

SINGLE-FAMILY HOMES AS PERCENT OF ALL HOMES

**19%**



PERCENT OF ALL HOMES OCCUPIED BY OWNERS

**20%**

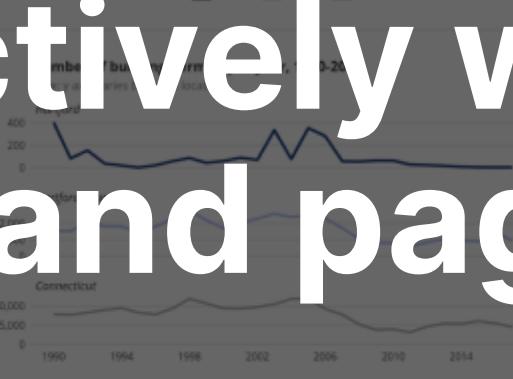
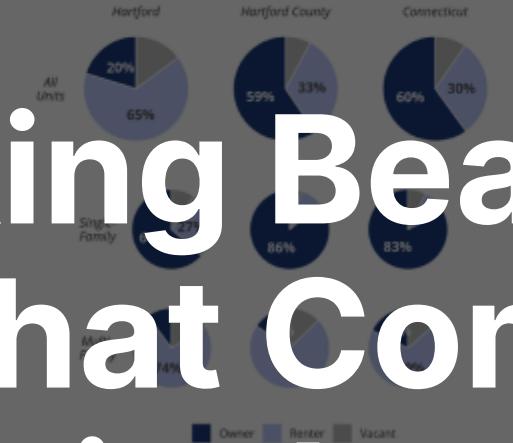
Over 54% of Connecticut's occupied housing stock is comprised of single-family units. This is mostly due to the fact that most single-family structures are occupied by homeowners, while most multifamily units are occupied by renters.

In Hartford, 19% of occupied homes are single-family, and 81% are multifamily. Owners live in 64% of Hartford's 10,178 single-family homes, and renters live in 74% of its 43,680 multifamily homes.

**-99%**

Growth is slow in the state, which has seen a 42% decrease in building permits between 1990 and 2017.

In Hartford, there were 405 building permits issued in 1990, compared to 5 issued in 2017, representing a 99% decrease.



PEOPLE BURDENED BY COST OF HOUSING

**50%**

Households that are cost-burdened spend more than 30% of their income on housing. Severely cost-burdened spend more than 50% on housing.



RENTERS BURDENED BY COST OF HOUSING

**59%**

Renters who are cost-burdened spend more than 30% of their income on rent. Severely cost-burdened spend more than 50% on rent.



OWNERS BURDENED BY COST OF HOUSING

**38%**

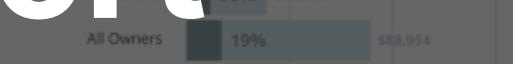
Owners who are cost-burdened spend more than 30% of their income on mortgage payments. Severely cost-burdened spend more than 50% on mortgage payments.



RENTERS' HOUSING COSTS AS PERCENT OF INCOME

**30%**

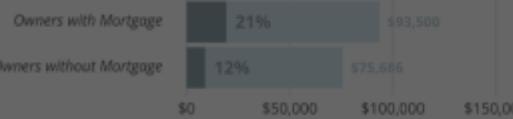
Renters whose housing costs are 30% or greater of their income are considered severely cost-burdened.



OWNERS' HOUSING COSTS AS PERCENT OF INCOME

**19%**

Owners whose housing costs are 30% or greater of their income are considered severely cost-burdened.



**Using costs as percent of income**

Costs as percent of income: Median income

Median income: \$38,818

Less than 30%: \$88,954

Between 30% and 50%: \$93,500

Greater than 50%: \$75,686

TOTAL POPULATION  
**123,62**

PEOPLE OF COLOR  
**85%**

Connecticut population is increasingly diverse, population is concentrated in municipalities, especially in Connecticut's cities. 85% of residents are BIPOC, 15% are white.

MEDIAN AGE  
**30**

POPULATION CHANGE 2040  
**+0.3%**

In the next twenty years, Connecticut's population is projected to grow from 126,443 to 126,846.

