Don’t start from scratch: Interacting with your graphics

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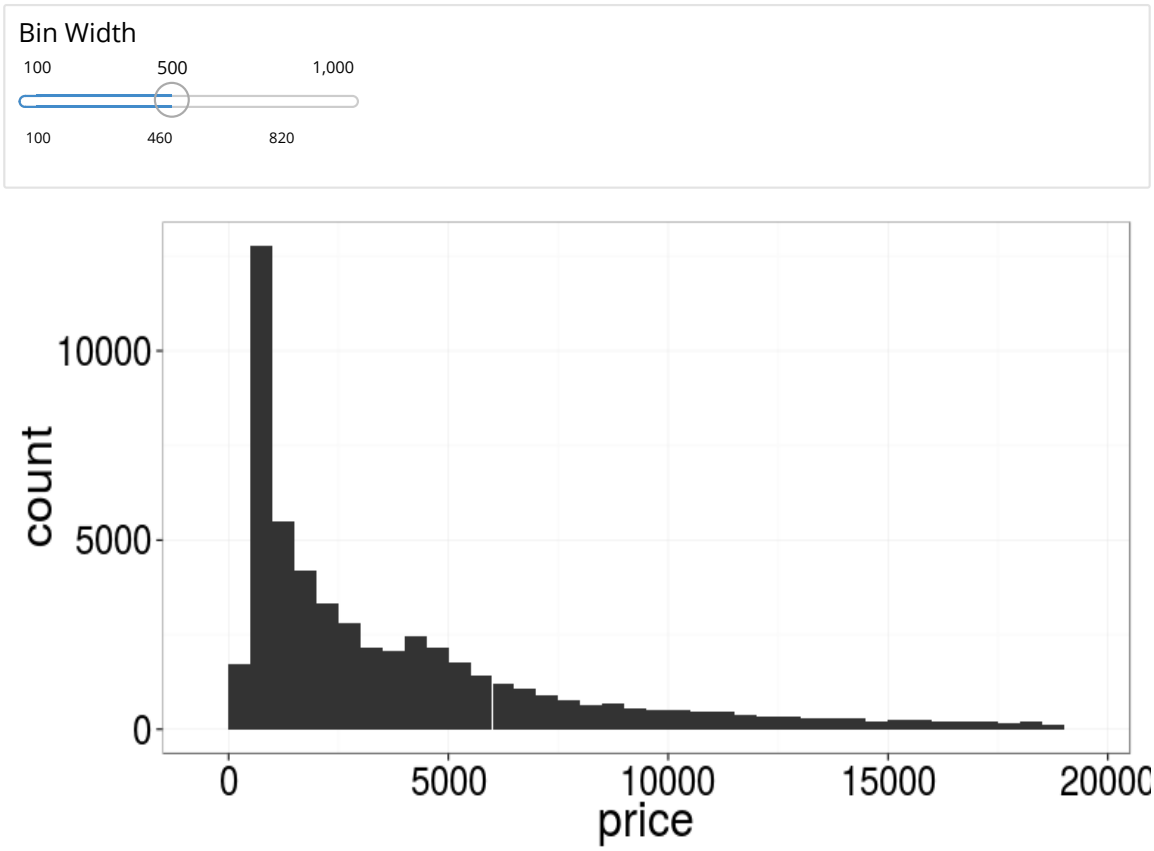
Why interactive graphics?

- Want to tweak just a small range of parameters
- Repetitive to run the same code over and over again
- Sometimes the best way to see or explore your data
- Now really easy in RStudio!

