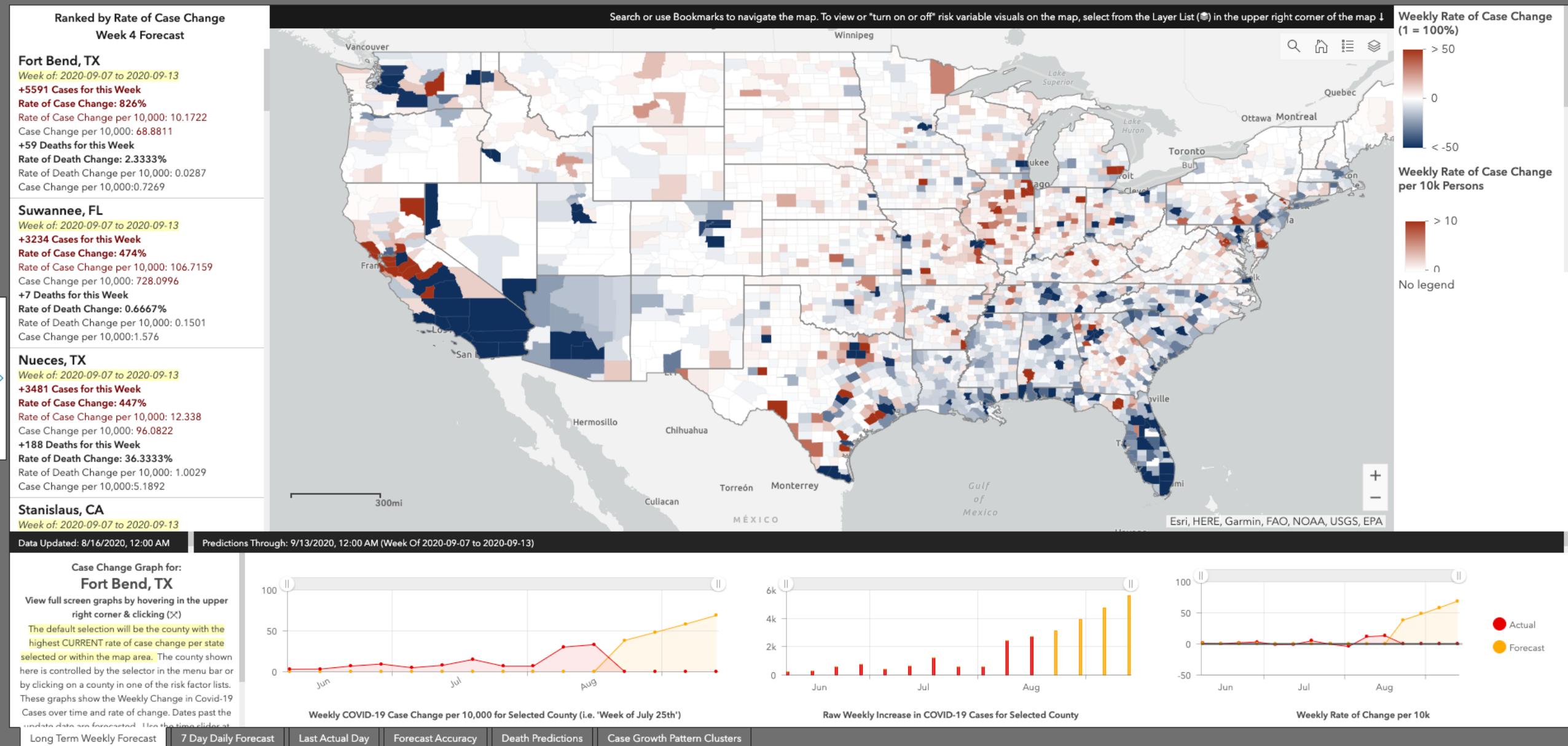
Hyperparameters

- Context Length (# previous time points to consider)
- Dropout Rate
- Embedding Dimension
- Epochs
- Learning Rate
- Mini Batch Size
- Number of Cells
- Number of Layer

