pandas & ggplot

quick analysis with python and friends

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GoDataDriven
PROUDLY PART OF THE XEBIA GROUP

Who is this guy?

- Data Scientist at GoDataDriven
- Netherlands/USA
- Former Calculus/Statistics Lecturer

- **STACK:**
  - R: ggplot, reshape
  - Python: np, pandas, scikit-learn
    flask, django
  - Javascript: d3, angularjs
  - Hadoop: hive, impala, mahout
- **SIDESTUFF**
  - scala, spark, blender, algorithms & math

How to start.

Make sure you have ipython notebook running.
http://continuum.io/downloads

Also install R/Rstudio, for extra plotting.
http://www.rstudio.com/

Also go to my blog for the .csv files.
http://koaning.com

What is this talk about?

- learning the basics of pandas
- learning the basics of visualisation with ggplot
- combining the two

Part of the talk will be slides, the other part will be done via an iPython-notebook.

Analyzing data.

Things learned in the real world.

- data is domain specific
- I like to see what steps my colleague took
- I need things quick and flexible
- lots of steps are similar
- I like to apply the DRY principle
- I prefer typing to mouseclicking

Analyzing data.

Things learned in the real world, summarised:

Analyzing data.

Other people would agree;

Switching over to python/R

Feels more like this:

Programming Analyst

Why python:

- flexible language
- large community
- performance
- tends to written quickly

Installing Pandas

From command line:

```
> pip install pandas
```

From python (notebook):

```
import pip

def install(package):
   pip.main(['install', package])

install('pandas')
```

Panda Theory

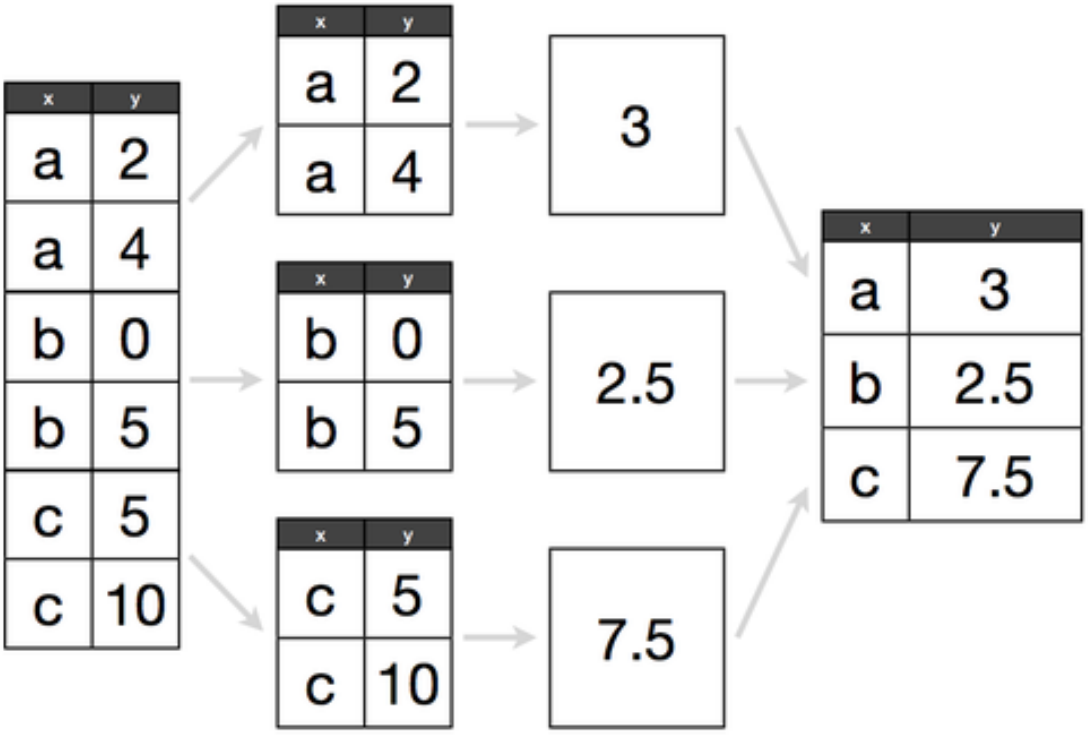
DataFrames at the core. **pa**nel **da**ta **st**ructures

Two-dimensional size-mutable, potentially heterogeneous tabular data structure with labeled axes (rows and columns). Arithmetic operations align on both row and column labels. Can be thought of as a dict-like container for Series objects. The primary pandas data structure