# Making Beautiful Reports that Communicate Effectively with pagedown and pagedreport



# A Quick Story

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed          dist
##  Min.   : 4.0   Min.   : 2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean    :15.4   Mean    : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.    :25.0   Max.    :120.00
```

## Including Plots

You can also embed plots, for example:



# Report

David Keyes

1/5/2021

## R Markdown

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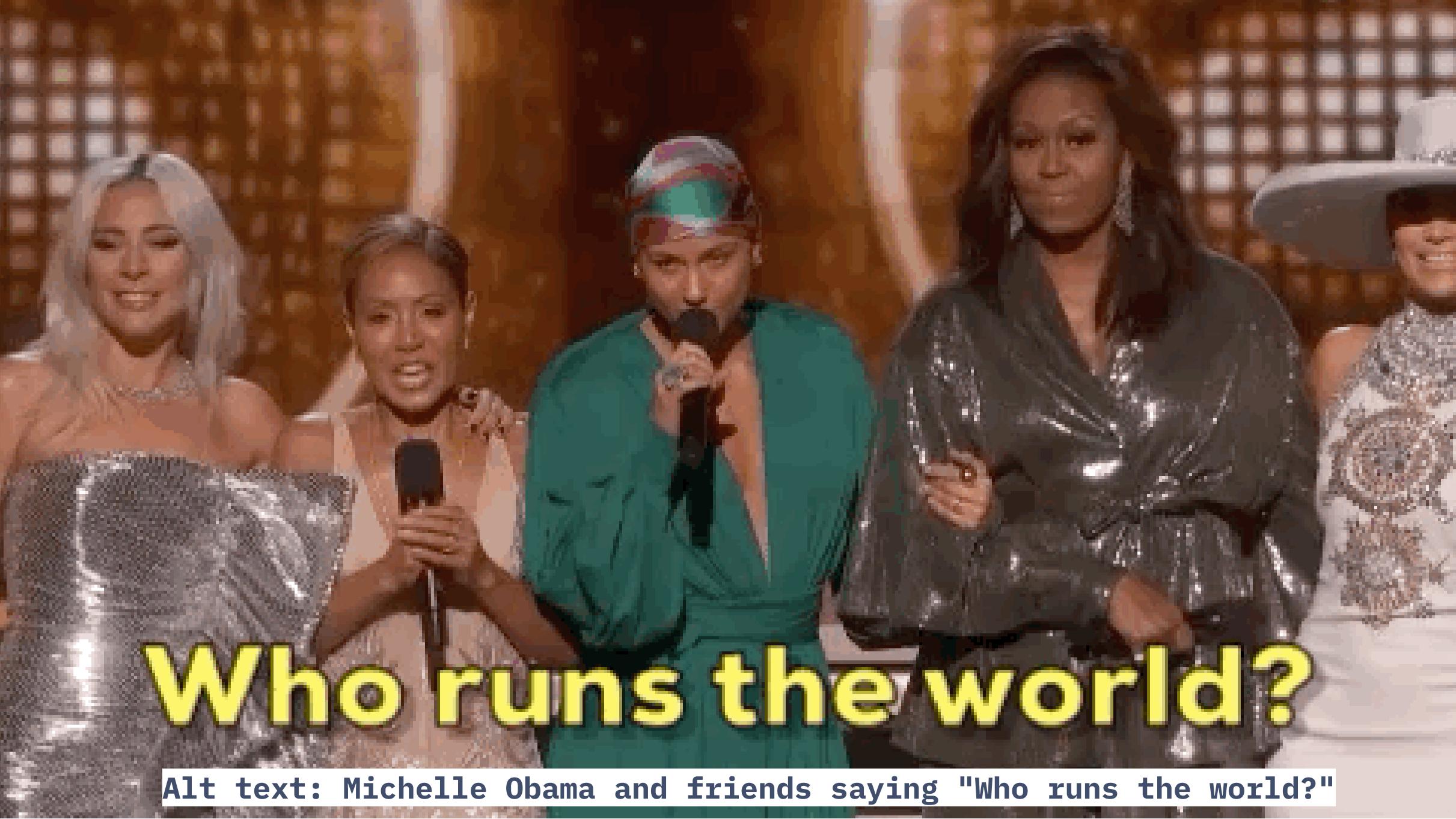
# Recognize This?

```
## Min. : 4.0  Min. : 2.00
## 1st Qu.:12.0 1st Qu.: 26.00
## Median :15.0 Median : 36.00
## Mean   :15.4 Mean  : 42.98
## 3rd Qu.:19.0 Alt text: Default PDF Format Rendered from RMarkdown
## Max.  :25.0  Max. :120.00
```

# R Users Are Not Designers



**Alt text: Person pointing to their head and saying "DUH!"**



# Who runs the world?

Alt text: Michelle Obama and friends saying "Who runs the world?"

Alt text: Michelle Obama and friends saying "Who runs the world?"



**PDFs Run the World  
Who runs the world?**

Alt text: Boss from Office Space



Yeah, I'm Gonna  
Need That in a PDF

# Options to Make PDF Reports

Alt text: Road splitting in two directions

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```
summary(cars)
```

```
##      speed         dist
```

# Option #1 Default PDF Format

## Including Plots

You can also embed plots, for example:



Please Don't

# Option #2

## LaTeX



Andrew Heiss  
@andrewheiss

Which program gives the most obscure and maddeningly difficult-to-decipher logs and messages?