DeepAR Forecast Model Analyst Dashboard

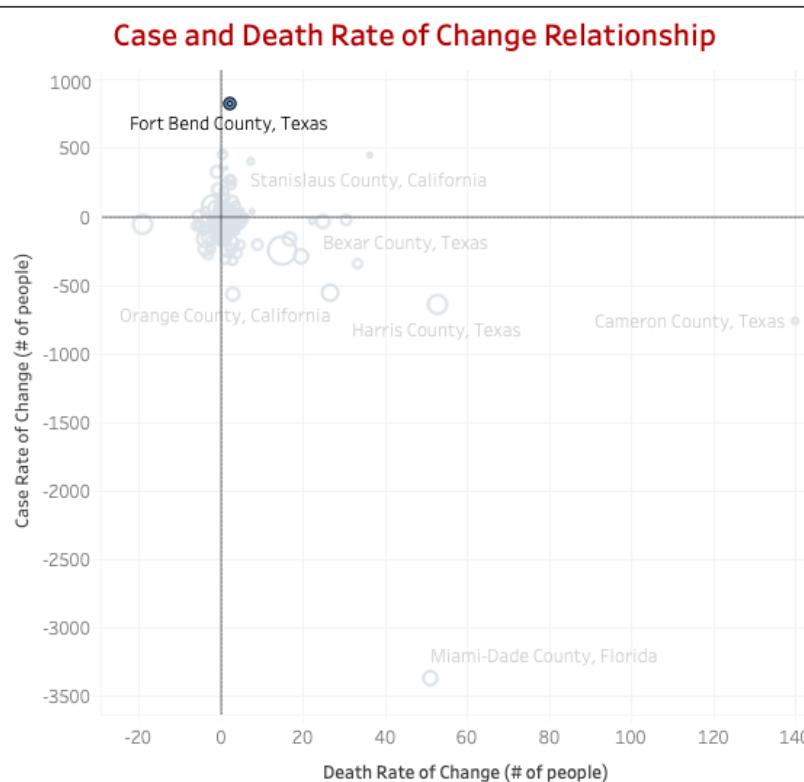
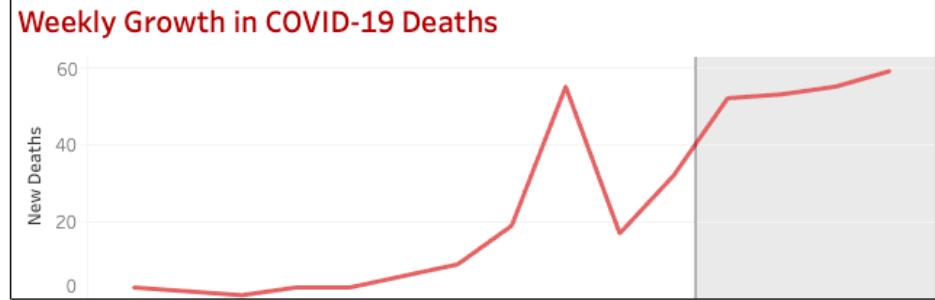
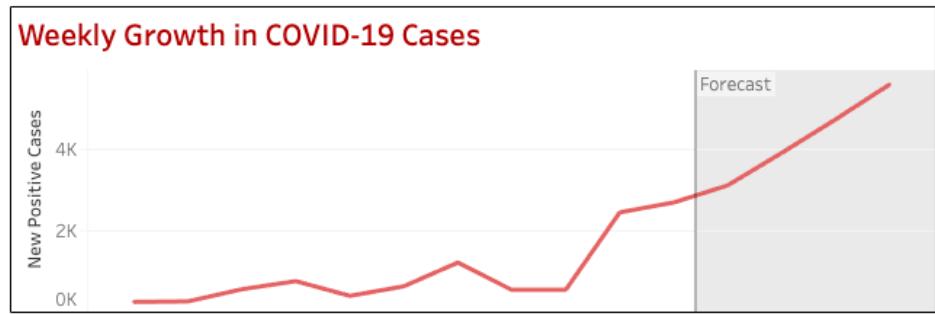
AWS COVID-19 Predictive Analytics STAGING