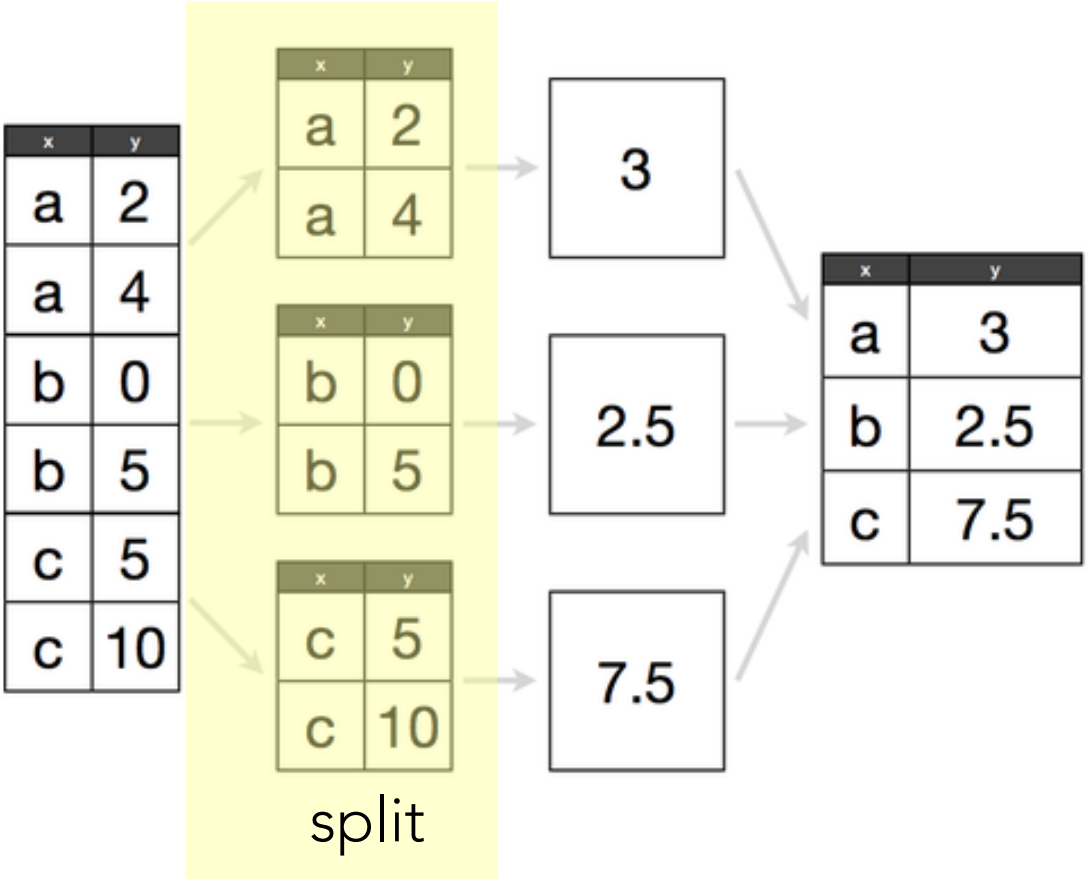
Enough talk. Code!

Start up the notebook.

Apply Split Combine



Apply Split Combine



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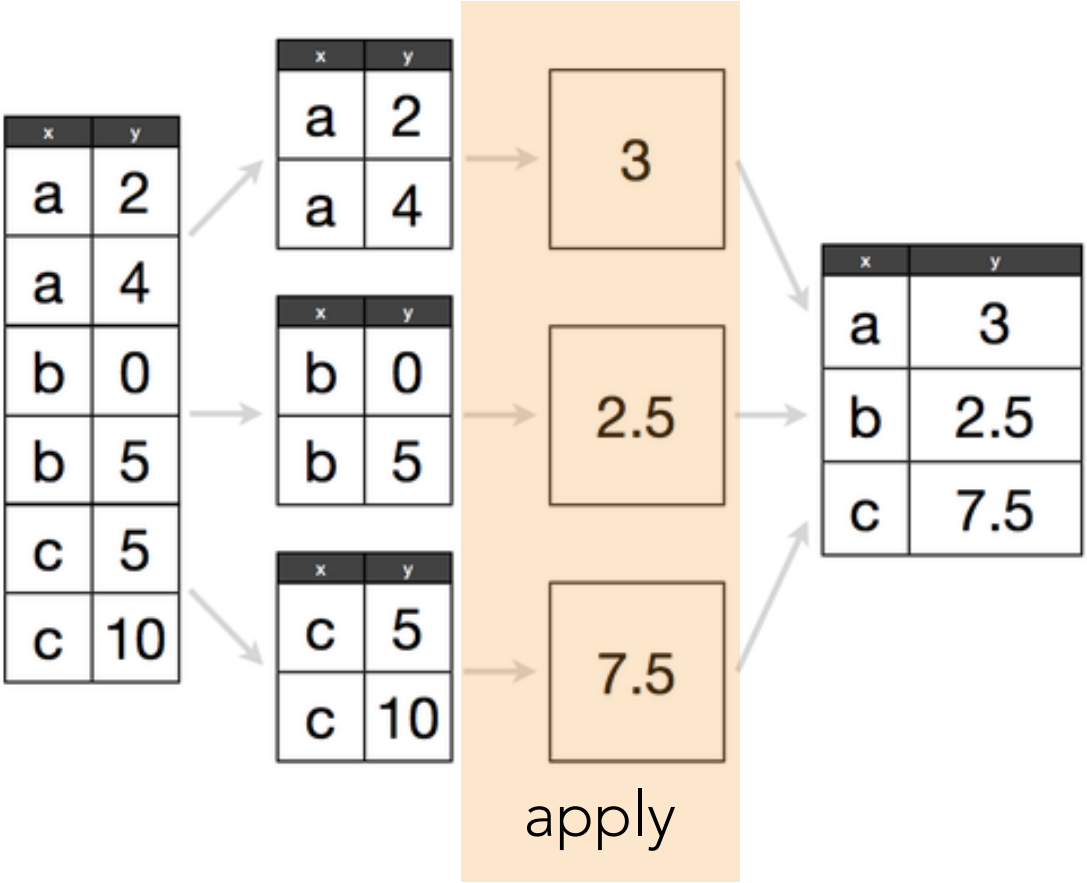

