HEALTHCARE OPTIMIZATION

DATA ANALYTICS DASHBOARD

B.S. Abdur Rahman Crescent Institute of Science & Technology — Deemed to be University u/s 3 of the UGC Act, 1956

IBM

PROJECT MENTOR

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PROJECT GUIDE

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PROJECT TEAM

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B.Tech - CSE A - (IV Year)

B.S. Abdur Rahman Crescent

Institute of Science and Technology

TOPICS

- Problem Statement & Breakdown
- High Level Design
    - Implementation Method - CRISP DM
    - Project Architecture
    - Cloud Corpus Concept
    - Compiled Concept
- Tool Box
- Modules

- Total Data Dealt
- Schema Design - ER Diagram
- Output Screens
    - DocFinder
    - Overview
    - PatientAnalytica
   - GeoInsight
- Demo

PROBLEM STATEMENT

Build a system that has a **record of hospitals, doctors/specializations, consulting hours, appointments and availability**. Design an **analytics dashboard** designed to analyze the performance of different aspects of the business such as **which doctors are the busiest, what are most preferred timings of patients, which specialization has the most demand**, slice-dice all these parameters by patient demographics such as gender, age group.

PROBLEM STATEMENT BREAKDOWN

- ▸ Cloud corpus of Hospitals, Doctors and Specializations

- ▸ Consulting Hours, Appointments, Ratings, Average waiting time etc.,

- ▸ Drill-thru dashboard that shows:

  - ▹ Busiest doctors

  - ▹ Most Preferred timings of patients

  - ▹ Demanding Specialization
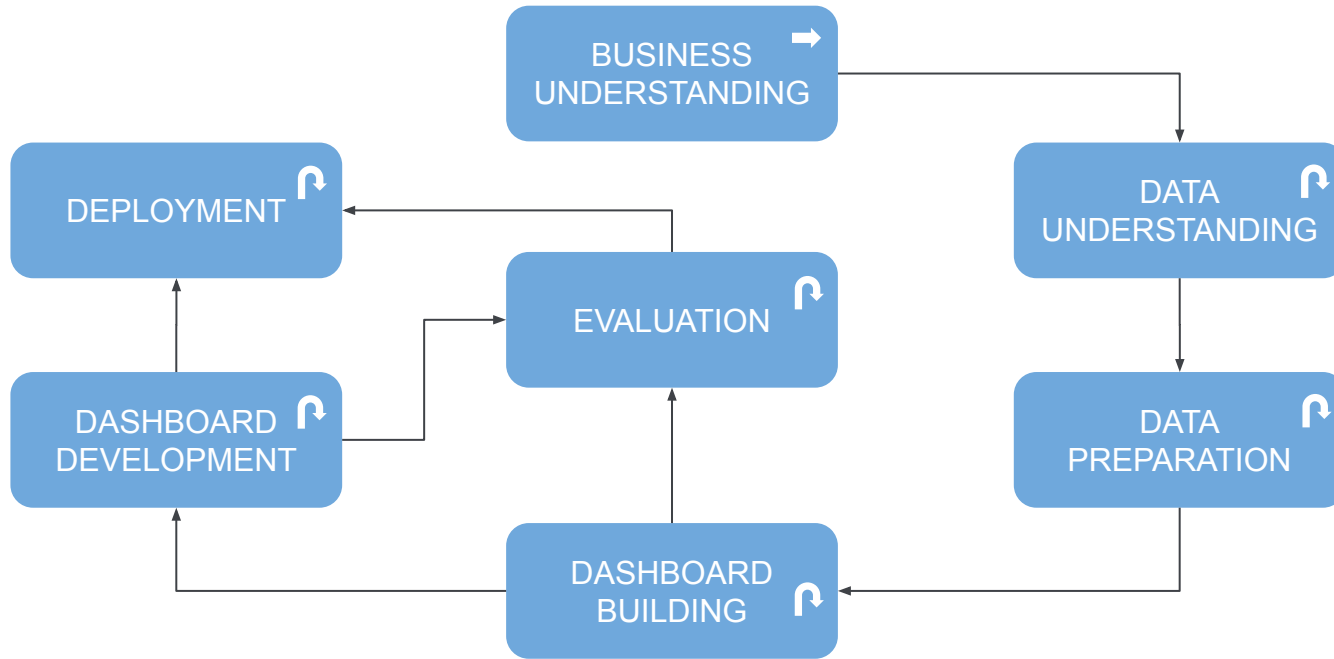
PROBLEM STATEMENT BREAKDOWN