State Selector: None Selected County Selector: Fort Bend, TX



DeepAR Forecast Model Analyst Dashboard

COVID-19 Positive Case and Death Comparison



Expected Weeks Between Case Increase and Death Increase

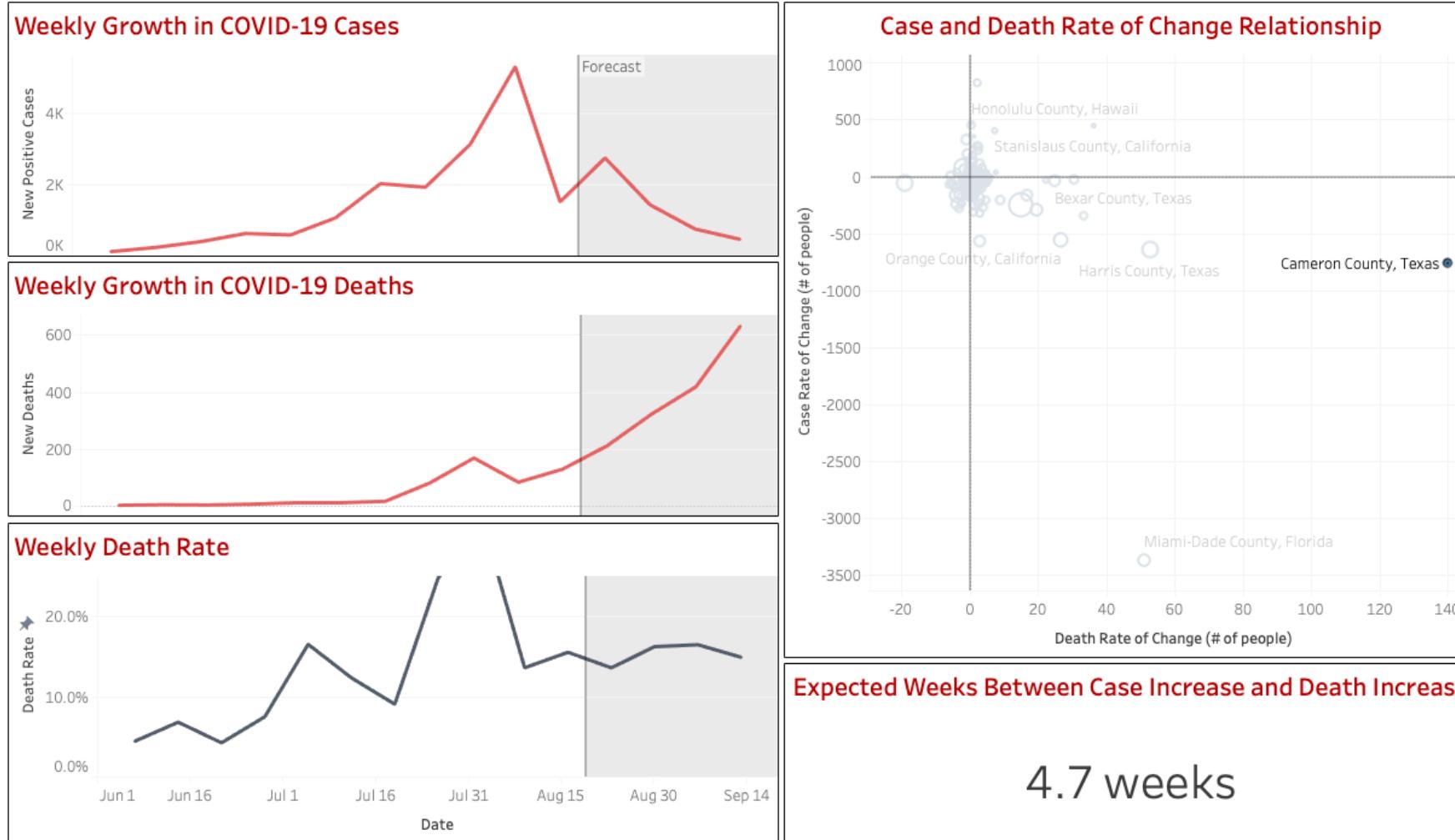
4.4 weeks

Fort Bend County, TX

- Cases
- Deaths
- Both cases and deaths will continue to increase for the next month