Alt text: Tweets of people complaining about LaTeX



Andrew Heiss  
@andrewheiss

Which program gives  
maddeningly difficult

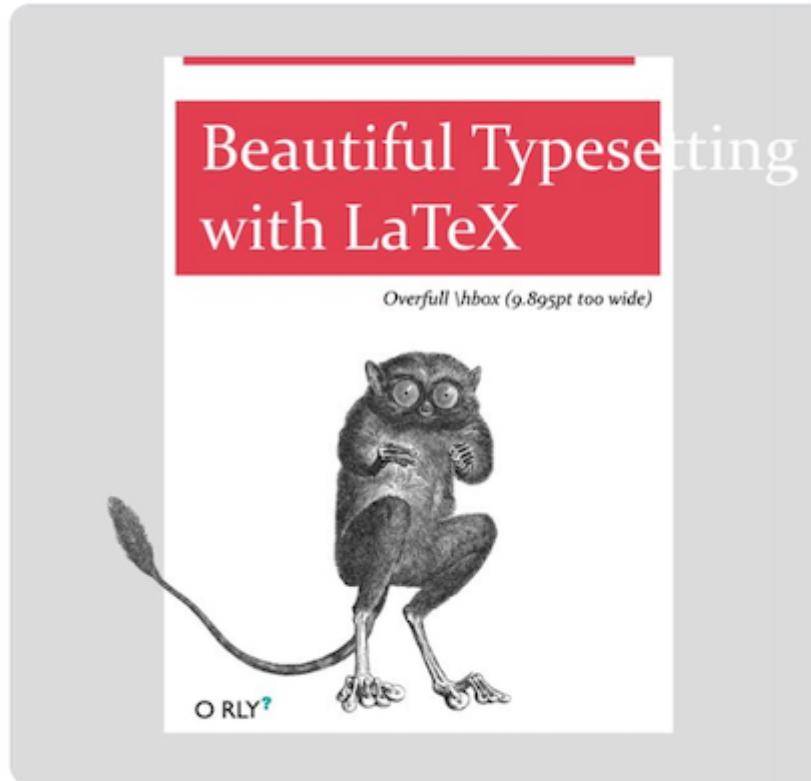
LaTeX

LaTeX



Give to MSF if you can  
@thattommyhall

So nice to see this in print at last



11:29 AM · Apr 10, 2020 · Twitter for Android

**Alt text: Tweets of people complaining about LaTeX**



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@andrewheiss

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maddeningly difficult-to-decipher logs and messages?

LaTeX

LaTeX



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Matt Cowgill  
@MattCowgill

making tables in LaTeX is enough to make me take back  
every bad thing I ever said about Microsoft Office

9:21 PM · Apr 11, 2020 · [Twitter Web App](#)

11:29 AM · Apr 10, 2020 · [Twitter for Android](#)

**Alt text: Tweets of people complaining about LaTeX**

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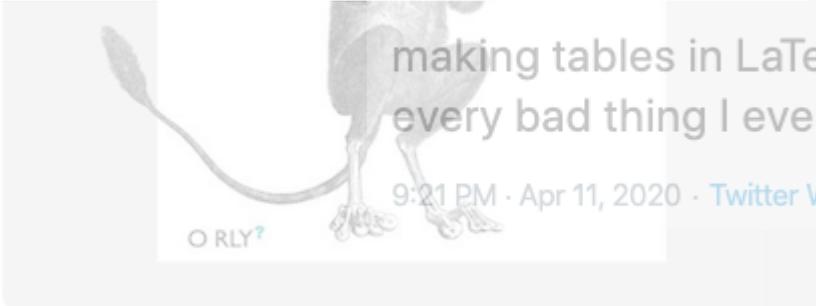
So nice to see this in print at last

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@andrewheiss

Which program gives the most c  
mad 

 Jeff Littlejohn  
@jefflittlejohn

Potential cause of death: troubleshooting Latex errors  
from knitting rmarkdown. [#rstats](#)

  
making tables in LaTeX is enough to make me take back  
every bad thing I ever said about Microsoft Office  
9:21 PM · Apr 11, 2020 · Twitter Web App

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Which program gives the most maddeningly difficult-to-de



Jeff Littlejohn  
@jefflittlejohn

LaTeX

Potential cause of death from knitting rmarkdown



Give to MSF if you can  
@thattommyhall

So nice

Slides available at [bit.ly/TynerDCR19](https://bit.ly/TynerDCR19)



O RLY? 9:21 PM · Apr 11, 2020 · Twitter Web App

11:29 AM · Apr 10, 2020 · Twitter for Android

back

Alt text: Tweets of people complaining about LaTeX

# Option #3 Work With a Designer

Alt text: Computer screens with nicely laid out reports



# Is There Another Option?

Alt text: Gorilla thinking deeply

**Yes!**

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```

# How Did I Get From Here ...

```
##   Mean    :15.4    Mean    : 42.98  
##   3rd Qu.:19.0    3rd Qu.: 56.00  
##   Max.   :25.0    Max.   :120.00
```

## Including Plots

You can also embed plots, for example:



**HOUSING**

2020 Housing Data Profiles

HARTFORD

**AFFORDABILITY**

2020 Housing Data Profiles

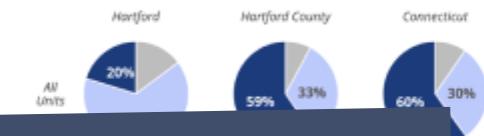
HARTFORD

**POPULATION**

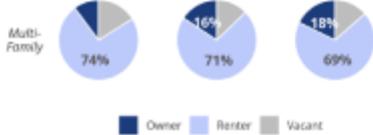
 SINGLE-FAMILY HOMES AS  
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**19%**

 PERCENT OF ALL HOMES  
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**20%**


In Hartford, 19% of occupied homes are single-family, and 81% are multi-family. Owners live in 64% of Hartford's 10,178 single-family homes, and renters live in 74% of its 43,680 multifamily homes.

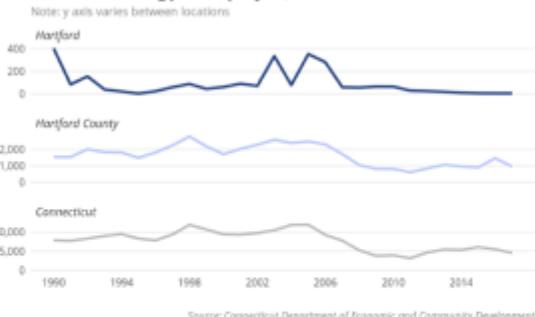

 CHANGE IN BUILDING PERMITS,  
1990-2017

**-99%**

Growth is slow in the state, which has seen a 42% decrease in building permits between 1990 and 2017.

