

# PubHlth 497-D: Introduction to Statistical Computing with R

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# Course outline

- Course formed to complement PubHlth 490ST
- Use DataCamp to teach R
- Will try to customize modules to fit class needs
- Worry about the programming, not your grade



- “... is a language and environment for statistical computing and graphics”
- What does that mean?
  - Can store data, perform different calculations, analyze data, and make visualizations
- And anyone can add onto it!



- For example, dengue fever in Thailand
- Load monthly data from 1968-present
- Find historical averages and variability
- Determine if current season is high or low
- Make predictions and pretty graphs



## Dengue prediction in Thailand

### Choose language

- ☐ ไทย
- ☒ English

These forecasts should be considered preliminary drafts, pending model validation.

### Select Date

2015-05-07

Previous

Next

### Select variable

Outbreak probability (%)

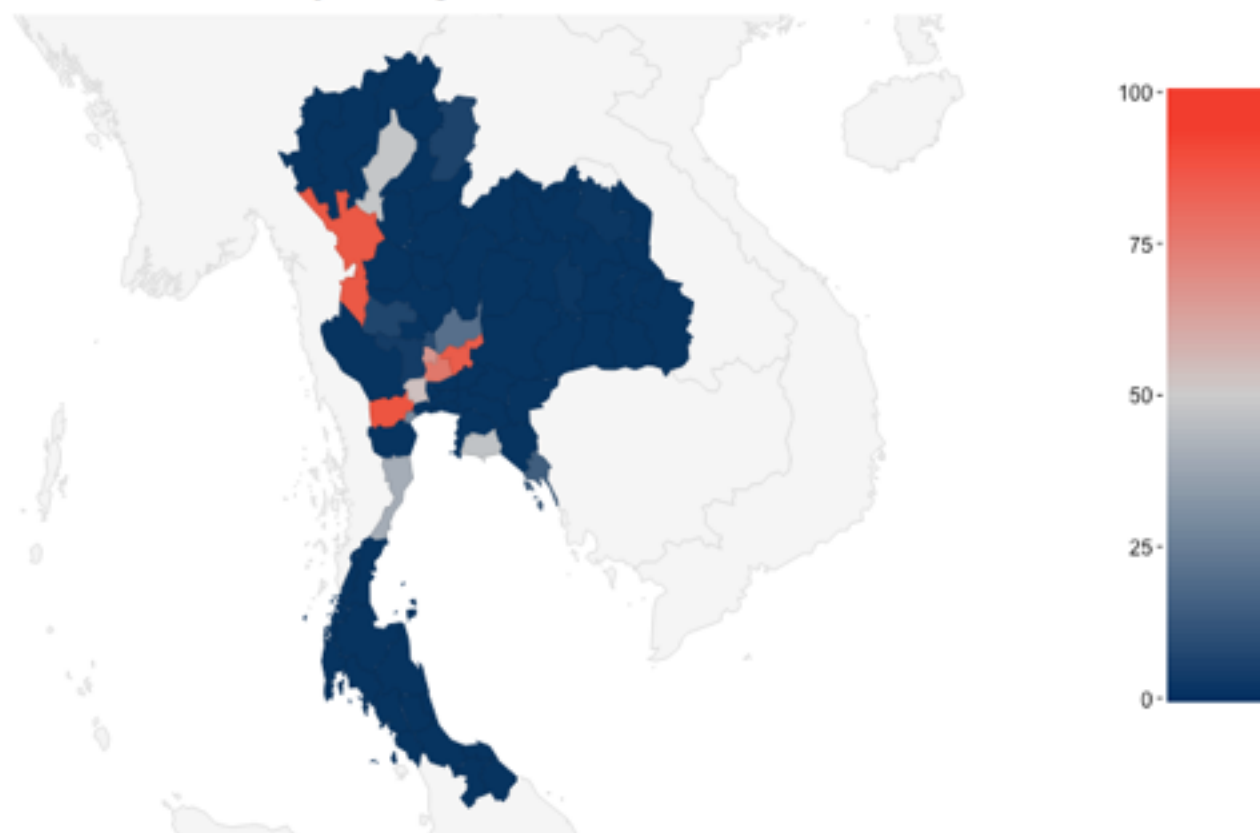
This app was created by Stephen A Lauer, Krzysztof Sakrejda, and Nicholas G Reich at the University of Massachusetts-Amherst, in collaboration with the Thai Ministry of Public Health and researchers at Johns Hopkins Bloomberg School of Public Health. This work was funded in part by the U.S. National Institutes of Health through the grant "Methods for Reducing Spatial Uncertainty and Bias in Disease Surveillance" (R01AI102939).

Map

Plot

Annual Table

### Probability of dengue outbreak occurrence





- Modeling galaxies
- Predicting elections, economies, and stocks
- Genetic analyses of crops or tumors
- Mapping bird migrations
- ...



- A graphical user interface (GUI; program you can use) that makes R more organized and accessible
- Side note: the developers are wicked smart and have designed some of the programs we'll use in this course



- Online learning platform that utilizes R Studio to teach programming, statistics, and visualization in R (amongst other things)
- We have a premium group account, which gives all group members 6 months of free access to all of the modules provided by this course
- Might as well max it out!