- ▶ Slice and Dice operations using patient demographics:
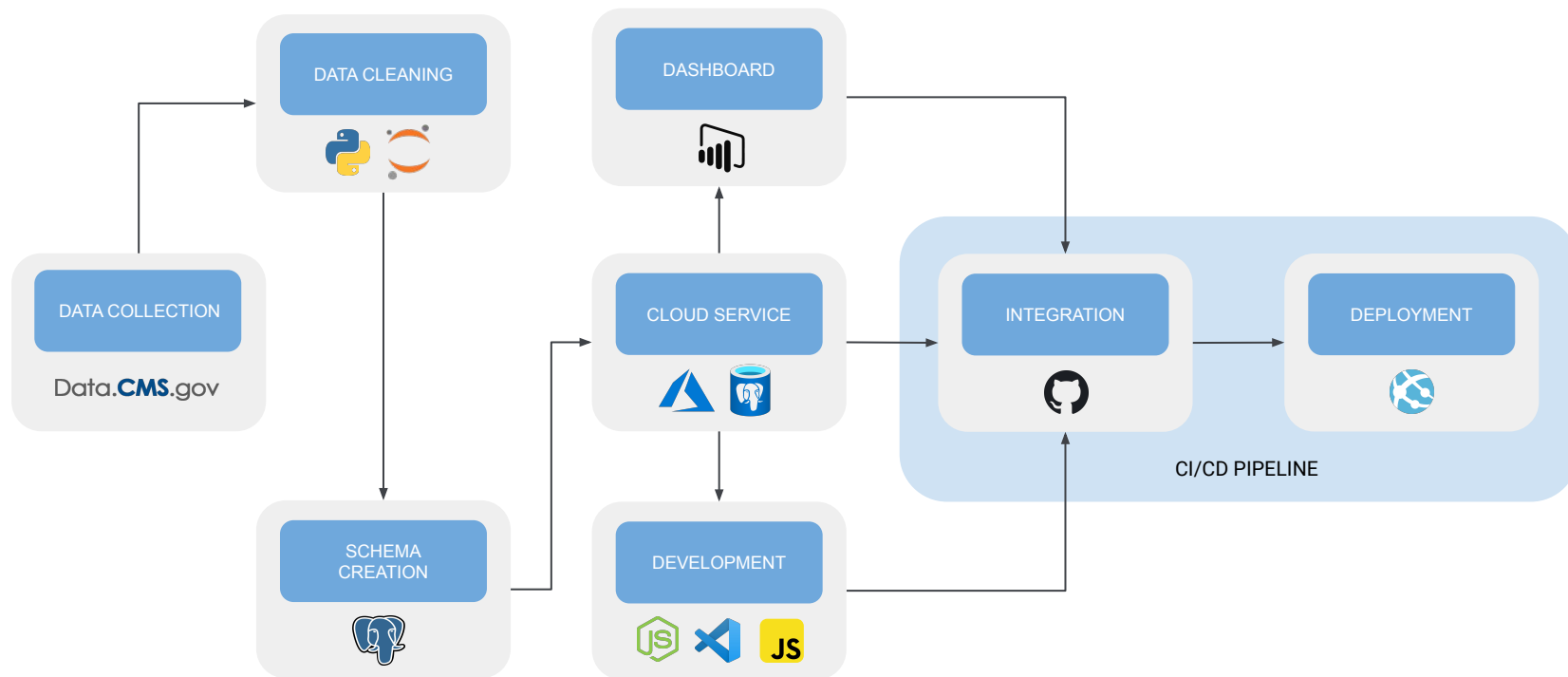 - ▷ Gender
  - ▷ Age Group
  - ▷ Location
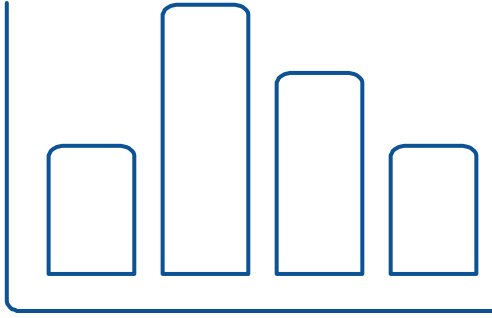
HIGH LEVEL DESIGN