In Hartford, there were 405 building permits issued in 1990, compared to 5 issued in 2017, representing a 99% decrease.

Number of building permits per year, 1990-2017


**AFFORDABILITY**

 PEOPLE BURDENED BY COST OF  
HOUSING

**50%**

Households that are cost-burdened spend more than 30% of their income on housing. Severely cost-burdened spend more than 50% on housing.

 RENTERS BURDENED BY COST OF  
HOUSING

**59%**
**Housing cost burden for renters**

Hartford	32%	22%	41%
Hartford County	25%	22%	47%
Connecticut	26%	23%	45%

 OWNERS BURDENED BY COST OF  
HOUSING

**38%**
**Housing cost burden for owners**

Hartford	16%	21%	62%
Hartford County	10%	16%	73%
Connecticut	12%	17%	71%

 RENTERS' HOUSING COSTS AS  
PERCENT OF INCOME

**30%**

 OWNERS' HOUSING COSTS AS  
PERCENT OF INCOME

**19%**
**Housing costs as percent of income**

	Housing costs as percent of income	Median income
All Renters	30%	\$38,818
All Owners	19%	\$88,954
Owners with Mortgage	21%	\$93,500
Owners without Mortgage	12%	\$75,686



TOTAL POPULATION

**123,62**

 PEOPLE OF COLOR  
**85%**

Connecticut population is increasingly diverse, population is becoming more diverse, municipalities, especially in Connecticut's cities, of residents are BIPOC. 85% of residents are white.

MEDIAN AGE

**30**

 POPULATION CHANGE  
2040

**+0.3%**

In the next twenty years, Connecticut's population is projected to grow by 0.3% from 126,443 to 126,846.

# **Client Needs 170+ Reports**

**Alt text: Animation of map of Connecticut, with all towns appearing one after the other**

A close-up photograph of a person with long dark hair, wearing a white t-shirt. They are holding their head in their hands, with their fingers gripping the sides of their head and palms resting against their forehead. Their eyes are closed, and they appear to be in a state of distress or extreme frustration. The background is blurred, showing what might be a window or bright light.

# Enough to Drive You Crazy

Alt text: Person holding their head in their hands

Alt text: Screenshot of article about parameterized reporting



# R is Efficient ...

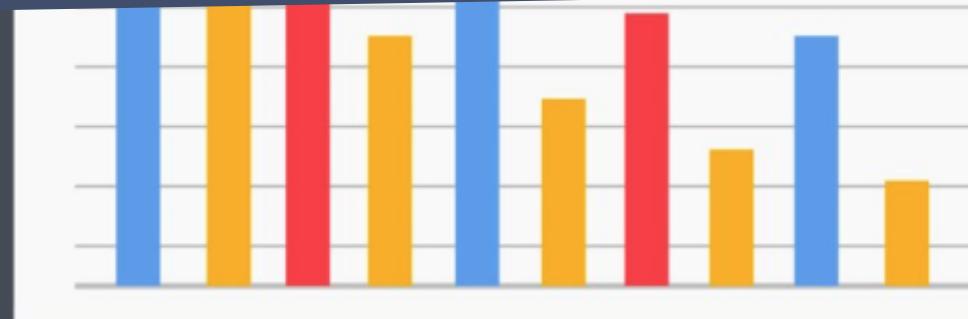


Illustration by MSSA/Shutterstock

## Iterated fact sheets with R



... But Can it Be Beautiful?

Alt text: Beautiful lake with mountains surrounding it

# LIJIA YU

## Currently searching for a PhD student position

Please note that this is a *real* resume, and I'm really looking for a PhD student position at the moment. I made this resume because Yihui asked me if I'd like to test the `pagedown` package with my resume. If you are interested in my background and skills, please feel free to contact me.

2010  
B.S.  
Biology  
Tufts University

2014

# Enter pagedown

## RESEARCH EXPERIENCE

2011  
Graduate Research Assistant  
Beijing Institute of Genomics, Chinese Academy of Sciences  
Beijing, China

- Performed computational biology research towards understanding regulation of alternative splicing in human and mouse transcriptome.
- Found EGFR pathway related mutations, aimed to understand the impacts of cancer mutations on EGFR signaling pathway.

2015  
Bioinformatician  
My Health Gene Technology Co., Ltd.  
Beijing, China

- Investigated how cancer cells spread to other parts of the body at the single cell level.

2016  
Visiting Scientist  
University of Alabama at Birmingham  
AL, USA

- Investigated the role of mitochondria in development of cancer.
- Investigated the evolution of genome architecture and its role in important evolutionary events.
- Detected thrombotic thrombocytopenic purpura related mutations in multiple patients' blood genome.

## CONTACT INFO

[lijia.yu@outlook.com](mailto:lijia.yu@outlook.com)  
[github.com/yulijia](https://github.com/yulijia)  
+1 000-000-0000

For more information, please contact me via email.

## SKILLS

Experienced in statistical analysis, statistical learning models, and optimization methods.

Full experience with next generation sequencing data analysis.

Highly skilled in R, Bash, Perl, Python, LaTeX

2014

## PROFESSIONAL EXPERIENCE

### Data Scientist, intern

SupStat Inc.  
Beijing, China

- Taught R language to beginners.
- Wrote Shiny app demos.
- Converted statistical tutorials from SPSS to R language.

