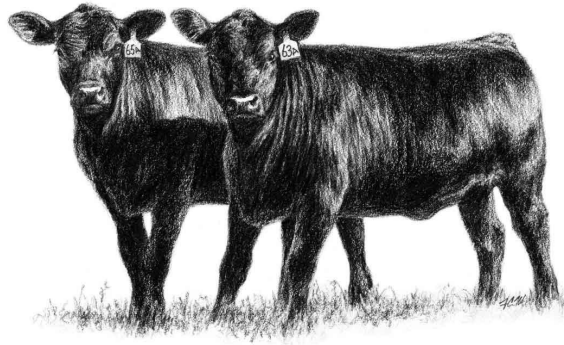


AgViz Data Visualization Tool:

A web application that visualizes climate change
to aid sustainable practices in livestock production



Gemini

Matt, Nani, Ryan and Roosevelt



Overview

1. Motivation (Ryan)
2. Web application (Ryan)
3. System requirements (Matt)
4. Design principles (Nani)
5. System decomposition (Nani)
6. State of the project (Nani)
7. Project schedule (Roosevelt)
8. Development tools (Roosevelt)
9. Data visualization in R (Matt)

Motivation

Client: Center for Sustaining Agriculture and Natural Resources at WSU
↳ conducts research and education in sustainable practices

Problem: Climate change affects food availability and heat stress on cattle

Solution: Educate producers on forecasted change in forage supply and heat so that operations may adapt to ensure cattle have sufficient food and access to water and shade

Web Application

Data product: web-based tool that visualizes forecasts of the effect of climate change on environmental variables across the United States

Use case: cattle producer views a geographic map coded by color to display change in a variable from baseline and selects a region of interest, which generates plots of that variable over time for multiple climate models

Data: values for environmental variables over 4 km² areas forecast from present day to year 2100; provided by the US Department of Agriculture

Requirements: Functional

Splash page

- Map
- Zoom
- Data Points
- Legend
- Menu
 - Indicators
 - Boundaries
 - Overlay
 - Climate Models
 - Time Period



Data view page

- Food supply
 - Net Production
 - Forage Variability
 - Inedible : Edible Plants
- Heat Stress
- Aggregate

Requirements: Non-functional

Quality Requirements

- User design
 - Load times
 - User help
 - Indicator descriptions
 - Browser compatibility
- User interface
 - Resolution of visuals
 - Color scheme and font

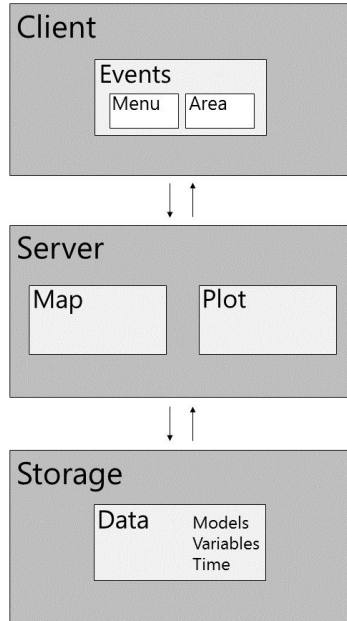
Implementation Constraints

- Development tools
 - R language
 - Shiny
 - Leaflet
- Data files
 - File format

Design Principles

- **Decouple data from implementation**
Provide for changes to data such as addition of climate models
- **Enhance performance**
Reduce visualization load times through preprocessing
- **Maintain consistency in user experience**
Ensure browser compatibility and adequate resolution of visuals