▷ Implementation Method - CRISP DM

▷ Project Architecture

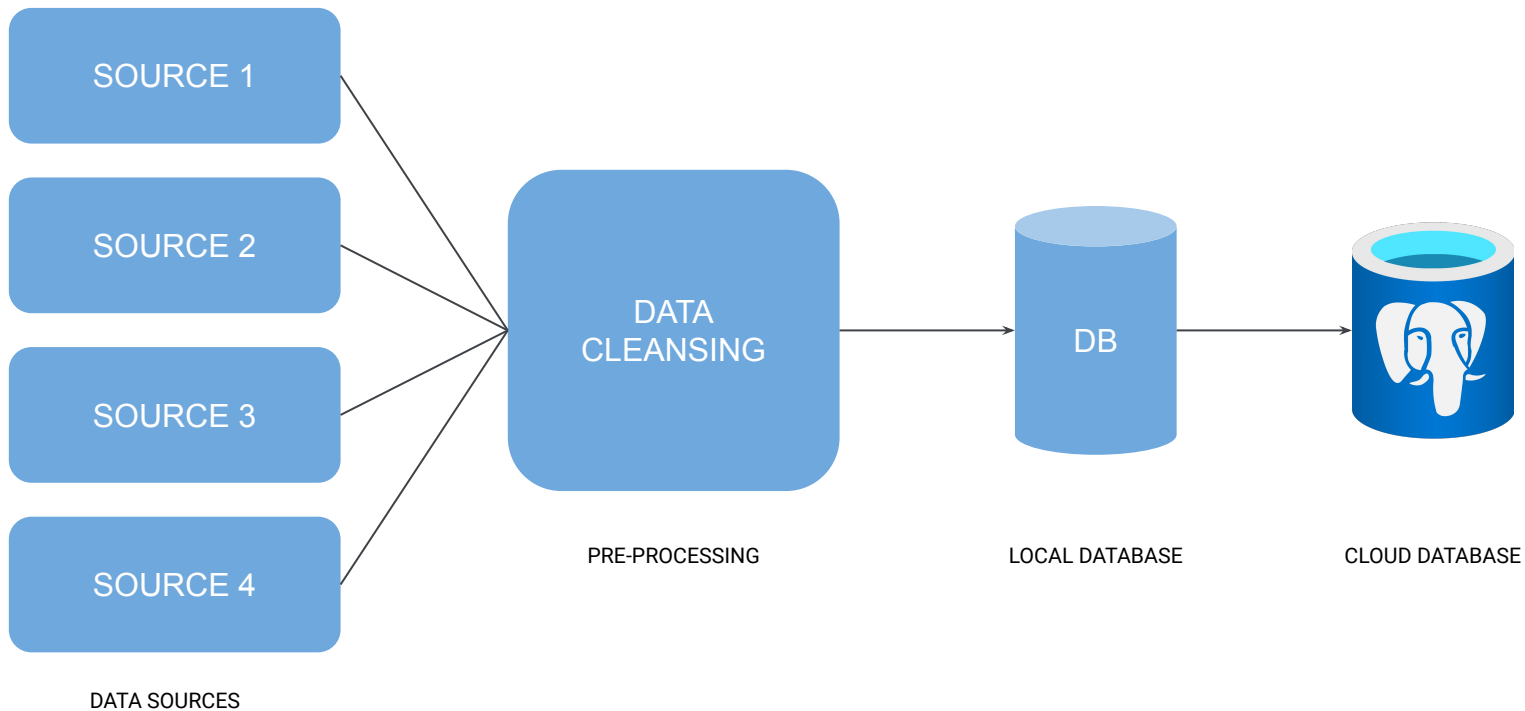▷ Cloud Corpus Concept

▷ Compiled Concept

IMPLEMENTATION METHOD - CRISP DM

PROJECT ARCHITECTURE

DATA CLEANING

DASHBOARD

DATA COLLECTION

Data.**CMS**.gov

CLOUD SERVICE

INTEGRATION

DEPLOYMENT

CI/CD PIPELINE

SCHEMA
CREATION

DEVELOPMENT

CLOUD CORPUS CONCEPT

SOURCE 1

SOURCE 2

SOURCE 3

SOURCE 4

DATA
CLEANSING

DB

DATA SOURCES

PRE-PROCESSING

LOCAL DATABASE

CLOUD DATABASE

COMPILED CONCEPT

TOOL BOX

MODULES

DEPLOYMENT MODULE

Web App Deployment with CI/CD Pipeline

4

DEVELOPMENT MODULE

Dashboard Development and Integration

3

DASHBOARD MODULE

Dashboard with Power BI

2

DATA MODULE

Data Collection, Preprocessing, Cloud Corpus

1

TOTAL DATA DEALT

1m

DOCTORS

43k LOCATIONS

5k HOSPITALS

3m

PATIENTS

SCHEMA DESIGN - ER DIAGRAM

www.quickdatabasediagrams.com

hospital

facility_id	text
facility_name	text
facility_address	text
city	text
state	text
state_code	text
zip	text
phone	text
hosp_type	text
hosp_ownership	text
emergency_unit	text
ehr_interoperability	text
hosp_rating	bigint

patient

patient_id	text
patient_age	bigint
patient_gender	text
pref_day	text
pref_time	text
consulting_date	text
consulting_time	text
consulting_day	text
consulting_timestamp	timestamp
npi	bigint
pri_spec	text
city	text
state	text
state_code	text
zip	text

doctors

npi	bigint