### Bioinformatician

My Health Gene Technology Co., Ltd.  
Beijing, China

- Analyzed whole-exome sequencing data.
- Wrote analysis pipelines of ChIP-seq, single cell DNA-seq and single cell RNA-seq.
- Studied tumor metastasis and wrote research reports.
- Also did case studies to identify the genetic defect causing rare disease.

2014

## TEACHING EXPERIENCE

### Introduction to R Language for Beginners.

Instructor of R and Data Mining Training Courses at SupStat Inc.  
Beijing, China

### Computational Biology and Bioinformatics.

Teaching assistant of GBS CB2-201 courses at UAB

AL, USA

2014

## SELECTED PUBLICATIONS AND POSTERS

### Genetic and epigenetic signals are found predictive to the distribution of intra-individual divergence of alternative splicing.

Poster for 2013 International Conference of Genomics  
Qingdao, China

Yu L, Chen B, Zhang Z

### ESCRT-0 complex modulates Rbf mutant cell survival by regulating Rhomboid endosomal trafficking and EGFR signaling.

J Cell Sci. 2016 May 15;129(10):2075-84.  
Sheng Z, Yu L, Zhang T, Pei X, Li X, Zhang Z and Du W.

Alt text: Screenshot of resume made with pagedown package

## HOUSING

2020 Housing Data Profiles

HARTFORD

## AFFORDABILITY

2020 Housing Data Profiles

HARTFORD

## POPULAT

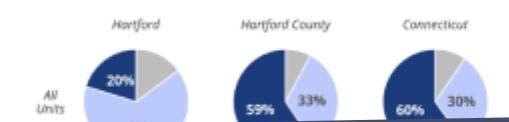
SINGLE-FAMILY HOMES AS PERCENT OF ALL HOMES

**19%**



PERCENT OF ALL HOMES OCCUPIED BY OWNERS

**20%**



Overall, 54% of Connecticut's

# Connecticut Housing Reports

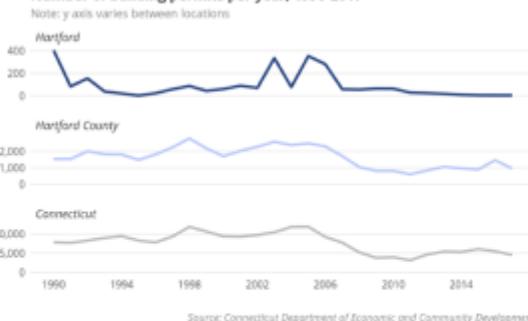
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Number of building permits per year, 1990-2017



## AFFORDABILITY

PEOPLE BURDENED BY COST OF HOUSING

**50%**

Households that are cost-burdened spend more than 30% of their income on housing. Severely cost-burdened spend more than 50% on housing.

2020 Housing Data Profiles

HARTFORD

## POPULAT

TOTAL POPULATION

**123,62**

PEOPLE OF COLOR

**85%**

Connecticut population is increasingly diverse, population is concentrated in municipalities, especially in Connecticut's cities. 85% of residents are BIPOC, 15% are white.

COST OF

### Housing cost burden for renters

Hartford	32%	22%	41%
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COST OF

### Housing cost burden for owners

Hartford	16%	21%	62%
Hartford County	10%	16%	73%
Connecticut	12%	17%	71%



MEDIAN AGE

**30**

POPULATION CHANGE 2040

**+0.3%**

In the next twenty years, population is projected to grow from 126,443 to 126,846.

# R Code for the Plots



```
data_building_permits %>%
  filter(area_name %in% area_name_filter) %>%
  ggplot(aes(x = year, y = nb_building_permits, color = area_name)) +
  geom_line(size = 1.1) +
  scale_x_continuous(name = "", breaks = seq(1990, 2017, 4)) +
  scale_y_continuous(name = "# building permits",
                     labels = label_comma(accuracy = 1),
                     breaks = pretty_breaks(n = 3)) +
  scale_color_manual(name = "",
                     values = psc_colors("blue", "blue3", "grey2")) +
  guides(color = FALSE) +
  facet_wrap(vars(area_name),
             scales = "free_y",
             ncol = 1) +
  expand_limits(y = 0) +
  labs(title = "Number of building permits per year, 1990-2017",
       subtitle = "Note: y axis varies between locations",
       caption = "Source: Connecticut Department of Economic and Community Development") +
  theme_psc() +
  theme(
    panel.grid.major.y = element_line(),
    legend.position = "bottom",
    axis.title.y = element_blank()
)
```

**Alt text: Sample of code used to make plot in housing data report**

# HTML and CSS for the Layout

```
:::{.wrap-columns .psc-no-border}
:::columns-33

#### Units built before 1970

### `r df_key_stats_filter$perc_b1970` 

Older homes are prone to falling into disrepair, and often carry environmental risks such as lead paint. An aging housing stock can be a sign of poor housing quality.

:::
:::columns-67

