

Welcome!

Intro to R and RStudio



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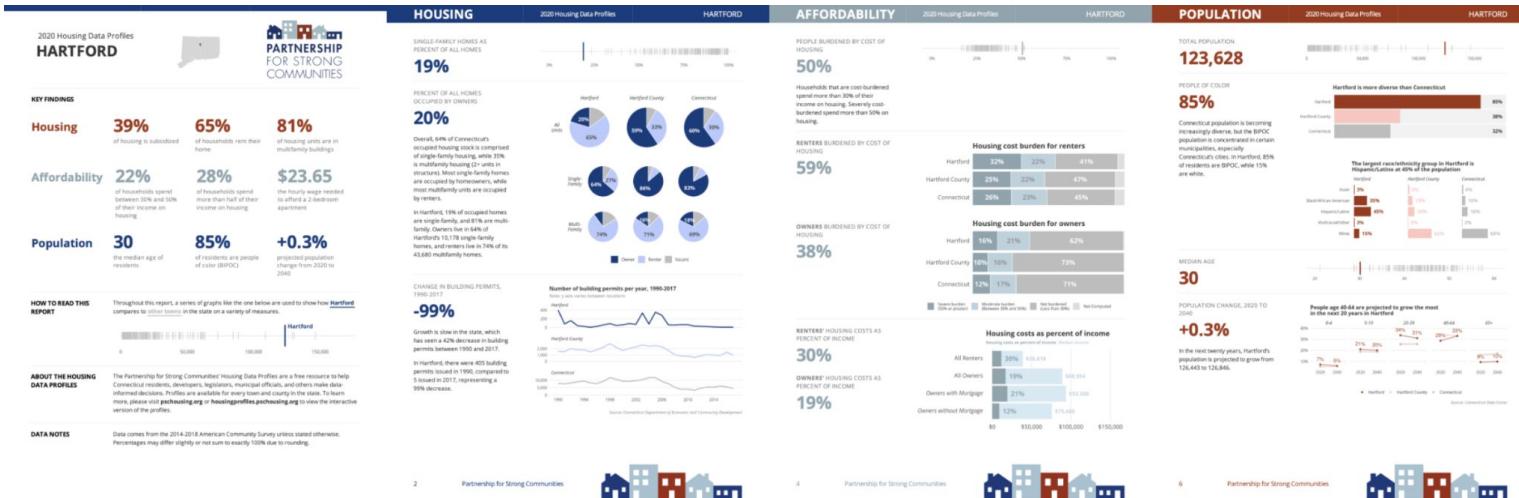
Our goal for today

Overview of the R ecosystem:

- **What is possible with R?**
- **RStudio the company**
- **R the programming language**
- **RStudio the IDE (Workbench)**
 - Importing your data
 - Visualization
 - Reporting

Photo Credit: Jeremy Allen

What is possible with R?



“ Making 170+ beautiful reports to inform policymakers and others in the state of Connecticut. All the way from data import to final report in R – David Keyes & Thomas Vroylandt

on R for the Rest of US

the products

What is possible with R?