DeepAR Forecast Model Analyst Dashboard

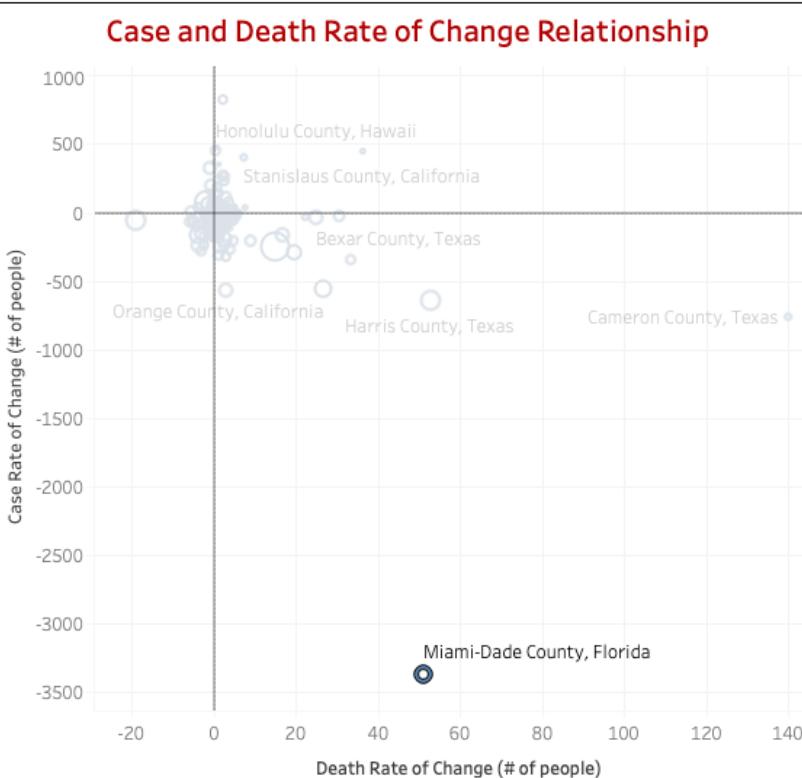
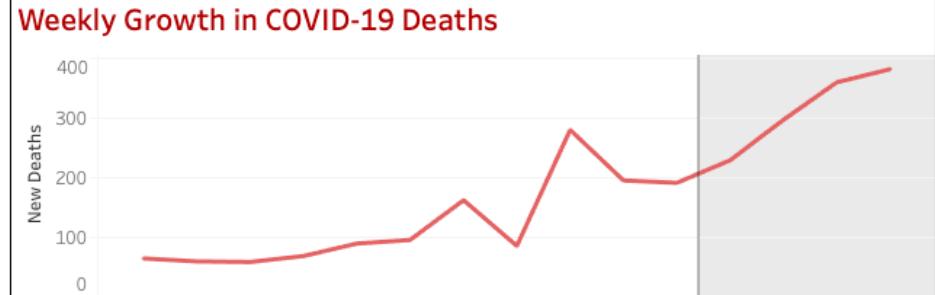
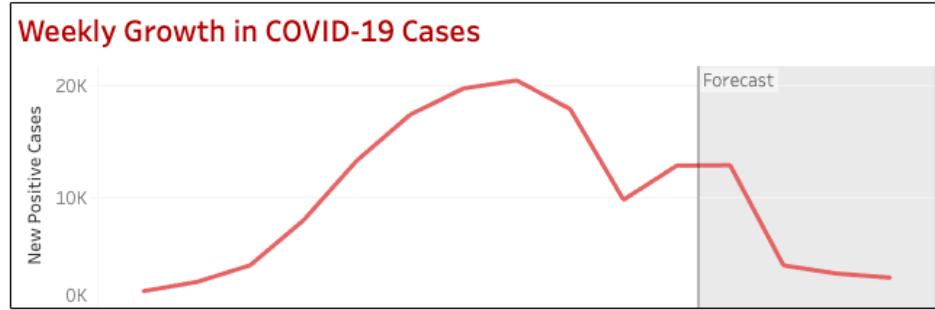
COVID-19 Positive Case and Death Comparison



- Cameron County, TX
- Cases
- Deaths
- Maintain death rate between 10 and 20 percent