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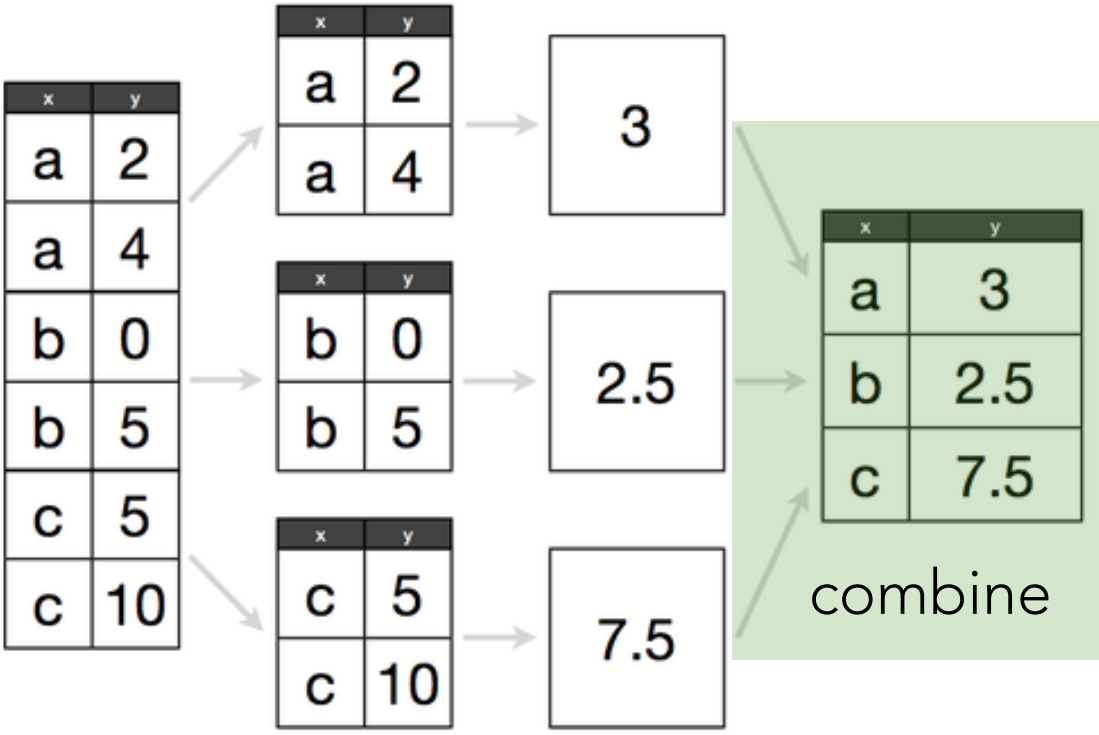


Enough talk. Code!

Start up the notebook.

So why not python?

Why python:

- flexible language
- large community
- performance
- tends to written quickly

Why not python:

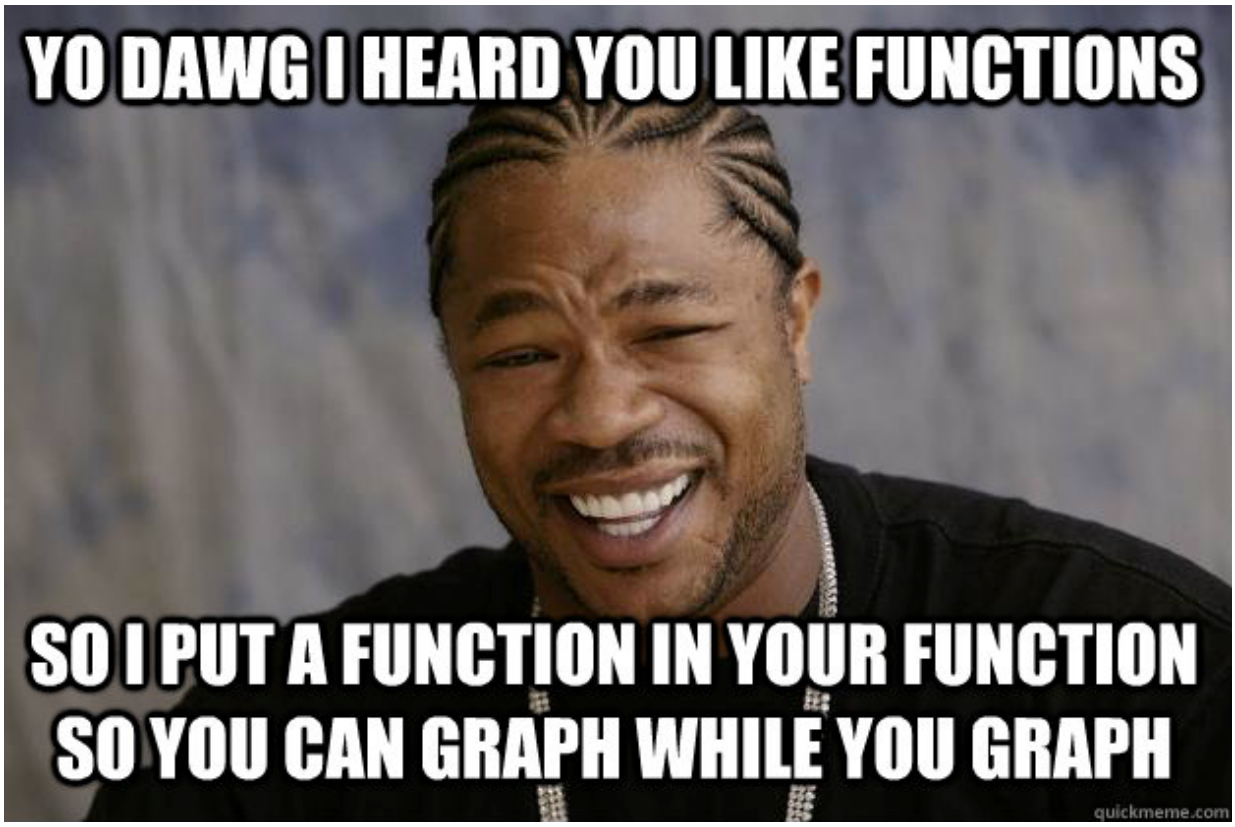
- ggplot2

Matplotlib

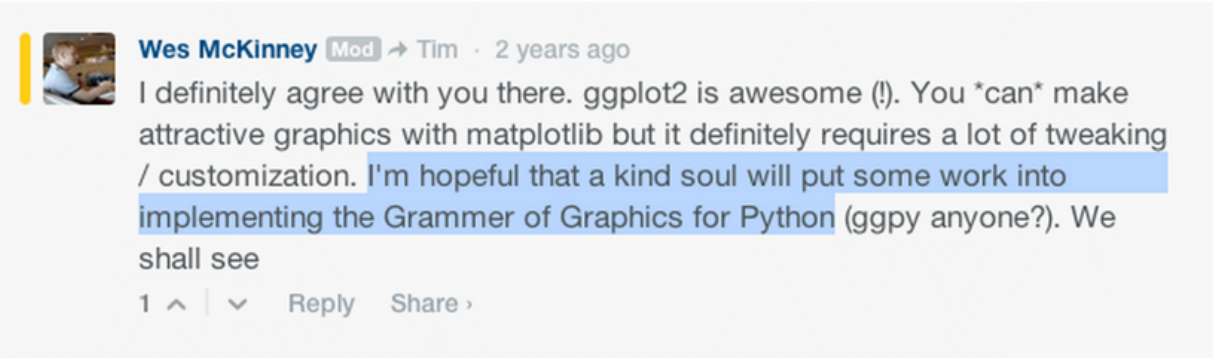
This is the code needed to plot a linechart.

```
#!/usr/bin/env python
from pylab import *
#from matplotlib.pyplot import *
#from numpy import arange

if 1:
    figure(figsize=(7, 4))
    ax = subplot(121)
    ax.set_aspect(1)
    plot(arange(10))
    xlabel('this is a xlabel\n(with newlines!)')
    ylabel('this is vertical\ntest', multialignment='center')
    #ylabel('this is another!')
    text(2, 7,'this is\nyet another test',
         rotation=45,
         horizontalalignment = 'center',
         verticalalignment   = 'top',
         multialignment      = 'center')

    grid(True)

    subplot(122)

    text(0.29, 0.7, "Mat\nTTp\n123", size=18,
         va="baseline", ha="right", multialignment="left",
         bbox=dict(fc="none"))

    text(0.34, 0.7, "Mag\nTTT\n123", size=18,
         va="baseline", ha="left", multialignment="left",
         bbox=dict(fc="none"))

    text(0.95, 0.7, "Mag\nTTT$^{A^A}$\n123", size=18,
         va="baseline", ha="right", multialignment="left",
         bbox=dict(fc="none"))

    xticks([0.2, 0.4, 0.6, 0.8, 1.],
           ["Jan\n2009","Feb\n2009","Mar\n2009", "Apr\n2009", "May\n2009"])

    axhline(0.7)
    title("test line spacing for multiline text")

subplots_adjust(bottom=0.25, top=0.8)
draw()
show()
```

Matplotlib


YO DAWG I HEARD YOU LIKE FUNCTIONS
SO I PUT A FUNCTION IN YOUR FUNCTION
SO YOU CAN GRAPH WHILE YOU GRAPH
quickmeme.com

Creators Agree



Wes McKinney Mod → Tim · 2 years ago

I definitely agree with you there. ggplot2 is awesome (!). You *can* make attractive graphics with matplotlib but it definitely requires a lot of tweaking / customization. I'm hopeful that a kind soul will put some work into implementing the Grammer of Graphics for Python (ggpy anyone?). We shall see

1 Reply Share ›

> matplotlib is powerful...but its plotting commands remain rather verbose, and its no-frills, default output looks much more like Excel circa 1993 than ggplot circa 2013. ~ Jake Vanderplas, Matplotlib & the Future of Visualization in Python (@jakevdp)

ggplot2, many better, much cool

Simple example, what should this code do?

```
p = ggplot()
p + geom_point(
   data=ChickWeight,
   aes(x=Time, y=weight)
)
```

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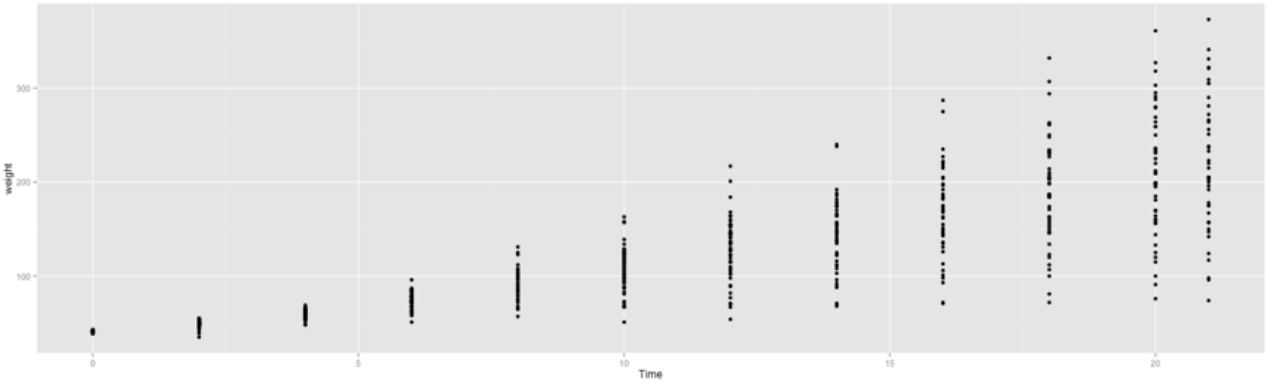