T-Mobile

◀ Back To Blogs

Enterprise Web Services with Neural Networks Using R and TensorFlow

By: Jacqueline Nolis and Heather Nolis

2018-11-02

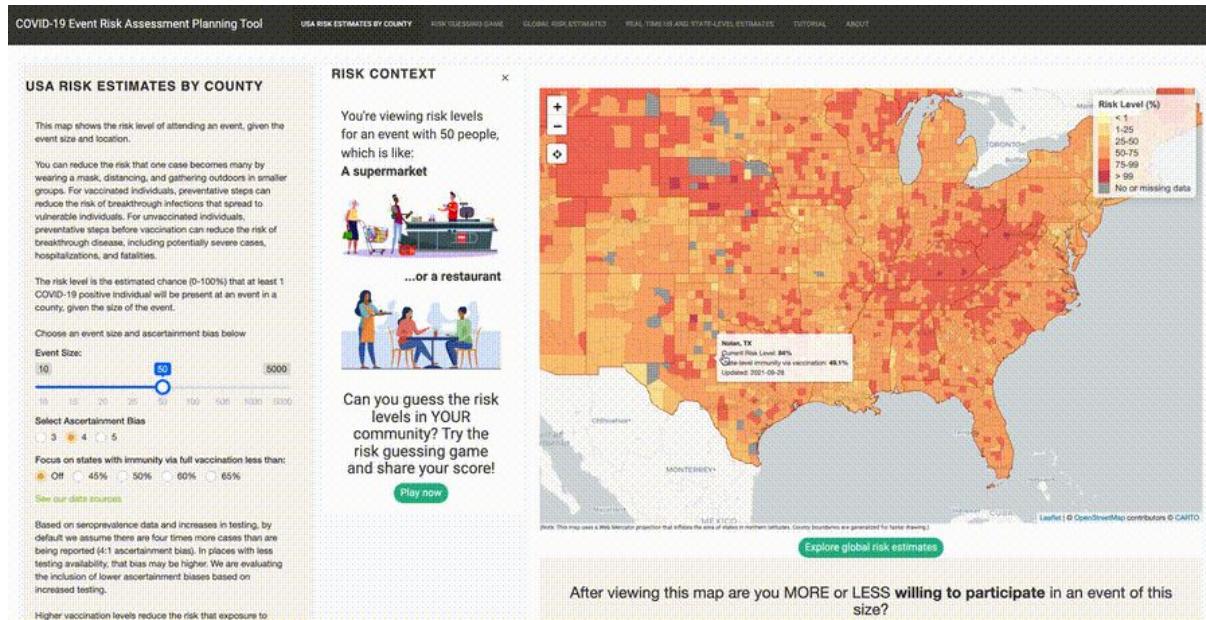
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We explore in R and immediately deploy in R. Our APIs are neural network models using R and TensorFlow in docker containers that are small and maintainable enough to make our DevOps team happy!

Presented at rstudioconf::2019

R Studio[®]

What is possible with R?



“ Georgia Tech’s COVID-19 Event Risk Assessment Planning Tool...adding up to ultimately over 8 million unique users around the world

[on YouTube](#)
[on RStudio's blog](#)

What is possible with R?

The screenshot shows the homepage of the California COVID Assessment Tool (CalCAT) at calcat.covid19.ca.gov/cacovidmodels/. The page title is "Modeling COVID-19 to Inform State and Local Response". It features three main sections: "Nowcasts" (represented by a magnifying glass icon), "Forecasts" (represented by binoculars icon), and "Scenarios" (represented by a telescope icon). Below each icon is a brief description: "How fast is COVID-19 spreading right now?", "What can we expect in the next 2-4 weeks?", and "What are the long-term impacts under different scenarios?". At the bottom left is the CDPH logo, and at the bottom right is the California ALL logo. The footer includes links to the CDPH COVID-19 Page, CalCAT Open Source, and information about icons from the nounproject.com.