physician_name	text
gender	text
pri_spec	text
is_affltd	text
hosp_affln	text
phone	text
rating	double
patients	integer
experience	bigint
avg_wttime	integer
busy_index	bigint
shift_1	text
shift_2	text
emergency_avail	text
street	text
city	text
state	text
state_code	text
zip	text

location

zip	text
city	text
state	text
state_code	text
latitude	double
longitude	double
timezone	bigint

OUTPUT SCREENS

DocFinder

Find the best doctor in the United States for the specialization of your preference according to their emergency availability, state/city, ratings, busy-index, average waiting time and get an appointment for your healthcare needs. We have 1.16M Doctors in our database, and we are sure that you would find the right doctor!

1.16M
Total Doctors

9bn
Total Patients Diagnosed

4460
Total Hospitals

Doctor Count by Busy Index

0.3M

0.2M

Count of npi

0.1M

0.0M

        0   50
       busy_index (bins)

Specialization

🔍 Search
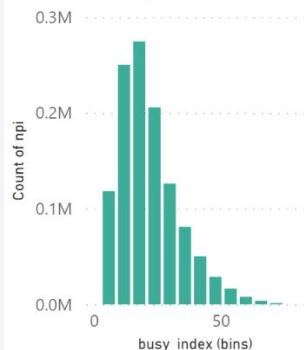
☐ ADDICTION MEDICINE
☐ ADULT CONGENITAL HEART DISEASE (ACHD)
☐ ADVANCED HEART FAILURE AND TRANSPLANT CARDIOLOGY
☐ ALLERGY/IMMUNOLOGY
☐ ANESTHESIOLOGY
☐ ANESTHESIOLOGY ASSISTANT
☐ CARDIAC ELECTROPHYSIOLOGY
☐ CARDIAC SURGERY
☐ CARDIOVASCULAR DISEASE (CARDIOLOGY)

State & City

🔍 Search

∨ ☐ ALABAMA
∨ ☐ ALASKA
∨ ☐ ARIZONA
∨ ☐ ARKANSAS
∨ ☐ CALIFORNIA
∨ ☐ COLORADO
∨ ☐ CONNECTICUT
∨ ☐ DELAWARE
∨ ☐ DISTRICT OF COLUMBIA

