CHOROBESITY
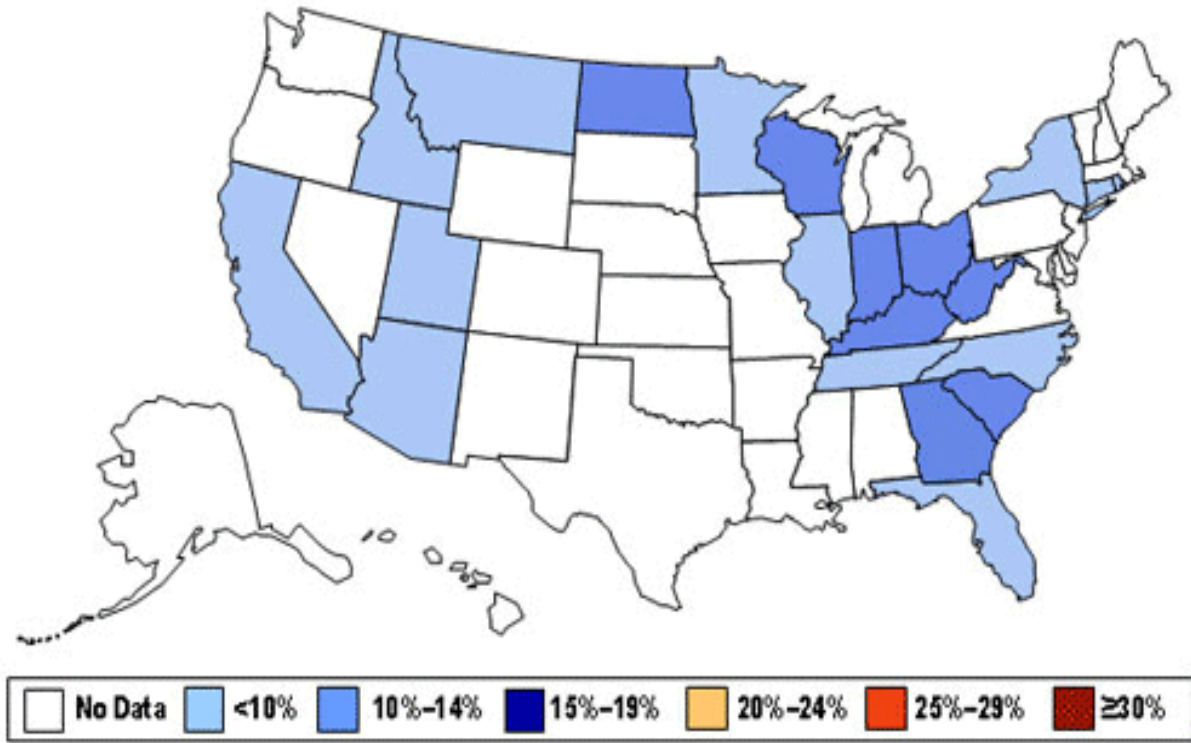
MODERN INSIGHT TO AN ENDURING EPIDEMIC

Bharathi Ganesan, Van Ha Nguyen, Sarah Burnett

Bradley Freedman, Roshan Ravindran
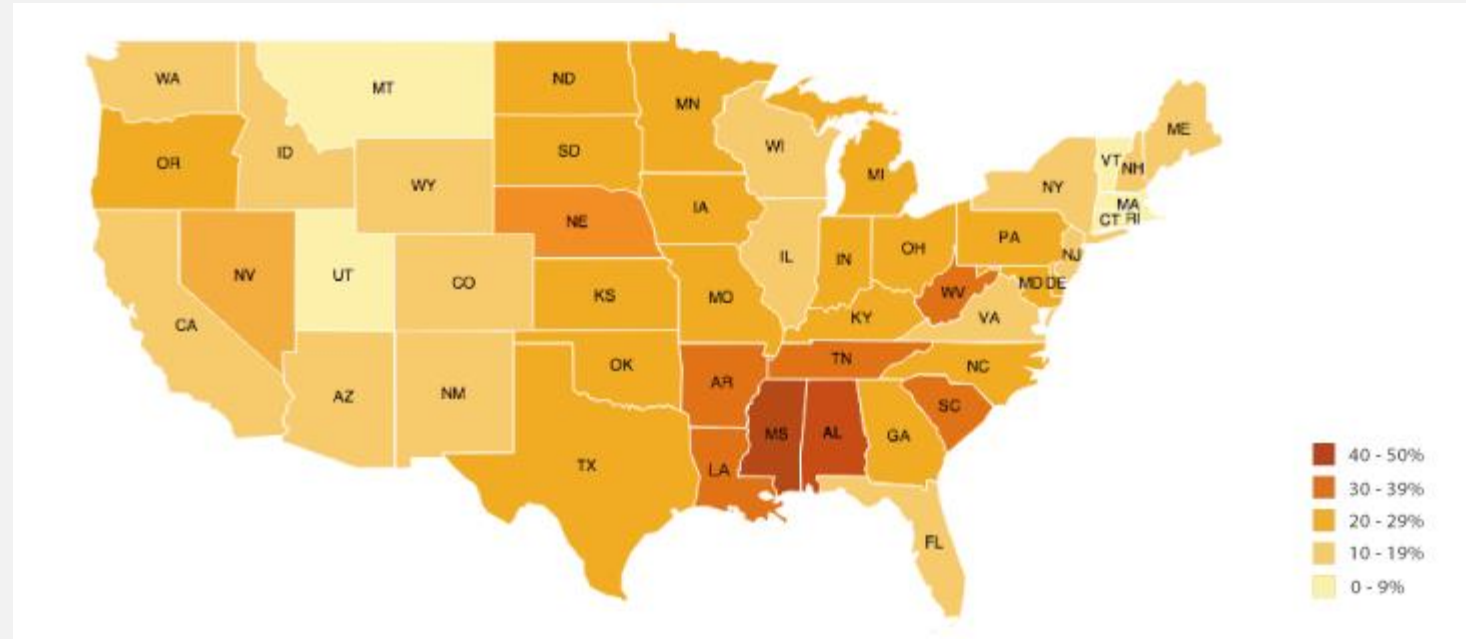
| No Data | <10% | 10%–14% | 15%–19% | 20%–24% | 25%–29% | ≧30% |

OUTLINE

Introduction

- Problem:
    - According to the American Diabetes Association: "Being overweight raises your risk for type 2 diabetes, heart disease, and stroke."[4]
    - Our client wants to utilize a *geographical representation tool* to do further research into prevalent health conditions:
        - Obesity
        - Diabetes

- Questions:
    - Is there a *geographical correlation* between obesity and diabetes?
    - How do we show this correlation?

Example Choropleth Map

PROJECT TIMELINE

STAGE **01**

September 15

Conceptualize and finalize the project's requirements

STAGE **02**

September 29

Establish a management framework

STAGE **03**

October 3

Development: Front-end, Back-end, Initial Testing

STAGE **04**

November 10

Final touches, thorough testing, and creation of User Manual

STAGE **05**

November 14

Complete report and launch project.

Application Development: Architecture
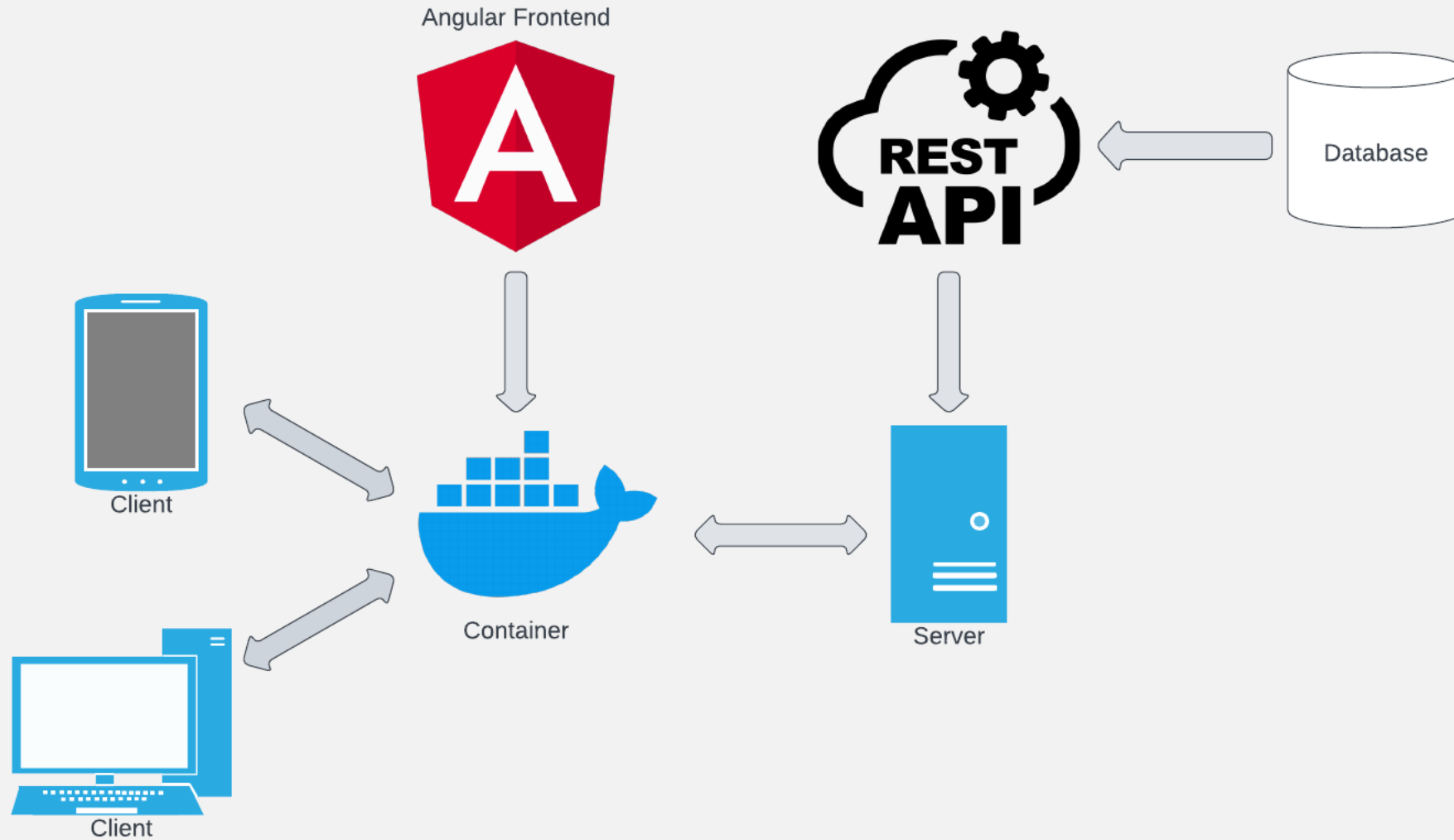
Application Development: Color-Coded Map