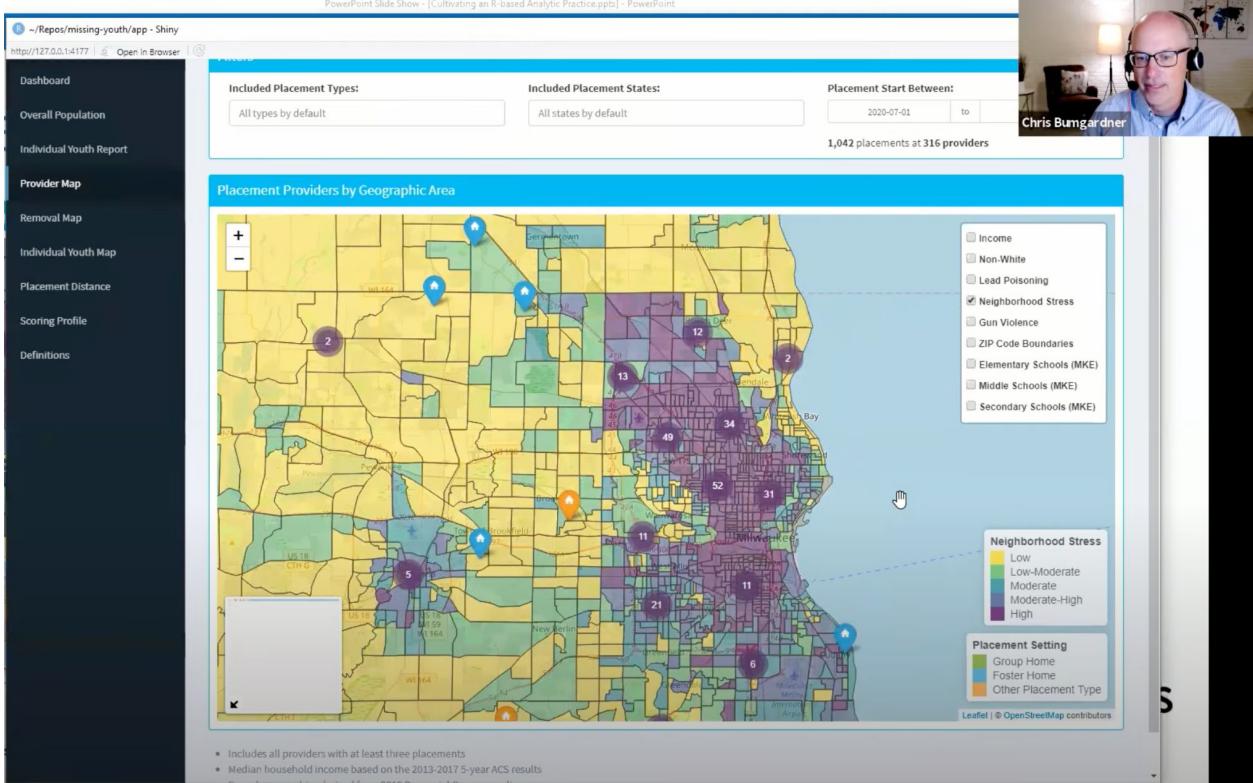
“ California COVID Assessment Tool

[The Shiny app site](#)

[RStudio's blog](#)

[Code](#)

What is possible with R?



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At Children's
Wisconsin...Example
R-based Projects: Missing
Youth, System-wide:
COVID-19 Response,
Operational: Patient
Placement Planning and
Optimization

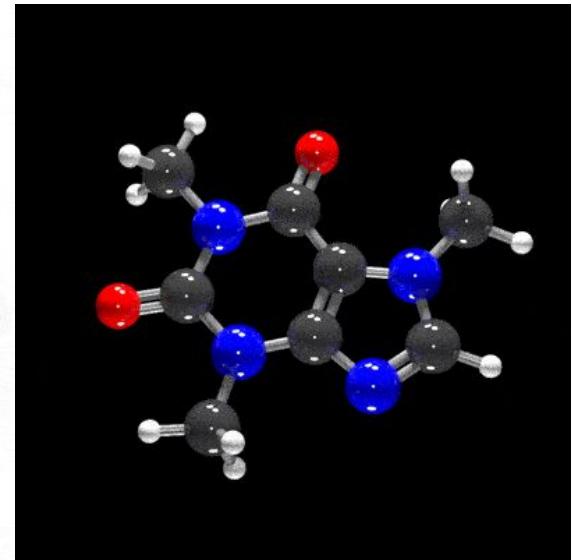
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Presented at our
community meetup

What is possible with R?

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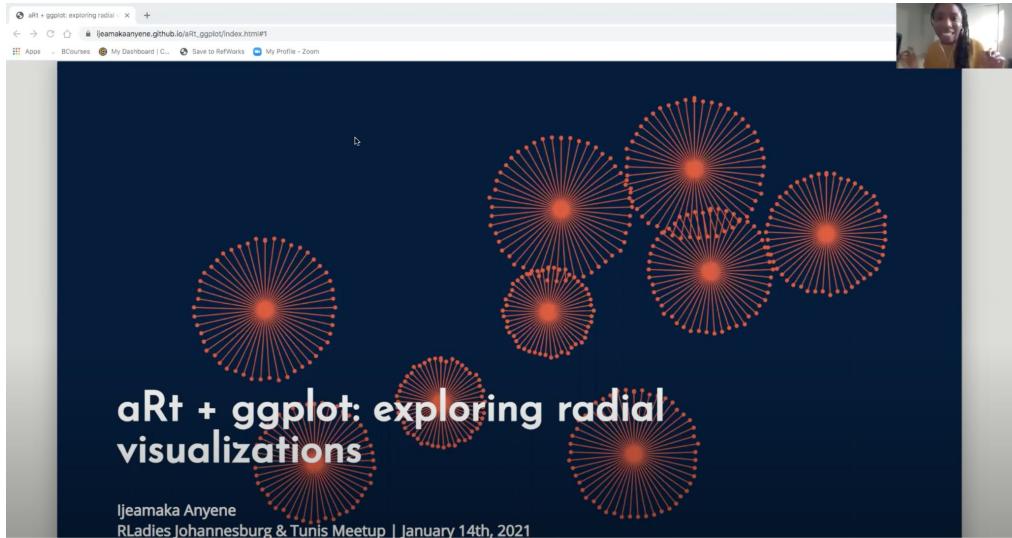
`raymolecule` is an R package to parse and render molecules in 3D. Rendering is powered by two packages: `rayrender` package, a pathtracer for R, and `rayvertex`, a rasterizer for R



[More 3D rendering by
Tyler Morgan-Wall](#)

What is possible with R?

Art!