DeepAR Forecast Model Analyst Dashboard

COVID-19 Positive Case and Death Comparison



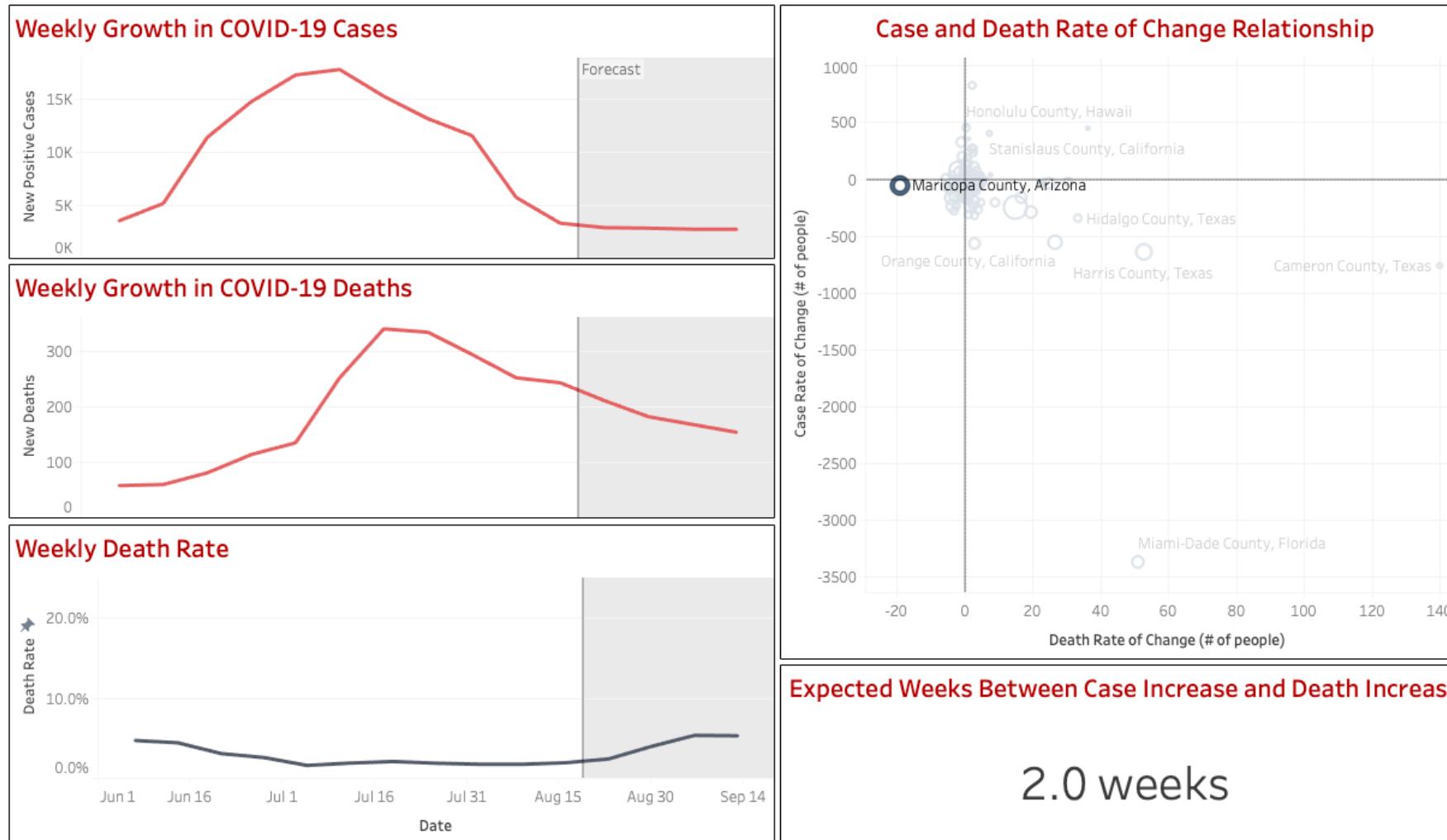
Expected Weeks Between Case Increase and Death Increase

2.7 weeks

- Miami-Dade, FL
 - Cases
 - Deaths
- Death rate to increase slightly over next 4 weeks

DeepAR Forecast Model Analyst Dashboard

COVID-19 Positive Case and Death Comparison



- Maricopa County, AZ
- Cases
- Deaths
- Past hotspot, the COVID-19 situation is now improving

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