A quick example of an interactive graph



Two easiest interactive graphics packages

- `manipulate`: quick sliders & buttons right in RStudio
- `shiny`: sliders, buttons & more for documents, presentations, & web apps

Setting up for `manipulate`

It comes with RStudio! So all we need to do is:

```
library(manipulate)
```

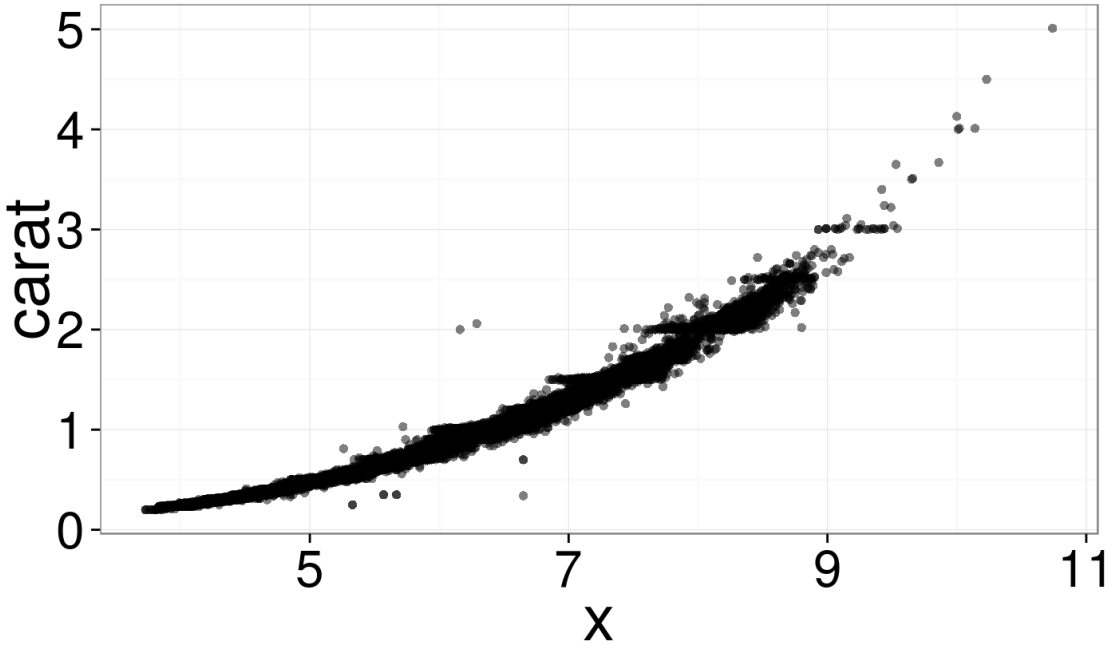
Also, to view these examples:

```
library(ggplot2)

## Filter diamonds to reasonable subset

diamonds2 = subset(diamonds, x > 0)
```

A static graph

`alpha` parameter controls transparency

```
ggplot(diamonds2, aes(x = x, y = carat)) +
  geom_point(alpha = 0.5)
```



Interactive version

Click on the "gear" icon in RStudio.

Note the braces around the original command.

```
manipulate({
  ggplot(diamonds2, aes(x = x, y = carat)) +
  geom_point(alpha = myalpha)
  },
  myalpha = slider(min = 0, max = 0.5, initial = 0.25)
)
```

Widget types

- `slider(min, max, initial)`: continuous change
- `picker(..., initial)`: chose from several options,
- `button`: one-time change (like regenerating a simulation); a little tricky to set up

Choosing a subset with the picker

```
manipulate({
  subdiamonds = subset(diamonds2, cut == mycut)

  ggplot(subdiamonds, aes(x = x, y = carat)) +
  geom_point(alpha = myalpha)
  },
  myalpha = slider(min = 0, max = 0.5, initial = 0.25),
  mycut = picker("Fair", "Good", "Very Good", "Premium", "Idea
)
```

Zoom & tweak text size

```
## Zoom in on a particular region of plot
manipulate({
  ggplot(diamonds2, aes(x = x, y = carat)) +
    geom_point(alpha = myalpha) +
    coord_cartesian(xlim = c(xmin, xmax)) +
    theme_bw(base_size = textsize)
},
  myalpha = slider(0, 1, initial = 0.5),
  xmin = slider(0, 11, initial = 0),
  xmax = slider(0, 11, initial = 11),
  textsize = slider(10, 100, initial = 20)
)
```

Fitting a polynomial

```
manipulate( {
  ggplot(diamonds2, aes(x = x, y = carat)) +
    geom_point() +
    geom_smooth(method = "lm", formula = y ~ poly(x, deg)) +
    ggtitle(paste("Fit with polynomial of degree", deg))
},
  deg = slider(1, 10))
```