Ijeamaka Anyene
(ee-jee-maka)



Will Chase

What is possible with R?

Books!

All of these books
were written in R with
the bookdown
package!

bookdown.org

BOOKDOWN

Write HTML, PDF, ePub, and Kindle books with R Markdown

The `bookdown` package is an [open-source R package](#) that facilitates writing books and long-form articles/reports with R Markdown. Features include:

- Generate printer-ready books and ebooks from R Markdown documents.
- A markup language easier to learn than LaTeX, and to write elements such as section headers, lists, quotes, figures, tables, and citations.
- Multiple choices of output formats: PDF, LaTeX, HTML, EPUB, and Word.
- Possibility of including dynamic graphics and interactive applications (HTML widgets and Shiny apps).
- Support a wide range of languages: R, C/C++, Python, Fortran, Julia, Shell scripts, and SQL, etc.
- LaTeX equations, theorems, and proofs work for all output formats.
- Can be published to GitHub, bookdown.org, and any web servers.
- Integrated with the RStudio IDE.
- One-click publishing to <https://bookdown.org>.

Below is a list of featured books. For a full list, please see the [archive](#) page. For the full documentation of the `bookdown` package, please see the free [online book](#) `bookdown: Authoring Books and Technical Documents with R Markdown`.

Geocomputation with R

by Robin Lovelace, Jakub Nowosad, Jannes Muenchow

2021-09-22

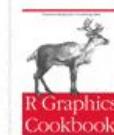


Welcome to Geocomputation with R for people who want to analyze, visualize and model geographic data with open source software. It is based on R, a statistical programming language that has powerful data processing, visualization, and geospatial capabilities. The book equips you with the knowledge and skills to tackle a wide range of issues manifested in geographic data, including those with scientific, societal, and environmental implications. This book will interest people from many backgrounds, especially Geographic Information Systems (GIS) users interested in applying their domain-specific knowledge in a powerful open source language for data science, and R users interested in extending their skills to handle spatial data. [Read more →](#)

R Graphics Cookbook, 2nd edition

by Winston Chang

2021-09-22



This cookbook contains more than 150 recipes to help scientists, engineers, programmers, and data analysts generate high-quality graphs quickly—without having to comb through all the details of R's graphing systems. Each recipe tackles a specific problem with a solution you can apply to your own project and includes a discussion of how and why the recipe works. [...] Welcome to the R Graphics Cookbook, a practical guide that provides more than 150 recipes to help you generate high-quality graphs quickly, without having to comb through all the details of R's graphing systems. Each recipe ... [Read more →](#)

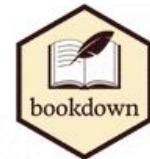
Statistical Inference via Data Science

by Chester Ismay and Albert Y. Kim

2021-09-16



An open-source and fully-reproducible electronic textbook for teaching statistical inference using tidyverse data science tools. [...] This is the website for Statistical Inference via Data Science: A ModernDive into R and the



What is possible with R?

Websites, too!

The screenshot shows a personal website for Alison Hill, PhD. At the top, there is a navigation bar with links to 'ABOUT', 'BLOG', 'PROJECTS', and 'TALKS'. Below the navigation is a large circular portrait of Alison, which is colorfully segmented (yellow, pink, blue, black). The main content area features her name 'Alison Hill, PhD' in a large, bold, orange font. Below her name is her title 'SENIOR DATA SCIENTIST, AI STRATEGY & INNOVATION @IBM'. Underneath that are social media icons for Twitter, GitHub, LinkedIn, and a mail icon. A bio follows: 'I am a data scientist, behavioral scientist, and award-winning educator. I work on creating online experiences to bring machine learning and artificial intelligence (AI) problems and solutions to life. My goal is to make AI more approachable, understandable, and empowering.' There is also a 'ABOUT ME →' link. At the bottom left is a sidebar for 'blogdown' with the subtitle 'Creating Websites with R Markdown', featuring a small logo and some text. At the very bottom are links for 'License', 'Contact', and 'RSS'.

[blogdown, also at bookdown.org](#)

The screenshot shows a website built with distill. The header includes the user's name 'Michael Clark' and a search bar. To the right are links for 'About', 'Documents', 'Workshops', 'Code', 'Resources', and social media icons. The main content area has a heading 'STATISTICS, DATA, SCIENCE' in orange. Below it is a complex line graph with multiple colored lines and points. A post titled 'Double Descent' is displayed, with the subtitle 'Rethinking what we thought we knew.' Below the post is another titled 'This is definitely not all you need' with the subtitle 'A summary of findings regarding deep learning for tabular data.' On the right side, there is a sidebar titled 'CATEGORIES' with a list of topics including 'Analytics', 'Bayesian', 'Big Data', 'deep learning', 'empirical bayes', 'exploratory data analysis', 'feature selection', 'Feature engineering', 'GAM', 'GLM', 'machine learning', 'model selection', 'model theory', 'regression', 'regression machine learning', 'selectivity', 'SEM', and 'visualization'. At the bottom right, the word 'distill' is written in teal.