Stepping back a bit...

# Programming

- Computers were invented to make calculations and replace human computers (often women)
- Programming is continuation of the original practice that computers were made for
- My philosophy: Struggle

**Why is programming so  
hard?**

# Coco vs. Computers



- Coco needs to be told the same command over and over to learn it
- Computer does exactly what you say, but is very sensitive to how you say it

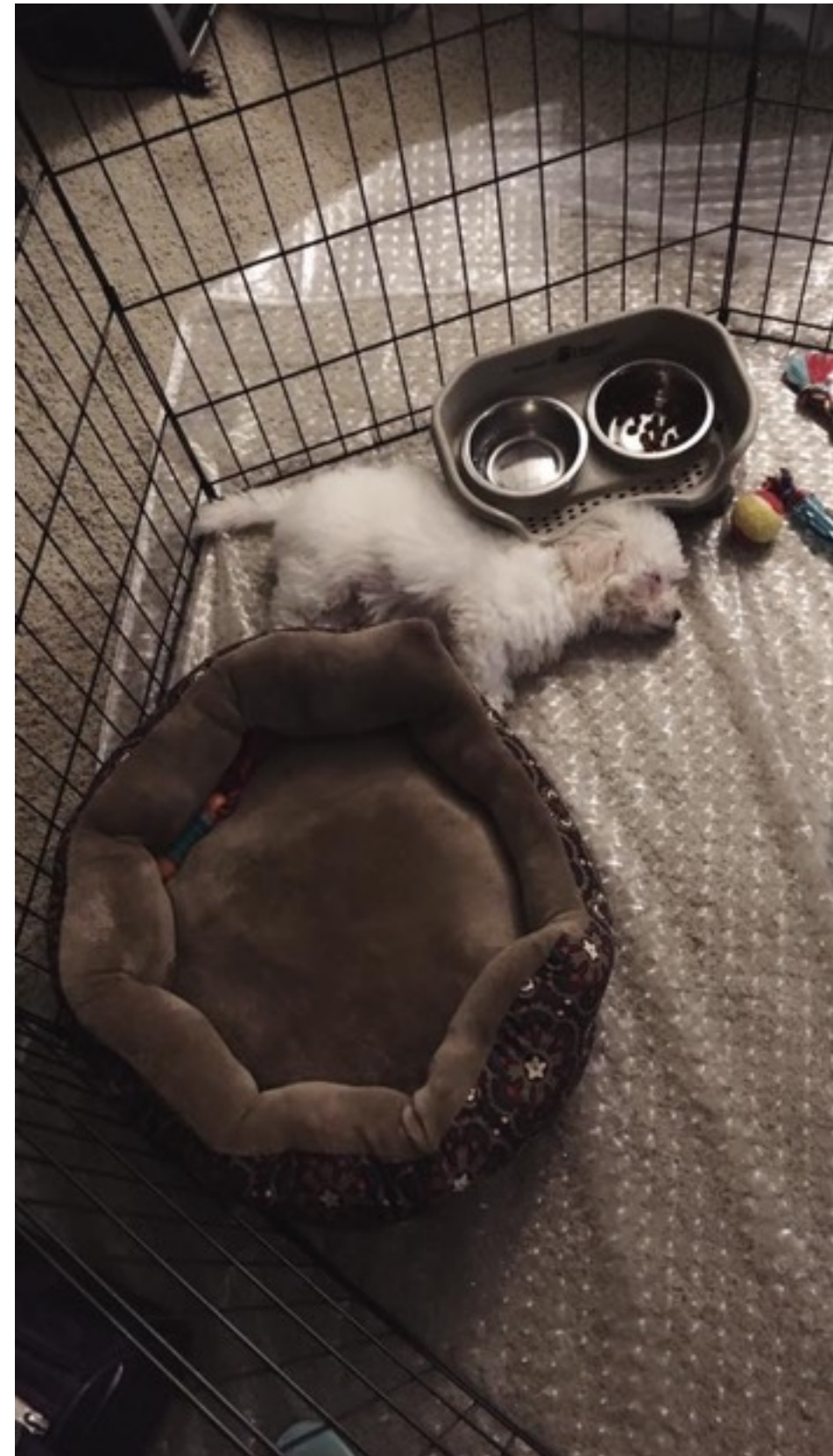




- Computer thinks logically, using True or False, If... Else, And/Or
- Coco is not always logical... thinks in terms of food and praise, wants to make me happy



- Computer represents data abstractly
- Coco knows only what she can see, taste, hear, and smell





- Coco can sense your emotions and respond accordingly
- Computers don't care about your feelings





# Computational Thinking

- Not how computers think — they don't
- About how we should think to break down problems, with extensions to programming
- <http://www.cs4fn.org/computationalthinking/>

# My Github Page

- Contains latest version of syllabus and lecture notes
- <https://github.com/salauer/PubHlth497D>