Emergency Availability

☐ N
☐ Y

Affiliated to Hospital

All	∨

ID ▲	DOCTOR NAME	PHONE	SHIFT	HOSPITAL
1003000126	ARDALAN ENKESHAFI	7035586161	22:00 - 07:00	STONESPRINGS HOSPITAL CENTER
1003000134	THOMAS CIBULL	N/A	09:00 - 13:30	NORTHSHORE UNIVERSITY HEALTHS'
1003000142	RASHID KHALIL	4194071182	22:00 - 07:00	MERCY ST ANNE HOSPITAL
1003000423	JENNIFER VELOTTA	4403577100	09:00 - 13:30	LAKE HEALTH
1003000480	KEVIN ROTHCHILD	7207771234	08:00 - 12:00	UNIVERSITY OF COLORADO HOSPITA
1003000530	AMANDA SEMONCHE	N/A	10:30 - 14:00	ST LUKES QUAKERTOWN HOSPITAL
1003000597	DAE KIM	9187564233	09:00 - 13:30	HILLCREST MEDICAL CENTER
1003000639	PEYMAN BENHARASH	3108259111	08:00 - 12:00	RONALD REAGAN UCLA MEDICAL CE
1003000704	ZACHARY GATTON	N/A	08:00 - 12:00	KNOX COMMUNITY HOSPITAL
1003000720	OTNIEL HERNANDEZ	9803080141	22:00 - 07:00	PRIVATE CLINIC

Rating

4.00	10.00

Wait time

10	36

Doctor Count by Gender

571K
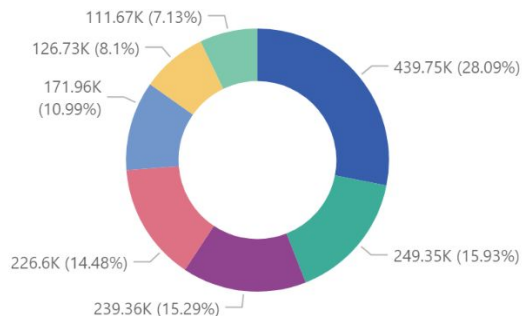(49.08%)

Gender
● M
● F

592.42K
(50.92%)

Overview

An overview of the most demanding specializations and preferred timings by patient demographics such as age group, gender, and location from US healthcare data.
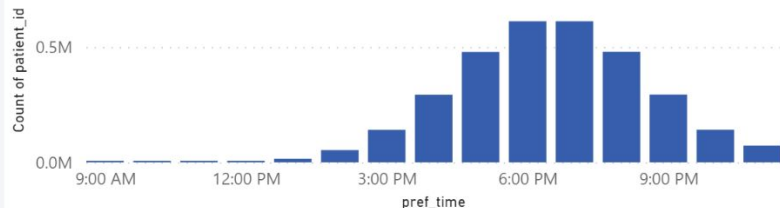
86

Total Specializations

Topmost & On-Demand Specializations

Specializations
- NURSE PRACTITIONER
- INTERNAL MEDICINE
- FAMILY MEDICINE
- PHYSICIAN ASSISTANT
- PHYSICAL THERAPY
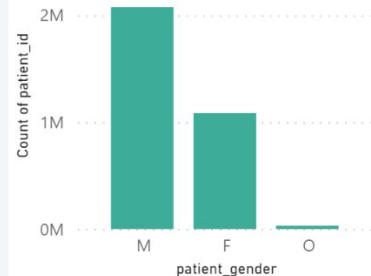- CERTIFIED REGISTERED...
- CLINICAL SOCIAL WOR...

111.67K (7.13%)
126.73K (8.1%)
171.96K (10.99%)
439.75K (28.09%)
249.35K (15.93%)
239.36K (15.29%)
226.6K (14.48%)

Patient Distribution by Age

Count of patient_id

0.4M

0.2M

0   50   100
patient_age (bins)