Histogram width

```
manipulate({
ggplot(data = diamonds2, aes(x = price)) +
  geom_histogram(binwidth = mybin)
},
  mybin = slider(100, 1000, initial = 500))
```

`shiny`

- `manipulate` is easy, but what if you want to have several plots?
- Or, embed in presentation like this one?
- `shiny` is way more powerful (and a bit more complex)
- Easiest to use with R Markdown

Set up `shiny`

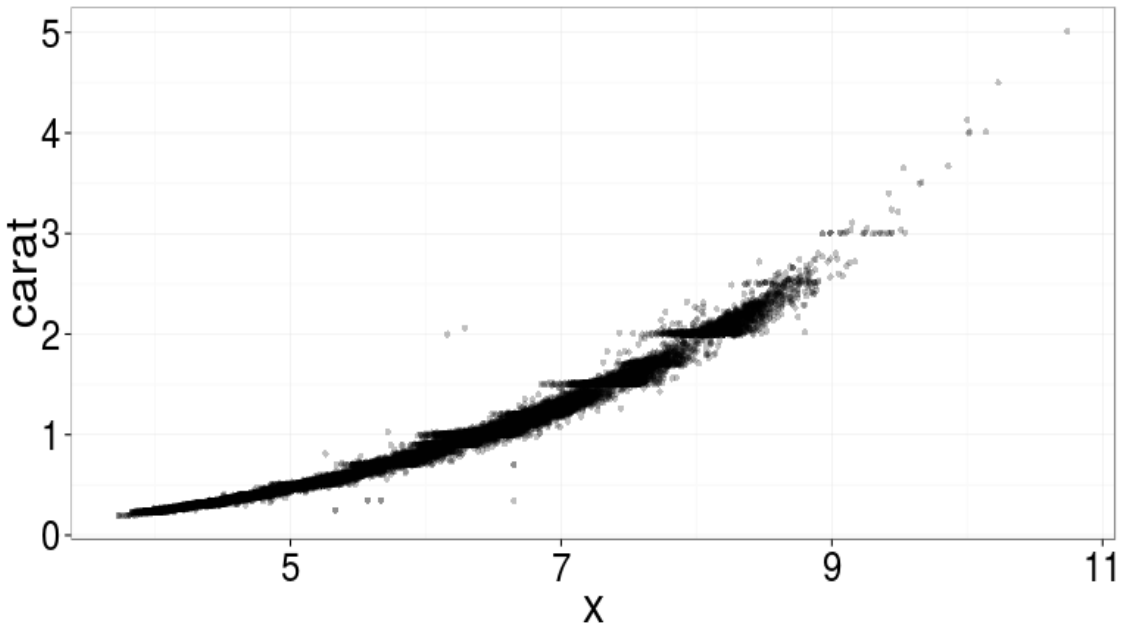
In RStudio, open **File > New > R Markdown** and choose **Shiny** (either an HTML document or presentation).

RStudio will prompt you to install or update the `shiny` package if you need to.

Setting `alpha` with `shiny`

```
renderPlot({
  ggplot(diamonds2, aes(x = x, y = carat)) +
  geom_point(alpha = input$myalpha)
  })

inputPanel(
  sliderInput("myalpha", label = "Alpha value:",
              min = 0, max = 0.5, value = 0.25)
)
```

Alpha result



Alpha value:

0 0.25 0.5

0 0.2 0.4

16/29

Two functions:

- `renderPlot`: all your plot-generating code. For a variable you want to control, refere to that variable as `input$`*`myvariable`*.
- `inputPanel`: Specifying the variables you're going to change using sliders or menus.

NOTE: You cannot repeat variable names in the same document.

`inputPanel`

Includes whatever input devices you want.

`sliderInput(inputID, label, min, max, value)`: Again, this is a slider.