What is possible with R?

And, research within the world's leading life sciences, healthcare, finance, manufacturing, and tech companies, as well as universities, governments, and nonprofits.



Public Benefit Corporation

Open source mission codified into our charter

Corporate decisions must balance the best interests of community, customers, employees, and shareholders

J.J. Allaire CEO, RStudio rstudio.com/pbc-keynote

Details of Certified B Corporation assessment at <https://bcorporation.net/directory/rstudio>





A language



Software for writing R and
Python code, analyzing data

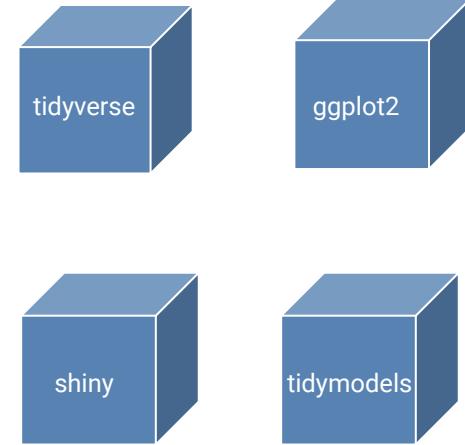


First look at R...



<https://www.r-project.org/about.html>

An open source
programming language



With packages of code
for related tasks

Download: <https://cran.r-project.org/>



Available Packages

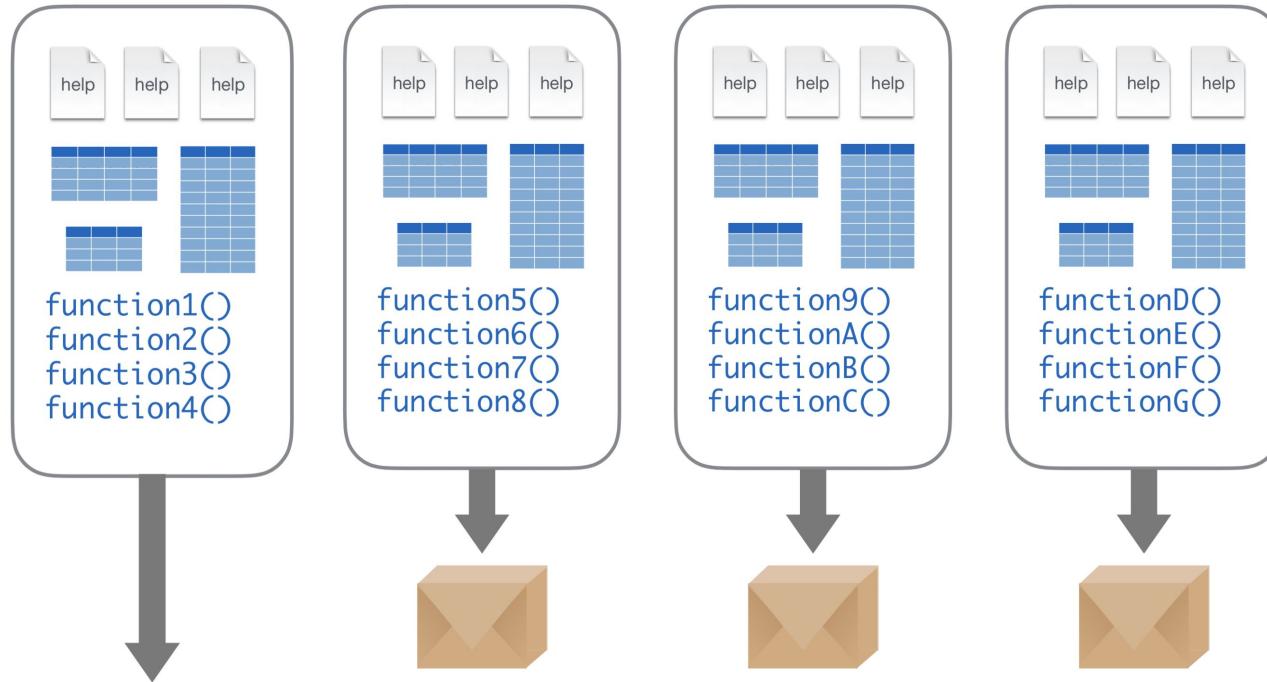
Currently, the CRAN package repository features 18594 available packages.