```{r year_built_dotplot, fig.height = 0.6}
data_acs$year_built %>%
  filter(year_built_grp %in% c("Before 1950", "From 1950 to 1970") &
         area_level == "Town") %>%
  group_by(area_name) %>%
  summarize(perc_built = sum(perc_built)) %>%
  mutate(
    highlight_town = if_else(area_name == params$area_name, "Y", "N"),
    text_label = if_else(area_name == params$area_name, params$area_name, ""))
) %>%
dot_plot_comparing_towns("blue", var = perc_built, type = "percent") +
  scale_x_continuous(labels = percent_format(),
                     limits = c(0, 1))
```

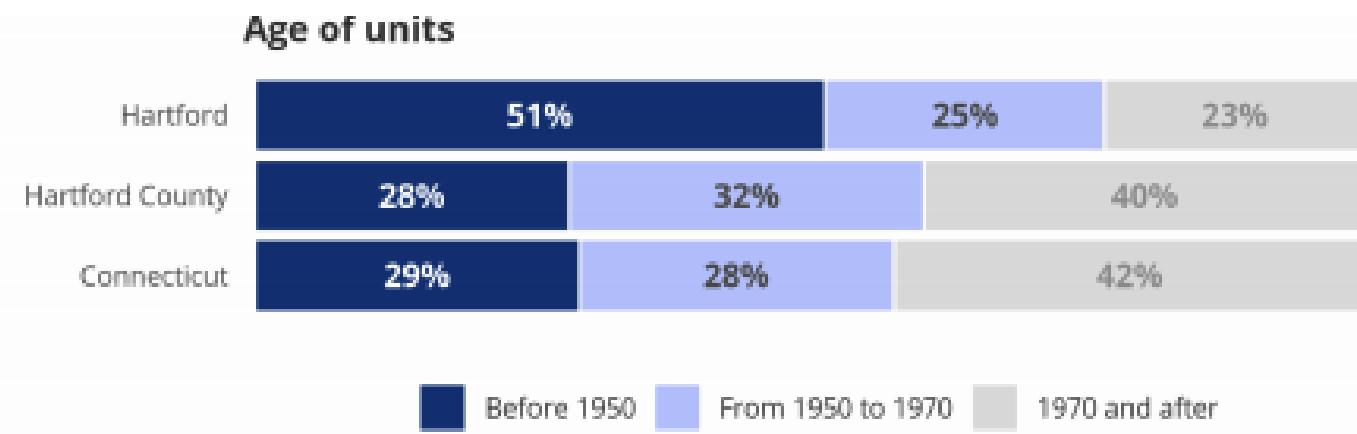
```

```
columns-33 {
  flex: 33%;
  padding-right: 20pt;
}

.columns-67 {
  flex: 67%;
  padding-left: 20pt;
  padding-top: 10pt;
  align-items: center;
}
```

**Alt text: Sample of code to lay out plots in housing data report**

Older homes are prone to falling into disrepair, and often carry environmental risks such as lead paint. An aging housing stock can be a sign of poor housing quality.



# The Result

Alt text: Sample from housing data report with plot next to text

```
:::
```

```
:::columns-67
```{r single_family_dotplot, fig.height=0.8}
types_of_units %>%
  filter(units_structure_grp == "Single-Family") %>%
  dot_plot_comparing_towns("blue", var = perc_estimate, type = "percent")
```
:::
:::
```

```
:::
```

```
:::{.wrap-columns nsc-border-top}
```

```
:::columns-3
```{r units_
df_text_units
filter(area_
name == "C
group_by(u
mutate(perc
```

```

```
:::
```

# Here's the Thing: It's Complicated

Overall, `r types\_of\_units %>% filter(area\_name == "Connecticut" & units\_structure\_grp == "Single-Family") %>% pull(percent)` of Connecticut's occupied housing stock is comprised of single-family housing, while `r types\_of\_units %>% filter(area\_name == "Connecticut" & units\_structure\_grp == "Multifamily") %>% pull(percent)` is multifamily housing (2+ units in structure). Most single-family homes are occupied by homeowners, while most multifamily units are occupied by renters.

In `r params\$area\_name`, `r types\_of\_units\_text %>% filter(units\_structure\_grp == "Single-Family") %>% pull(percent)` of occupied homes are single-family, and `r types\_of\_units\_text %>% filter(units\_structure\_grp == "Multifamily") %>% pull(percent)` are multi-family. Owners live in `r df\_text\_units %>% filter(units\_structure\_grp == "Single-Family" & occupancy\_status == "Owner") %>% pull(perc)` of `r params\$area\_name`'s `r types\_of\_units\_text %>% filter(units\_structure\_grp == "Single-Family") %>% pull(estimate) %>% comma(accuracy = 1)` single-family homes, and renters live in `r df\_text\_units %>% filter(units\_structure\_grp == "Multifamily" & occupancy\_status == "Renter") %>% pull(perc)` of its `r types\_of\_units\_text %>% filter(units\_structure\_grp == "Multifamily") %>% pull(estimate) %>% comma(accuracy = 1)` multifamily homes.

```
:::
```

```
:::columns-67
```

```
```{r units_structure_pie, fig.he
# computation
# visualization
```

```

```
:::
```

**Alt text: Sample of code used to make housing data report**

Alt text: Kids in class huddled around a computer



# I Tried Teaching Others

A close-up photograph of a woman with dark, wavy hair. She is looking upwards and to the right with a thoughtful or confused expression. Her mouth is slightly open, showing her teeth. She is wearing a white t-shirt. In the bottom right corner, a hand with red-painted fingernails is visible, pointing towards the text.