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Simple example, what should this code do?

```
p = ggplot()
p + geom_point(
   data=ChickWeight,
   aes(x=Time, y=weight), size = 5
)
```

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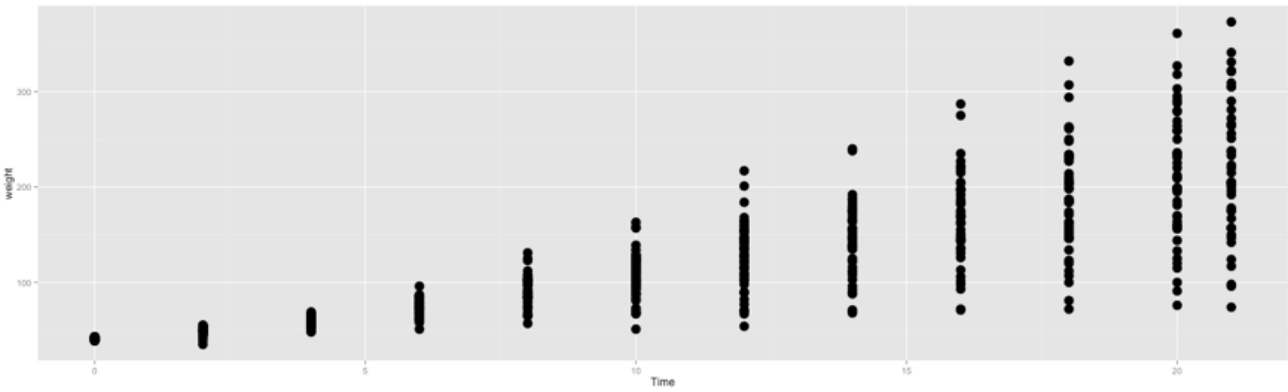
Simple example, what should this code do?

```
p = ggplot()
p + geom_point(
   data=ChickWeight,
   aes(x=Time, y=weight), size = 5
)
```



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)
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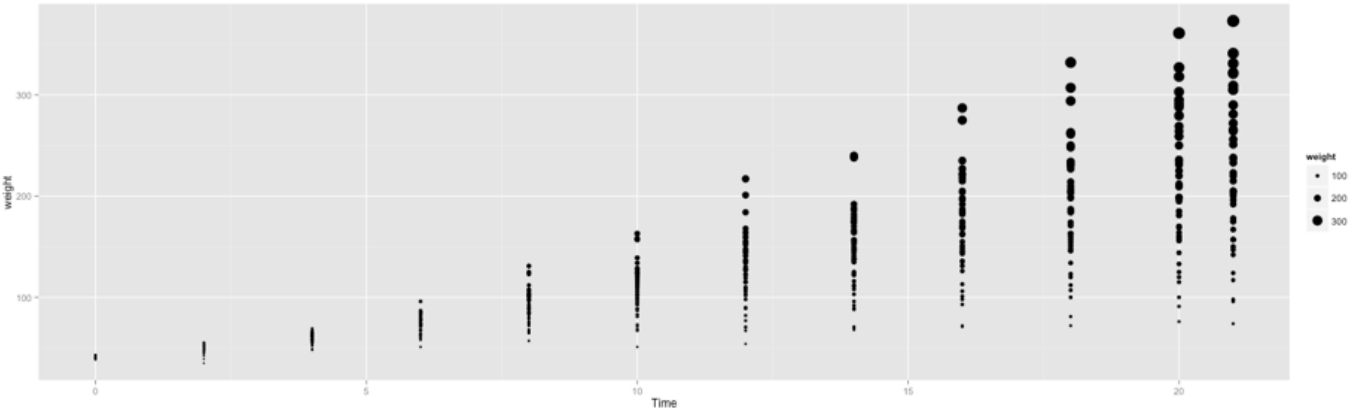

ggplot2, many better, much cool

Simple example, what should this code do?

```
p = ggplot()
p + geom_point(
   data=ChickWeight,
   aes(x=Time, y=weight, color = Chick)
)
```