May, 2022

A photograph of a dense forest of aspen trees. The trees have white, peeling bark with dark spots and yellow autumn leaves. The forest floor is covered in dry grass and fallen leaves.

**Today...we
don't want to
lose the forest
for the trees**

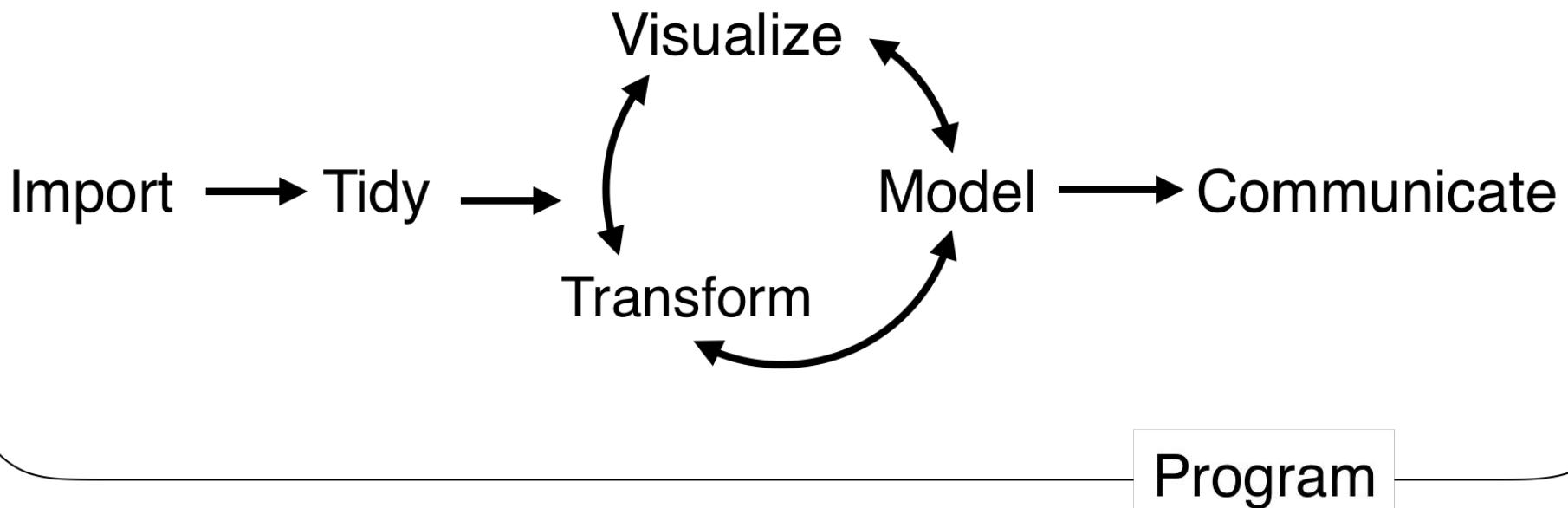
Photo Credit: Jeremy Allen



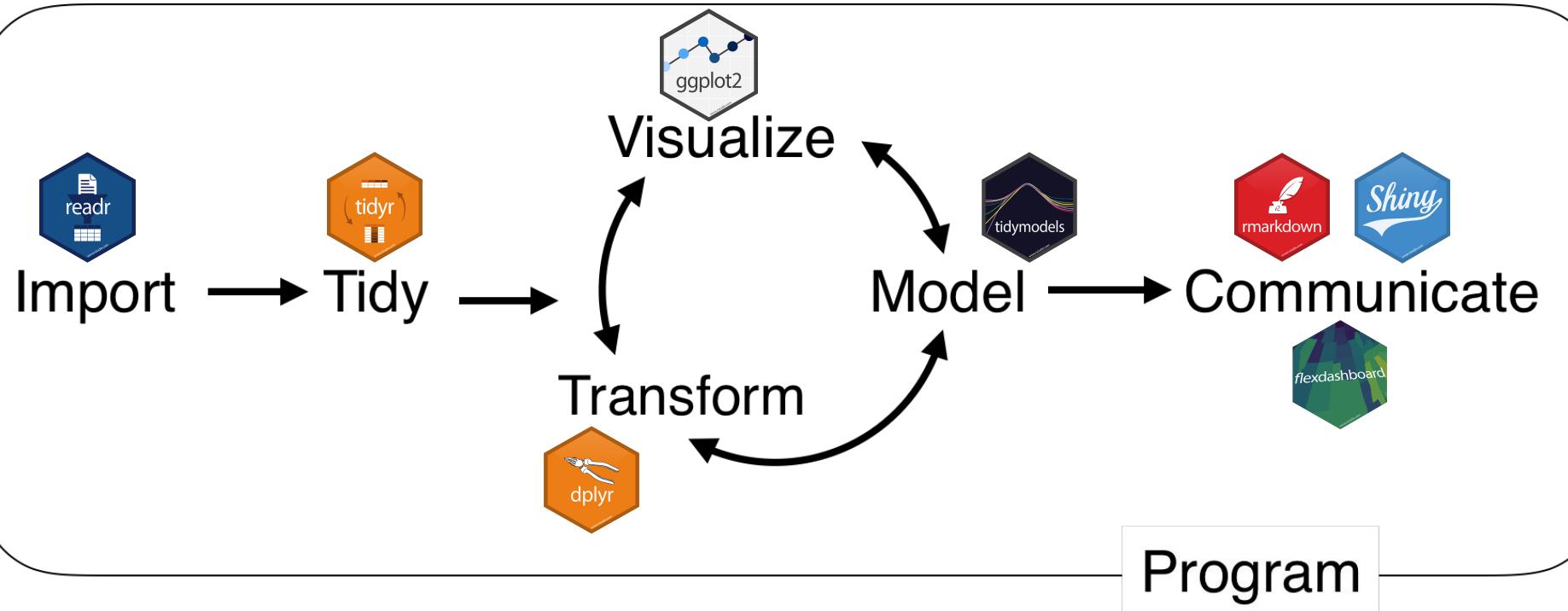
Base R

R Packages

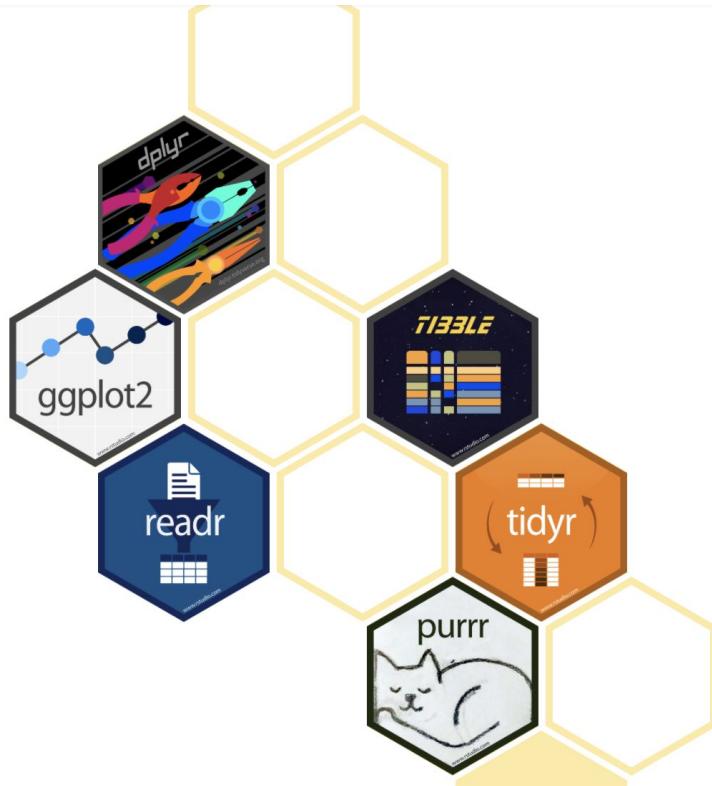
How we think about data science...



How we think about data science...