- `inputID` is the variable name you refer to in `renderPlot`
- `label`: What the user sees
- `min`, `max` are the minimum and maximum of the slider
- `value` is the initial value of the slider

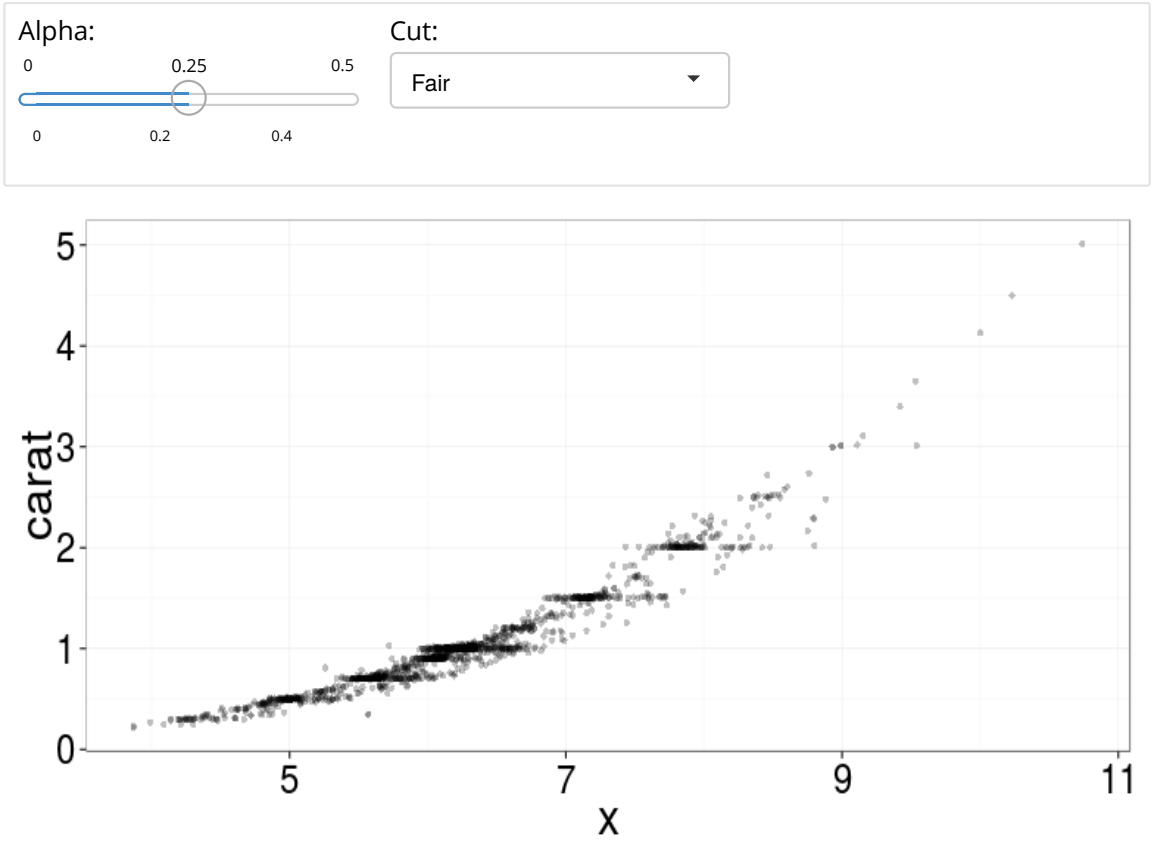
`selectInput`

- `inputID` is the variable name you refer to in `renderPlot`
- `label`: What the user sees
- `choices`: a vector of choices
- `selected`: the default choice

Choosing a subset with the selectInput (code)

```
inputPanel(
  sliderInput("myalpha2", "Alpha:",
              min = 0, max = 0.5, value = 0.25),
  selectInput("mycut2", "Cut:",
              choices = c("Fair", "Good", "Very Good", "Premiu
  )

renderPlot({
  subdiamonds = subset(diamonds2, cut == input$mycut2)

  ggplot(subdiamonds, aes(x = x, y = carat)) +
  geom_point(alpha = input$myalpha2)
  }
)
```