ggplot2, many better, much cool

Simple example, what should this code do?

```
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   data=ChickWeight,
   aes(x=Time, y=weight, color = Chick)
)
```
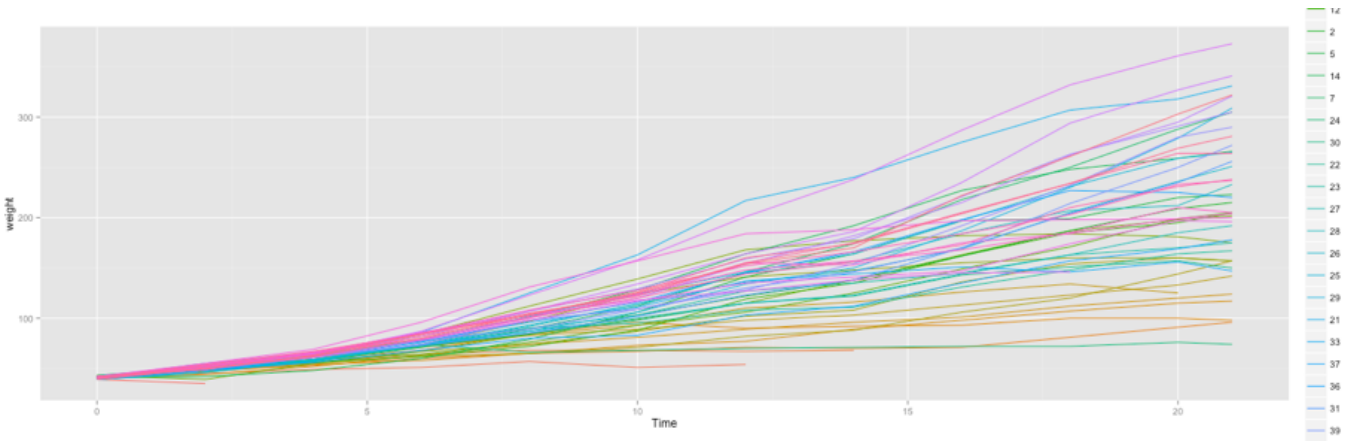
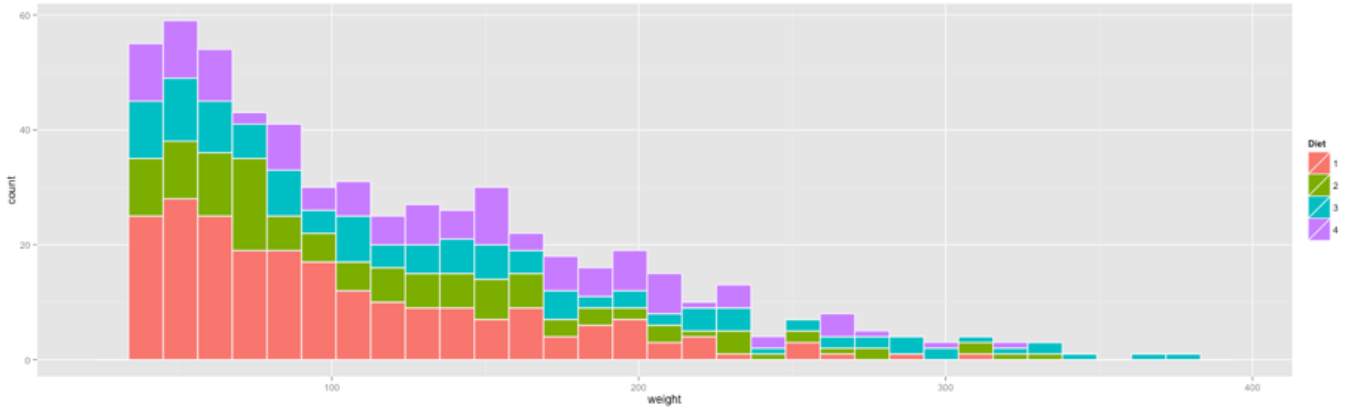



ggplot2, many better, much cool

Simple example, what should this code do?

```
p + geom_histogram(
   data=ChickWeight,
   aes(x=weight, fill=Diet)
)
```