Patient count by Gender

Count of patient_id

2M

1M

0M
M   F   O
patient_gender

Patient Count by Preferred Time

Count of patient_id

0.5M

0.0M
9:00 AM   12:00 PM   3:00 PM   6:00 PM   9:00 PM
pref_time

Patient Count by Preferred Day
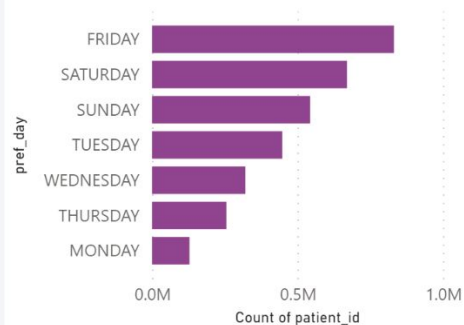
pref_day

FRIDAY
SATURDAY
SUNDAY
TUESDAY
WEDNESDAY
THURSDAY
MONDAY

0.0M   0.5M   1.0M
Count of patient_id

State & City

- ALABAMA
- ALASKA
- ARIZONA
- ARKANSAS
- CALIFORNIA
- COLORADO
- CONNECTICUT
- DELAWARE
- DISTRICT OF COLUMBIA
- FLORIDA
- GEORGIA
- HAWAII
- IDAHO
- ILLINOIS
- INDIANA
- IOWA

PatientAnalytica

The displayed visualizations and patterns are observed from 3.20M patient appointment data. Their consulting time (hour wise) / appointment patterns can be understood by patient demographics.
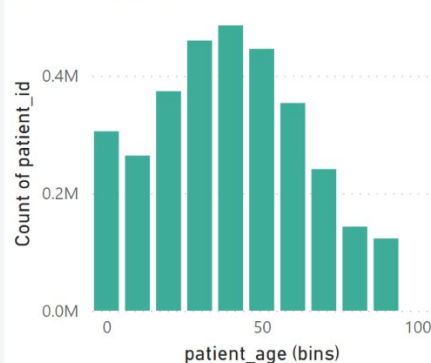
3.20M

Total Patients
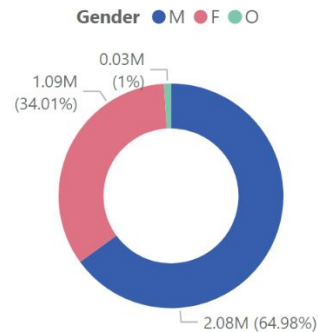
Patients by Consulting Hour
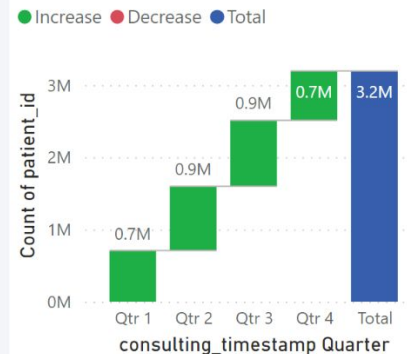


Date

1/1/2019   12/7/2020

Patients by Age

Patients by Gender

Gender ● M ● F ● O

0.03M (1%)
1.09M (34.01%)
2.08M (64.98%)

Patient Count by Quarter

● Increase ● Decrease ● Total

Qtr 1	Qtr 2	Qtr 3	Qtr 4	Total
0.7M	0.9M	0.9M	0.7M	3.2M

consulting_timestamp Quarter

State & City

- [ ] ALABAMA
- [ ] ALASKA
- [ ] ARIZONA
- [ ] ARKANSAS
- [ ] CALIFORNIA
- [ ] COLORADO
- [ ] CONNECTICUT
- [ ] DELAWARE
- [ ] DISTRICT OF COLUMBIA
- [ ] FLORIDA
- [ ] GEORGIA
- [ ] GUAM
- [ ] HAWAII
- [ ] IDAHO
- [ ] ILLINOIS
- [ ] INDIANA
- [ ] IOWA