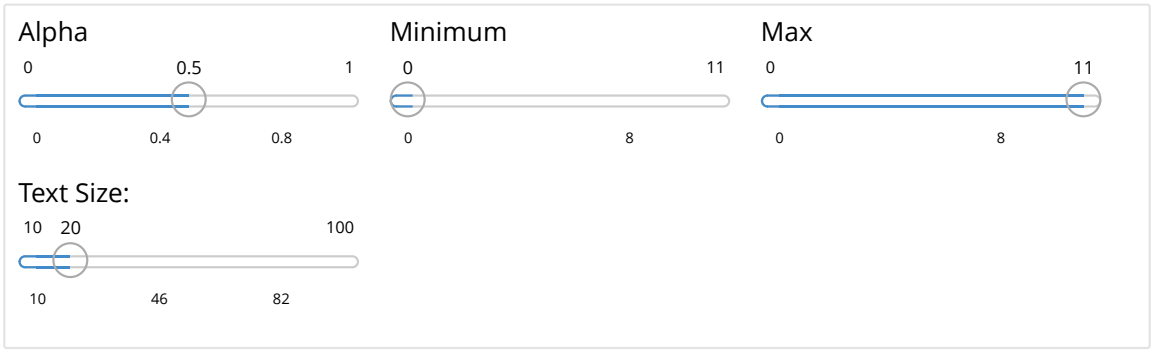
Choosing a subset with the picker (output)

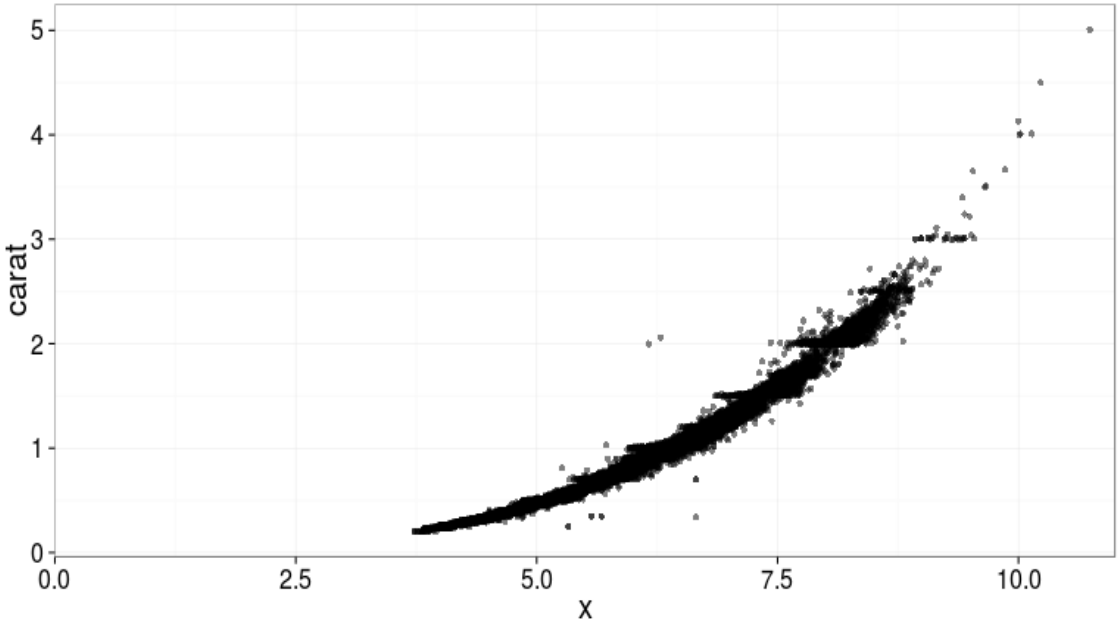


Zoom & tweak text size (code)

```
inputPanel(
  sliderInput("myalpha3", "Alpha", 0, 1, value = 0.5),
  sliderInput("xmin3", "Minimum", 0, 11, value = 0),
  sliderInput("xmax3", "Max", 0, 11, value = 11),
  sliderInput("textsize3", "Text Size:", 10, 100, value = 20)
  )

## Zoom in on a particular region of plot
renderPlot({
  ggplot(diamonds2, aes(x = x, y = carat)) +
    geom_point(alpha = input$myalpha3) +
    coord_cartesian(xlim = c(input$xmin3, input$xmax3)) +
    theme_bw(base_size = input$textsize3)
})
```