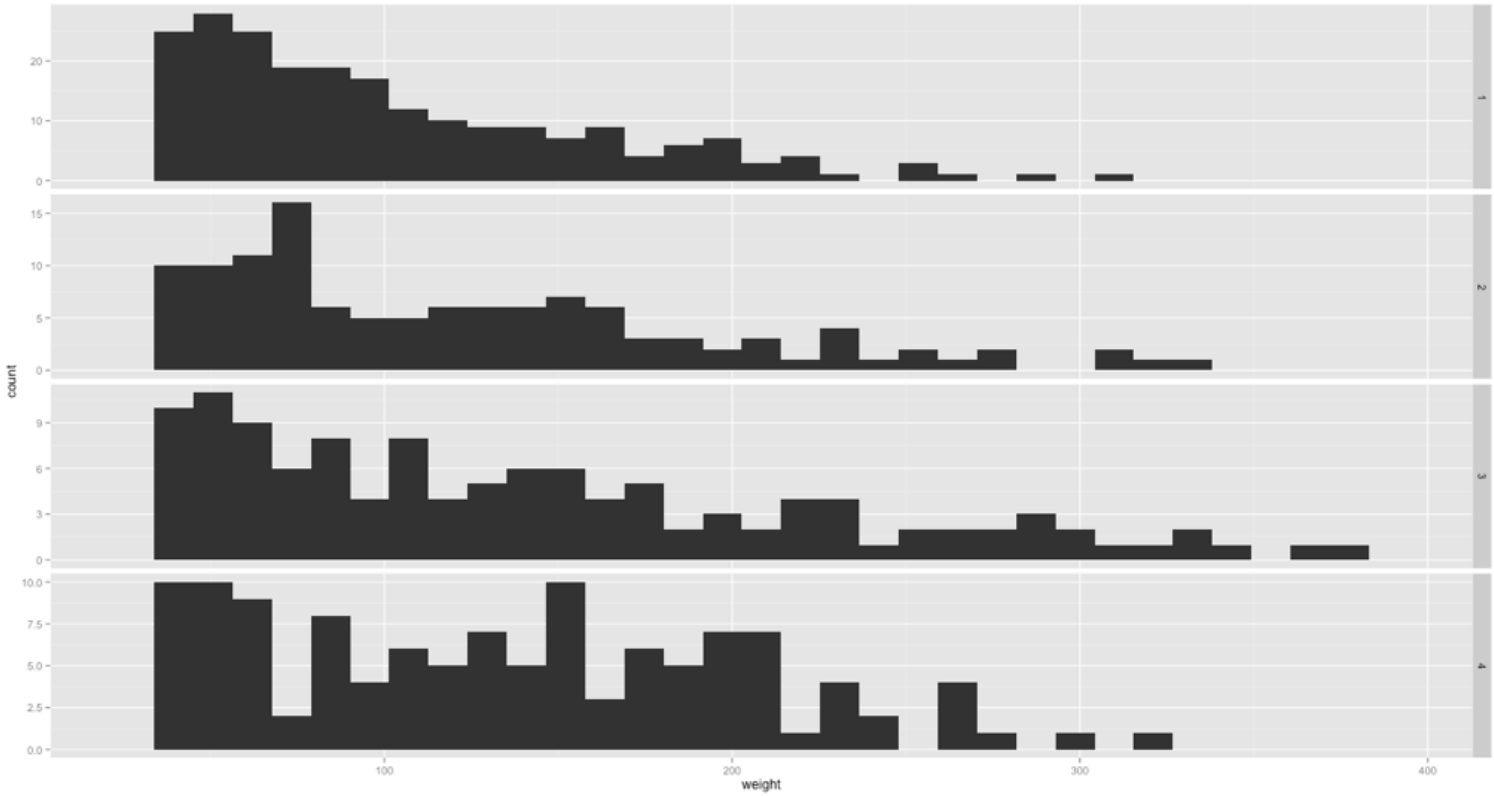


ggplot2, many better, much cool

Simple example, what should this code do?

```
p = p + geom_histogram(
   data=ChickWeight,
   aes(x=weight)
)
p = p + facet_grid( Diet ~ . , scales="free")
```