Subsystem Decomposition

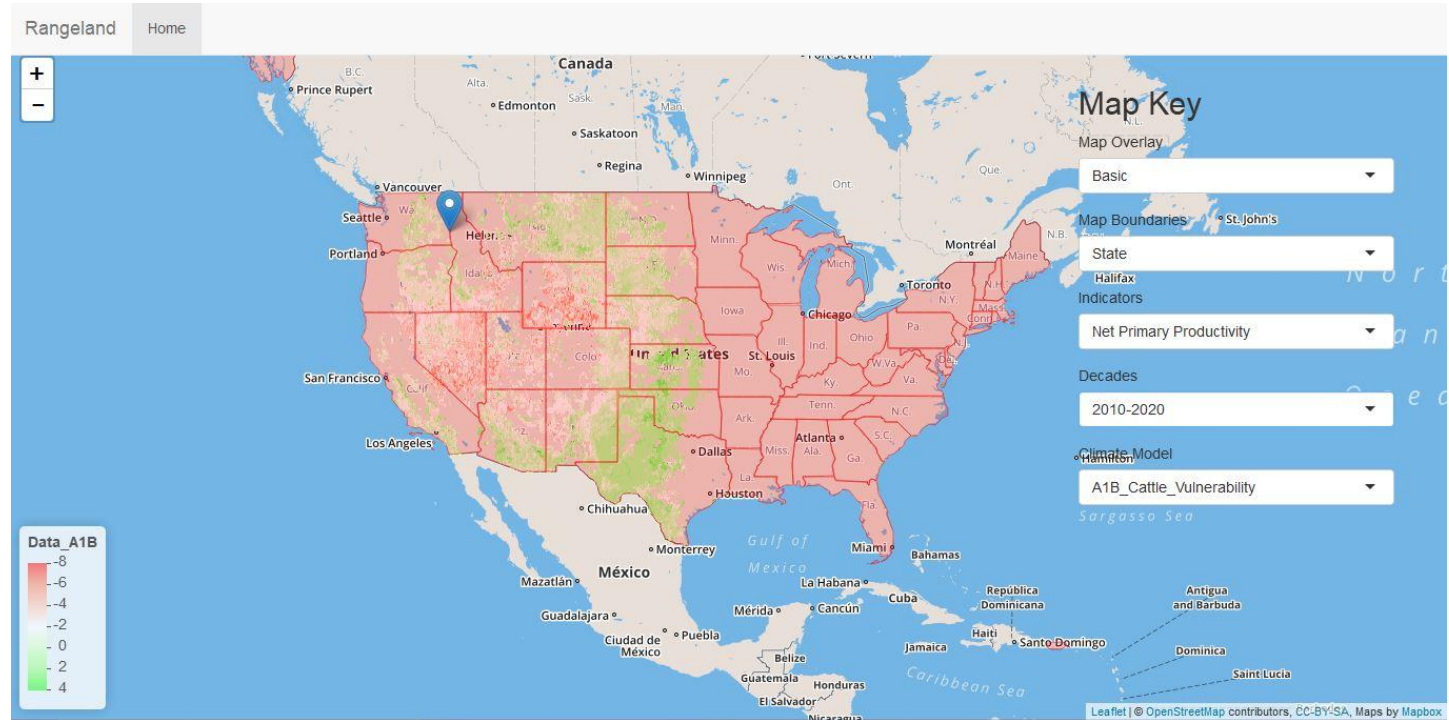


Displays map and plots
Captures user interaction

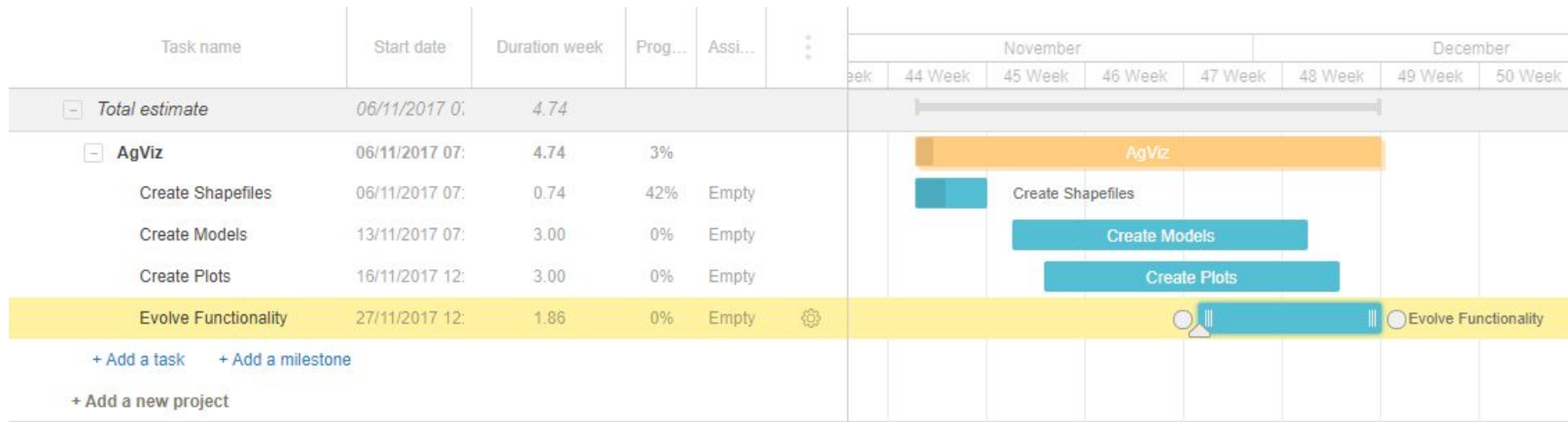
Transforms data
Generates map and plots

Selects data by variable, time, model

State of the Project



Project schedule



R + Tools

RStudio: IDE for R development

R: statistical computing and graphing language

R Libraries

- Leaflet: create maps

- Shiny: create interactive websites

- Other

 - Raster, lattice, rcolorbrewer: display information on map

 - Rgeos, sp, ggmap: parse data to use on map

Tools in other projects

Leaflet

- Interactive maps
- Mobile-friendly maps

R Shiny

- Data visualization
- Processing of large data set