Zoom & tweak text size (output)

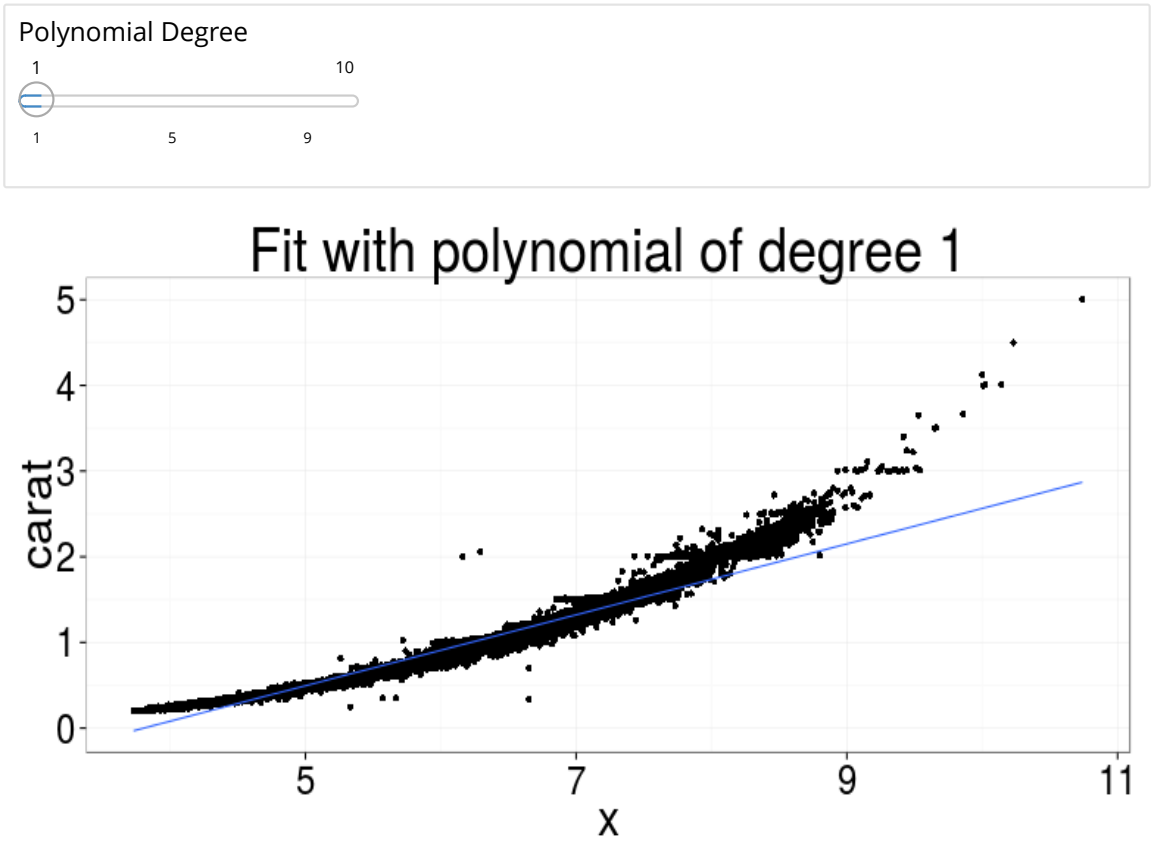




Fitting a polynomial (code)

```
inputPanel(
  sliderInput("deg", "Polynomial Degree", 1, 10, value = 1)
  )

renderPlot( {
  ggplot(diamonds2, aes(x = x, y = carat)) +
    geom_point() +
    geom_smooth(method = "lm", formula = y ~ poly(x, input$deg
    ggtitle(paste("Fit with polynomial of degree", input$deg))
```