Tidyverse



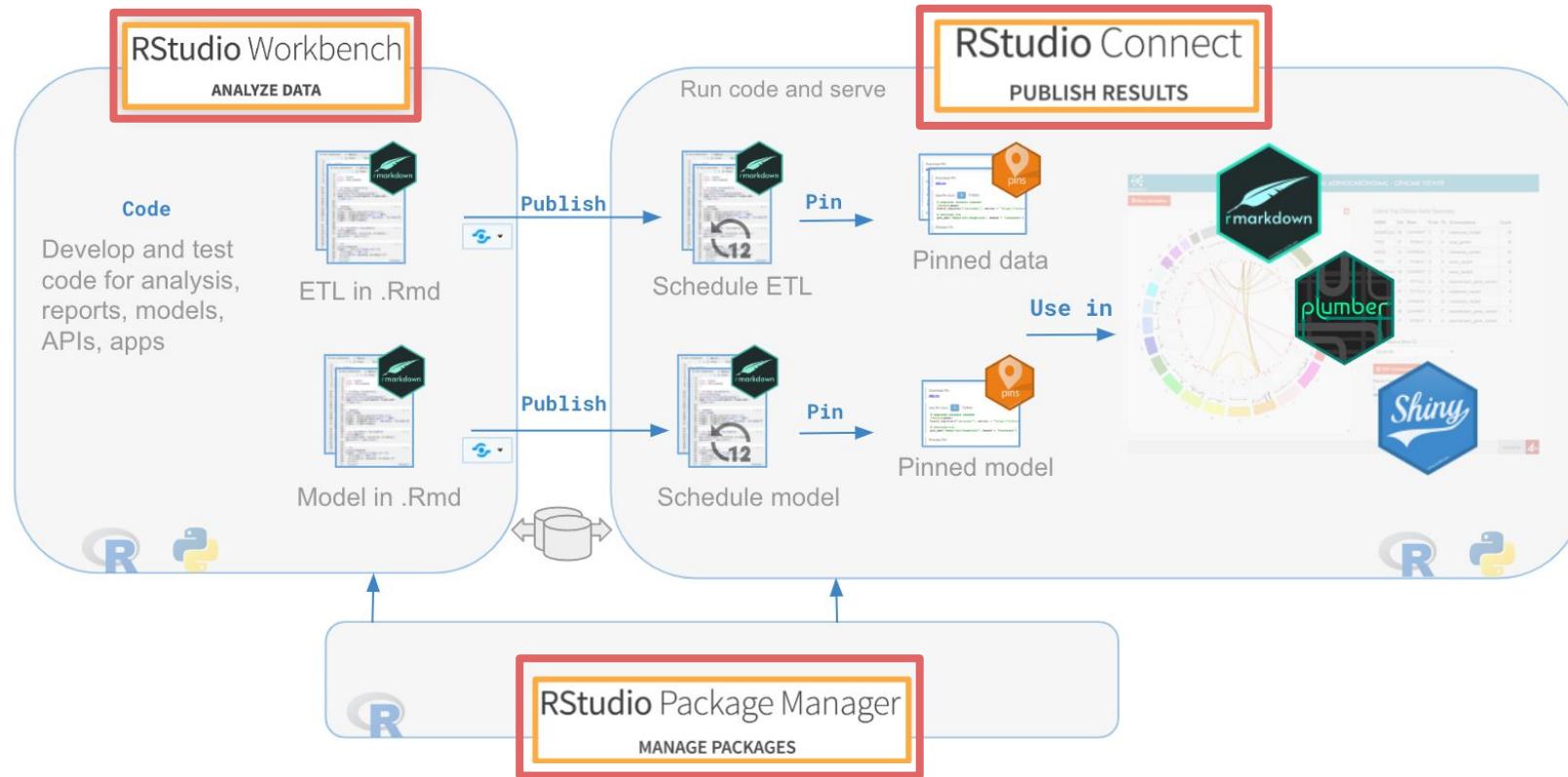
R packages for data science

The tidyverse is an opinionated **collection of R packages** designed for data science. All packages share an underlying design philosophy, grammar, and data structures.

Install the complete tidyverse with:

```
install.packages("tidyverse")
```

Example Workflow: code, publish, pin, use

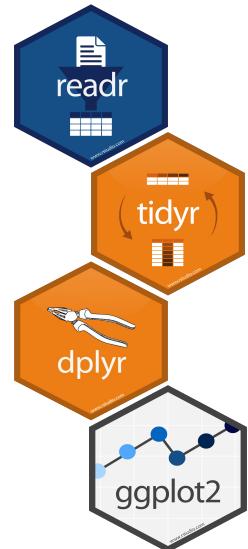


Let's go code!

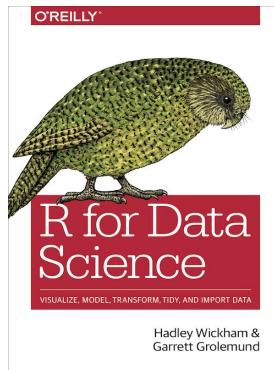
R script
R Markdown
ggplot2
gt
Plotly
renv
publish to Connect



Learn more!



R for Data Science Book



Also see our RStudio Education site



Get Started with R markdown



Learn Tidymodels



Shiny Tutorials



Using Flexdashboard

FIRST TIME USING R



Code and slides: <https://github.com/jeremy-allen/intro-to-r>



Thank you