- **Color Key: the "key" to the map display**
  - Obesity Scale (red)
  - Diabetes Scale (blue)
  - Bivariate Scale (both health conditions)

- **Integration of the Key with the Data**
  - Normalization of data
  - Calculate mean and standard deviation
  - Create ranges for which data points will fall
  - Associate data with a color on the map
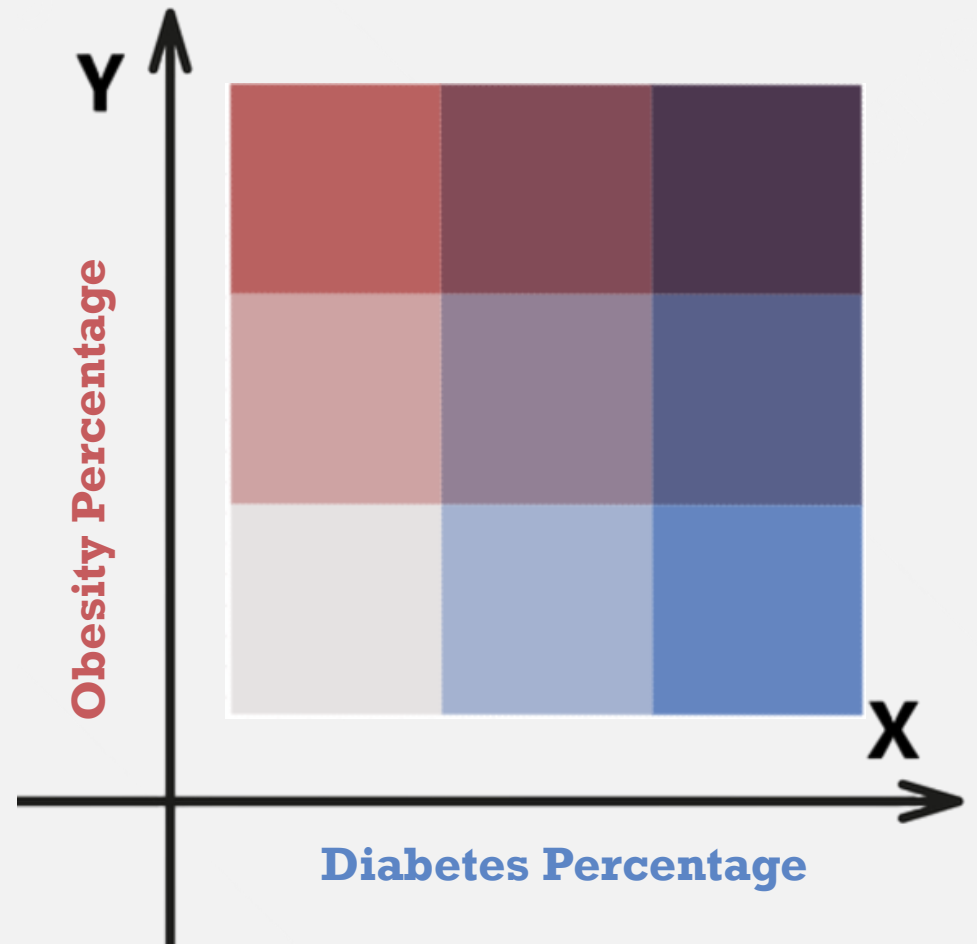
```
[
    ["#e6e2e2", "#a0b3d3", "#5c85c5"],
    ["#d6a1a2", "#967f97", "#565f8d"],
    ["#c65b5d", "#8b4857", "#503651"],
]
```