**It Didn't  
Go Well**

**Alt text: Person with a confused look on their face**

Alt text: Beautiful lake with mountains surrounding it



# Can We Make Something Beautiful ...

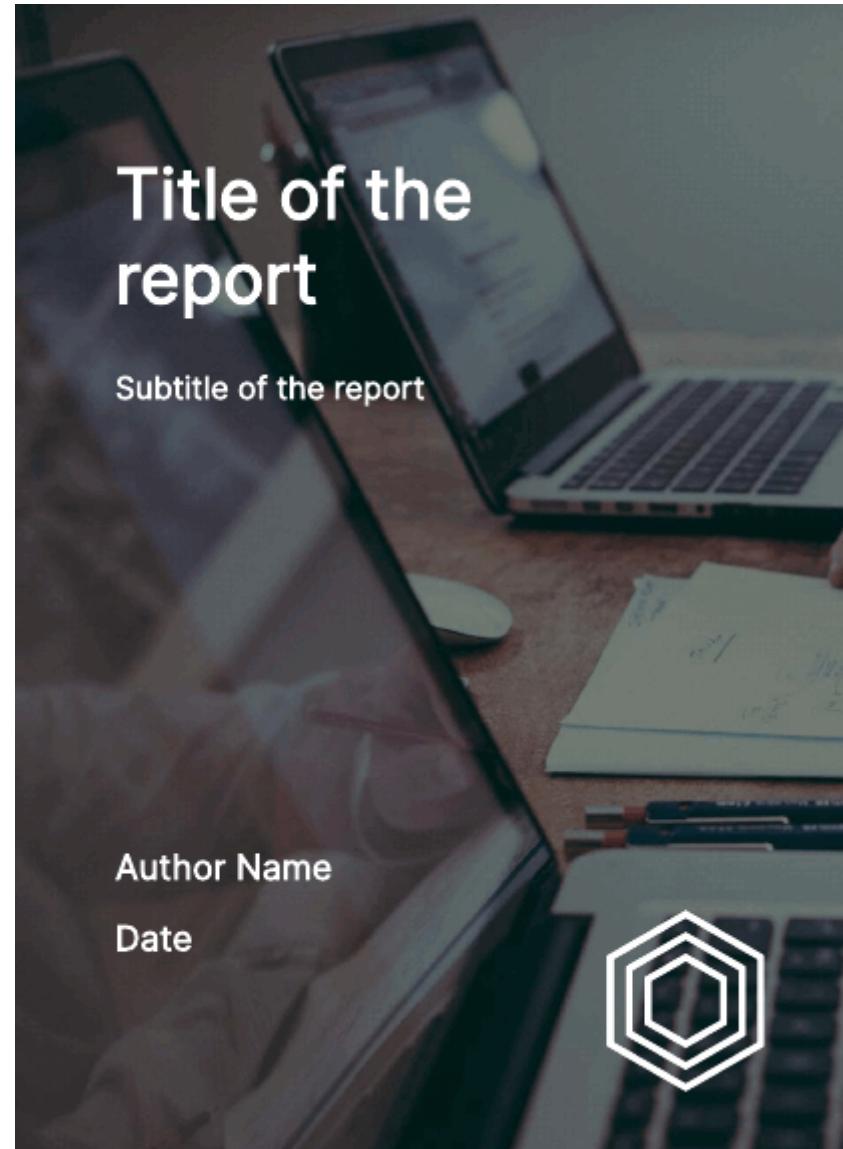
Alt text: Person standing on rock with arms outstretched



... and Easy to Use?