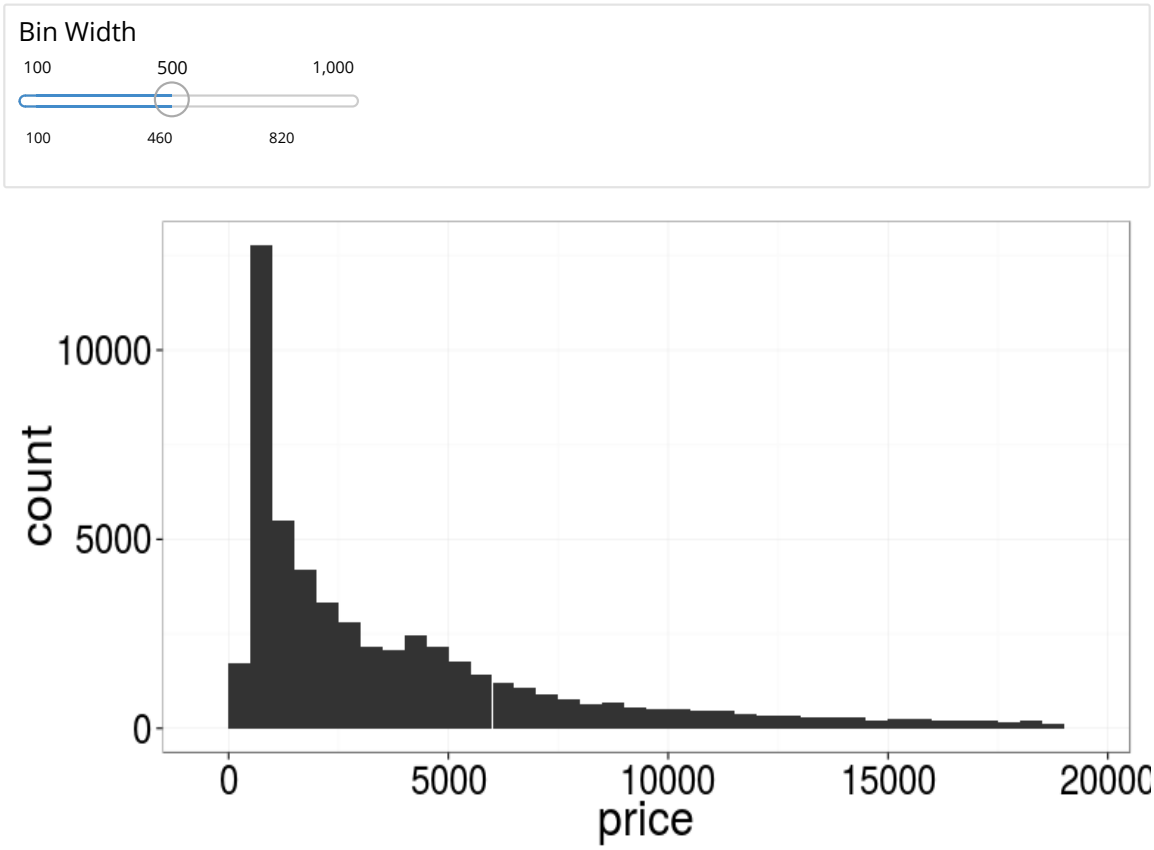
Fitting a polynomial (output)



Histogram width (code)

```
inputPanel(
    sliderInput("mybin", "Bin Width", 100, 1000, value = 500)
)

renderPlot({
ggplot(data = diamonds2, aes(x = price)) +
  geom_histogram(binwidth = input$mybin)
})
```

Histogram width (output)



`shiny` does a lot more

- Widgets for inputting data
- Custom themes
- Pretty elaborate fancyness

Table output

Columns in diamonds to show:
carat ☑
x ☑
price ☑

Show 10 entries

Search:

carat	x	price
0.23	3.95	326
0.21	3.89	326
0.23	4.05	327
0.29	4.2	334
0.31	4.34	335
carat	x	price

Showing 1 to 5 of 53,932 entries

Previous 1 2 3 4 5 … 10787 Next

Resources

- Interactive Plotting with `manipulate` (https://support.rstudio.com/hc/en-us/articles/200551906-Interactive-Plotting-with-Manipulate)
- R Studio guide to Shiny and R Markdown (http://rmarkdown.rstudio.com/authoring_shiny.html)
- Official shiny documentation (http://shiny.rstudio.com/tutorial/)—advanced users only!