GeoInsight

GeoInsight helps to identify interesting healthcare patterns based on the geographical dimension of the United States. Check out the map for individual state-wise comparison over different healthcare perspectives.
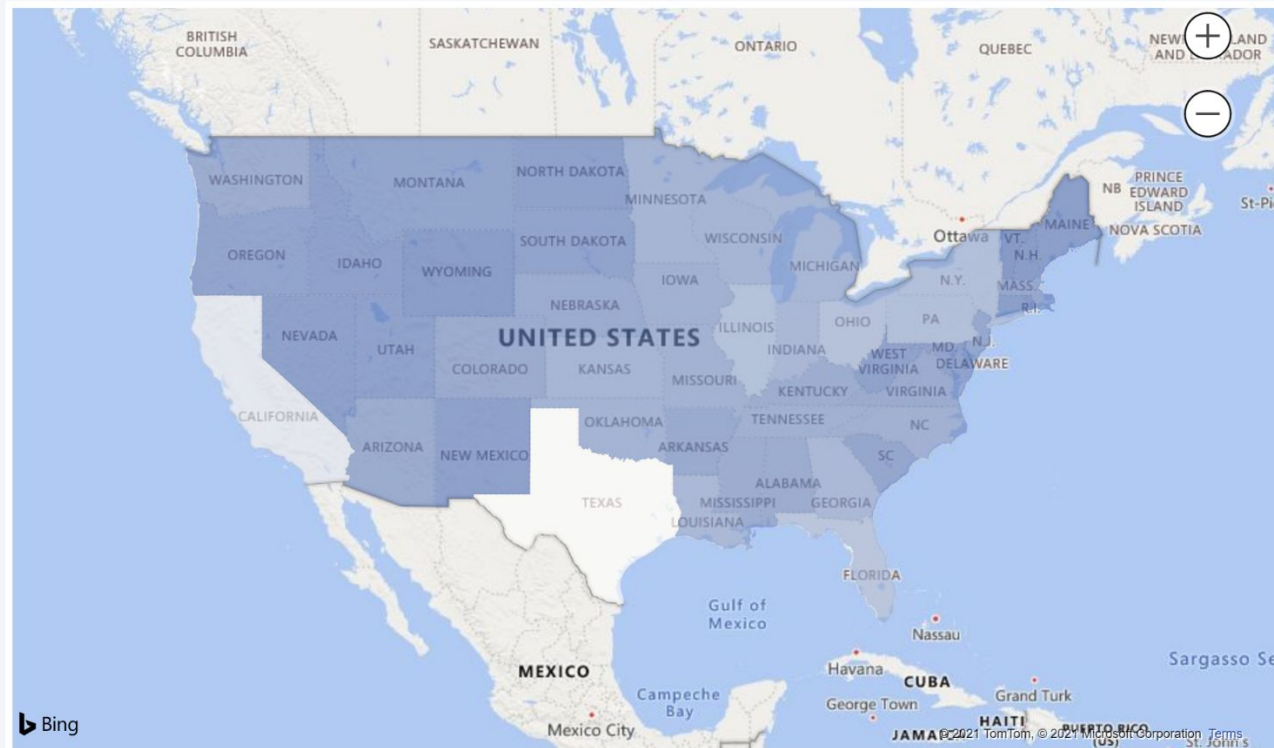
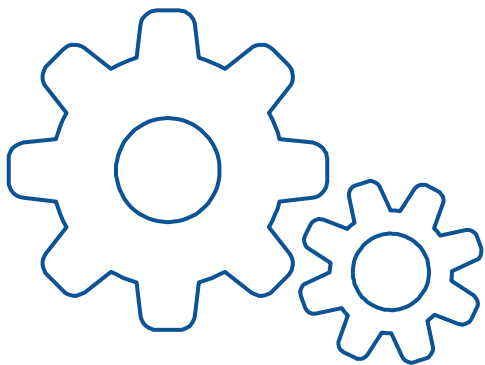## 5320
Total Hospitals

Doctor count by State

CALIFORNIA	TEXAS	FLORIDA
101.65K	73.11K	69.09K
NEW YORK		
81.35K	PENNSYLVANIA	
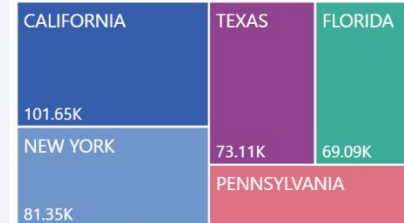
State

- ☐ ALABAMA
- ☐ ALASKA
- ☐ AMERICAN SAMOA
- ☐ ARIZONA
- ☐ ARKANSAS
- ☐ CALIFORNIA
- ☐ COLORADO
- ☐ CONNECTICUT
- ☐ DELAWARE
- ☐ DISTRICT OF COLUMBIA
- ☐ FLORIDA
- ☐ GEORGIA
- ☐ HAWAII
- ☐ IDAHO

DEMO

- ▷ Hosted Web Application
- ▷ CI/CD Pipeline

THANK YOU