Lessons Learned: Color Key in Front-End vs Back-End

Bivariate Choropleth Color Generator[2]

Obesity Percentage

Diabetes Percentage

Application Development: Data Management

Data Acquisition: Initial

- Find a comprehensive dataset
  - County Health Rankings

- Select data points that were relevant to the scope of the project:
  - County names
  - Obesity Percentage
  - Diabetes Percentage
  - Population

- Creation of our own, relevant Excel document for initial data points and testing

Data Processing: Final

- Translate Excel data into JSON format directly from source

- The JSON file is the bedrock to implementing the choropleth map on the front-end

- Stores calculations needed to display a corresponding color on the front-end map

```
{
    "name": "colorado",
    "valid_data": true,
    "population": 5812069,
    "obesity_percentage_afflicted": 24,
    "obesity_population_afflicted": 140652069,
    "diabetes_percentage_afflicted": 7,
    "diabetes_population_afflicted": 40684483,
    "mean_obesity_percentage": "24.00",
    "mean_diabetes_percentage": "7.00",
    "std_obesity_percentage": "3.58",
    "std_diabetes_percentage": "1.57"
},
{
    "name": "connecticut",
    "valid_data": true,
    "population": 3605597,
    "obesity_percentage_afflicted": 29,
    "obesity_population_afflicted": 106365111,
    "diabetes_percentage_afflicted": 8,
    "diabetes_population_afflicted": 29565895,
    "mean_obesity_percentage": "29.00",
    "mean_diabetes_percentage": "8.00",
    "std_obesity_percentage": "2.91",
    "std_diabetes_percentage": "0.82"
},
```

Challenges: Data Consistency, Data Validation, Integration with Visualization Tools.

APPLICATION FEATURES

Interactive State and Color Key Filter

View Options:
- National: 50 states
- Single-state: county outlines

Color Key Options:
- Obesity
- Diabetes
- Bivariate

Data Representation

Legend Features:
- Choropleth Key
- Width Factor
- Range Display

Interactivity

Mouse Hover Feature:
- State/County health data
- Clicking on Legend colors to view ranges

DEMO
OF THE APPLICATION

COMPLETED WORK

Initial Objectives:
- Choropleth map of Virginia + counties [met]
- Mouse hover with further information [met]
- Identify initial dataset(s) [met]

Extended Achievements:
- Choropleth map for the entire United States
- Choose between different scopes to view data
- Choose between different choropleth keys

Technical Accomplishments:
- Integration of comprehensive datasets into a user-friendly platform
- Utilization of cutting-edge web technologies for real-time data visualization and responsiveness

Provided a valuable tool for stakeholders in healthcare and policy to visualize and analyze regional health trends.

Containerization:
- Build and bundle the application to run anywhere

Mobile Integration
- Implement the application to be adaptable on all devices

File Upload (Front-End Support)
- Finish the necessary front-end infrastructure for users to upload files to the application

FUTURE WORK

ACKNOWLEDGEMENTS

Dr. Lynn Abbott is a professor at Virginia Tech and is the sponsoring client of the *Chorobesity* project. He received his B.S. at Rutgers University before earning his M.S. at Stanford and finally his Ph.D in Computer Vision and Electrical Engineering.

His research interests lie in his field of doctoral studies, as well as in biometrics and autonomous vehicle systems. His publications in this work have received over 3,000 citations.

Chenyu Mao, currently pursuing his Master's in Computer Science and Applications at Virginia Tech, previously earned his Bachelor's degree from the same institution.

He is a sponsoring client of the Chorobesity project. He has contributed significantly by providing a visual depiction of the anticipated outcome. This visual guide has served to unify the team's direction, ensuring all members are aligned with the intended objectives.

CHENYU
MAO

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[3]Cartography vectors. (n.d.). Cartography Vectors. https://cartographyvectors.com/map/1129-virginia-with-county-boundaries

[4] "Extra Weight, Extra Risk | ADA." American Diabetes Association | Research, Education, Advocacy, diabetes.org/health-wellness/weight-management/extra-weight-extra-risk.

[5] "Choropleth Map." The Data Visualization Catalogue, datavizcatalogue.com/methods/choropleth.html.

Questions?