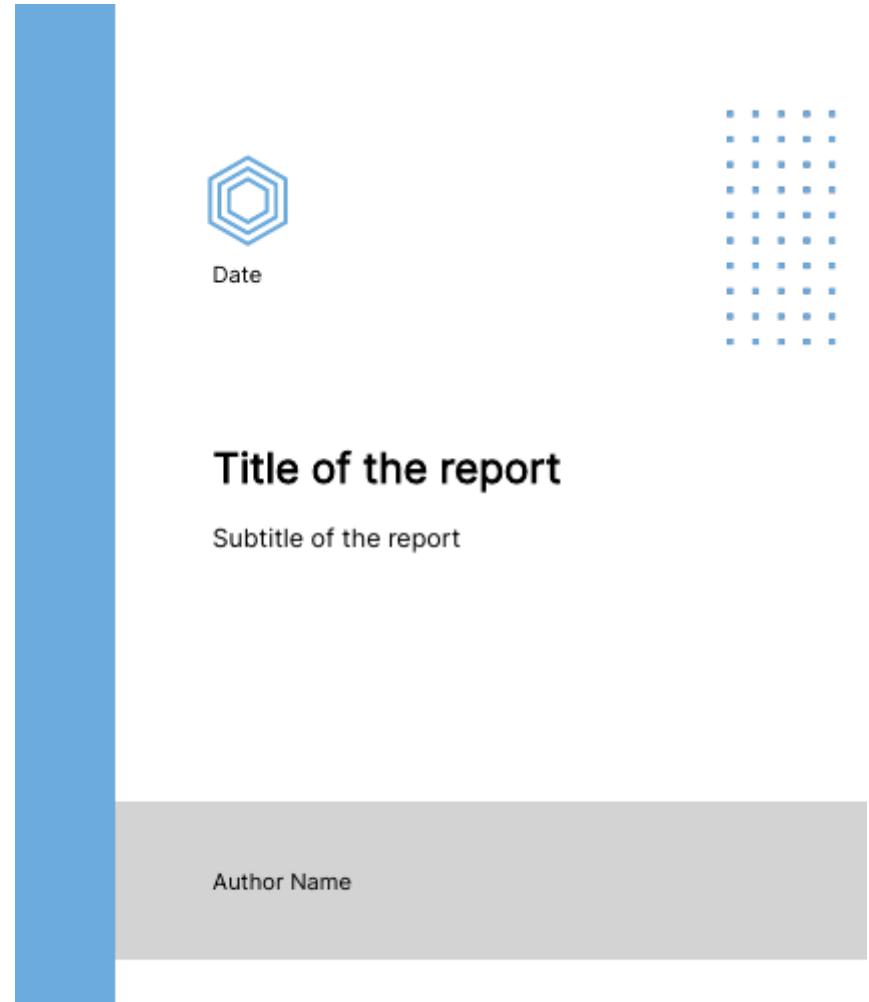
# Enter pagedreport

# Windmill



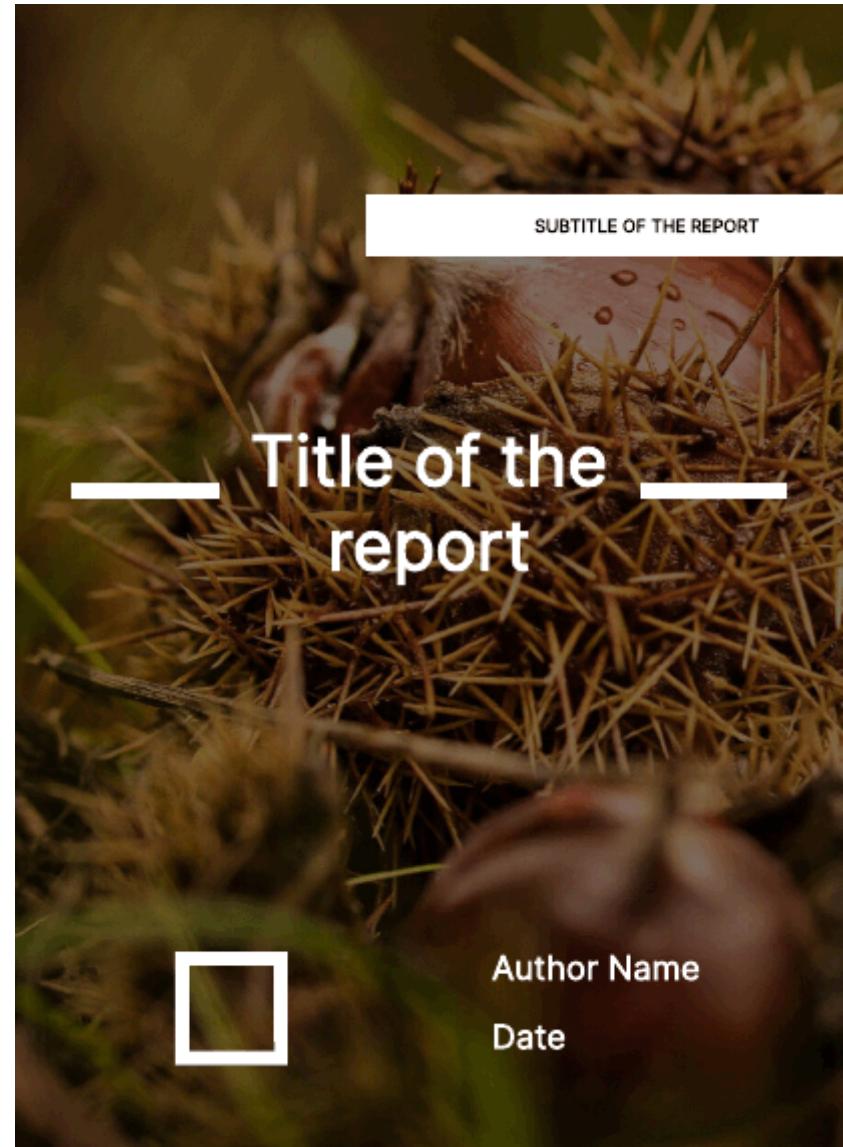
Alt text: Animation of pages from pagedreport template

# Grid



**Alt text: Animation of pages from pagedreport template**

# Hazelnuts



Alt text: Animation of pages from pagedreport template

A photograph of a deep, dark blue hole, likely a sea cave or a large sinkhole, surrounded by rugged, light-colored rock formations. The water is still, reflecting the light from above.

Alt text: Deep hole with water in it

# It's YAML All the Way Down

```
---
```

```
title: "Title of the report"
subtitle: "Subtitle of the report"
author: "Author Name"
date: "Date"
output:
  pagedreport::paged_windmill:
    logo: "https://mk0rfortherest0o08q.kinstacdn.com/wp-content/uploads/2020/08/rru-logo-blu
      img_to_dark: FALSE
      logo_to_white: TRUE
knit: pagedown::chrome_print
main-color: "#6cabdd"
---
```

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summary(cars)
```

# Please, Don't Make Ugly PDFs

## Including Plots

You can also embed plots, for example:



Got HTML + CSS Skills  
and Want 100% Control?  
Try pagedown

Subtitle of the report

Want A Simple Way  
to Make Beautiful  
PDF Reports?  
Try pagedreport

Alt text: Animation of pages from pagedreport template

pagedown: [pagedown.rbind.io](https://pagedown.rbind.io)

pagedreport: [pagedreport.rfortherestofus.com](https://pagedreport.rfortherestofus.com)

**Learn More**

Alt text: Headshot of David Keyes



Questions?

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