ggplot2, many better, much cool

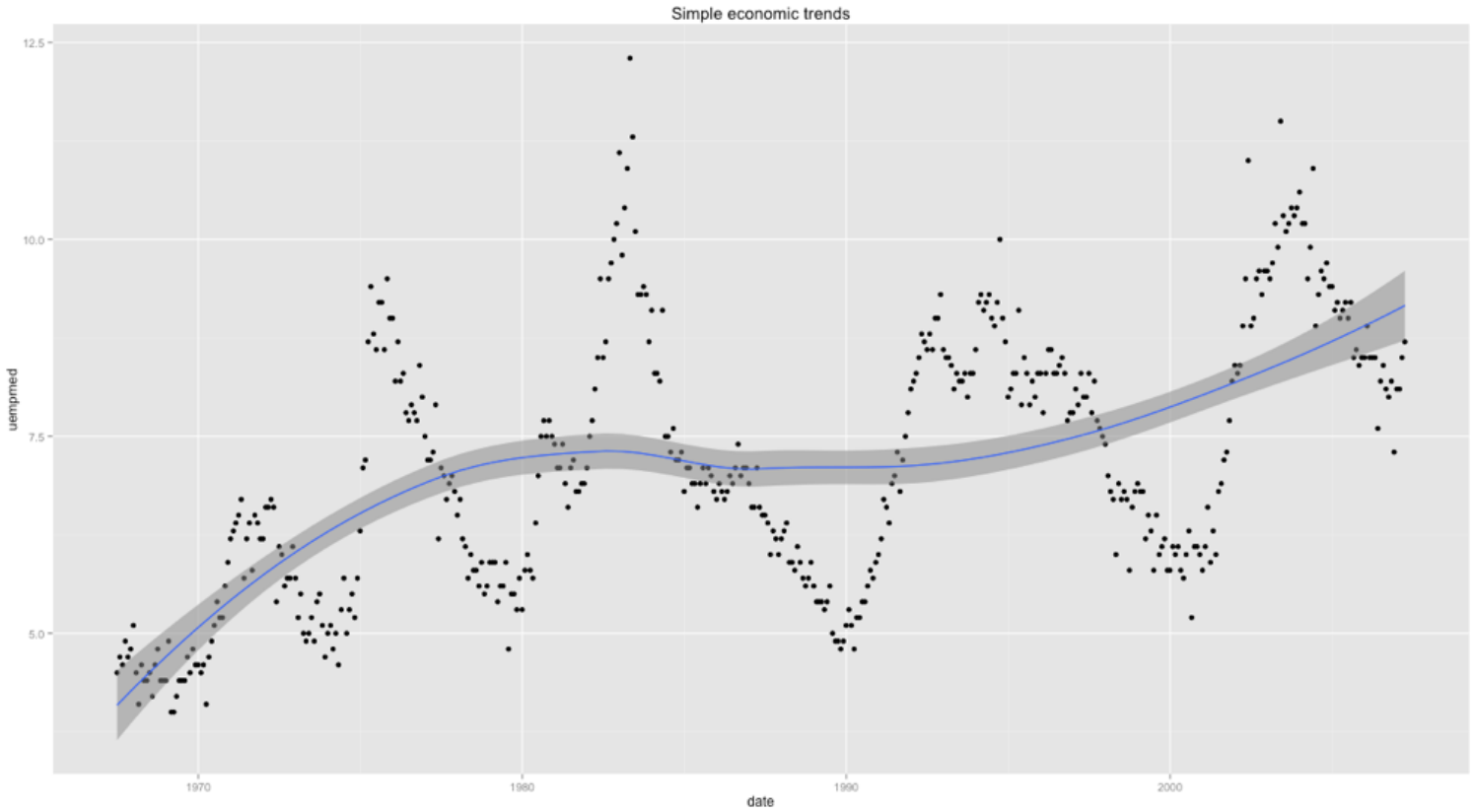


ggplot2, many better, much cool

Moar sugar!

```
p = p + geom_point(
  data=economics,
  aes(date, uempmed)
)
p = p + geom_smooth(
  data=economics,
  aes(date, uempmed)
)
p + ggtitle('Simple economic trends')
```

ggplot2, many better, much cool



Pipe Pandas to R

When R is installed, install python module

```
> pip install rpy2
```

When R is installed make sure ipython knows it

```
%load_ext rpy2.ipython
```

You can then push dataframes to R

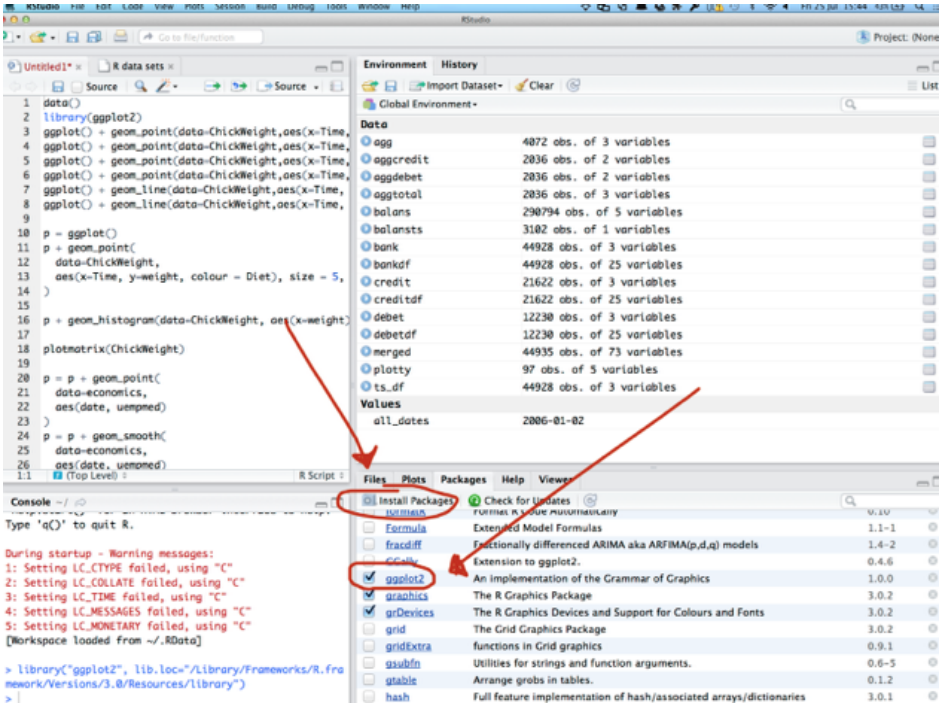
```
%Rpush df
```

And run Rcode when you start a block with

```
%%R -w 1200 -o df
```

Install ggplot2 in R

When R is installed, open R studio, install ggplot2.



Final Challenge

Go to my blog and download

```
whatweare.csv
```

Can you figure out what this dataset describes?

Moar Python Packages!

Machine Learning:

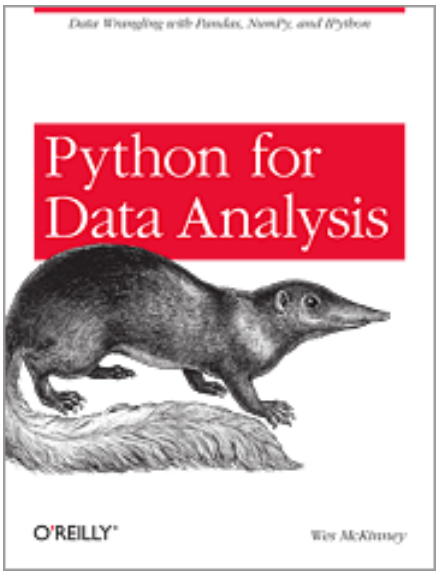
- Scikit-Learn
- PyBrain
- PyMC

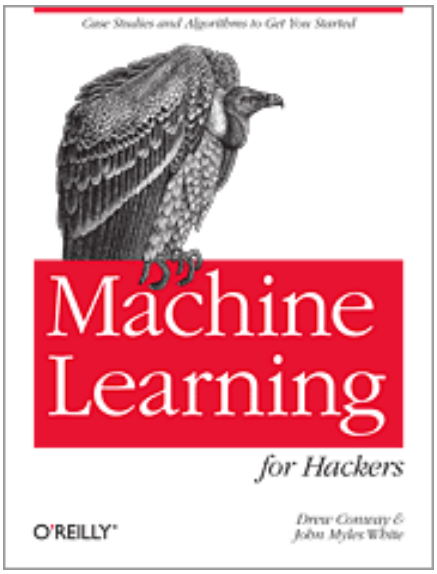
Visualisation:

- ggplot
- matplotlib
- bokeh
- vincent
- igraph

d3?

Proper Books.





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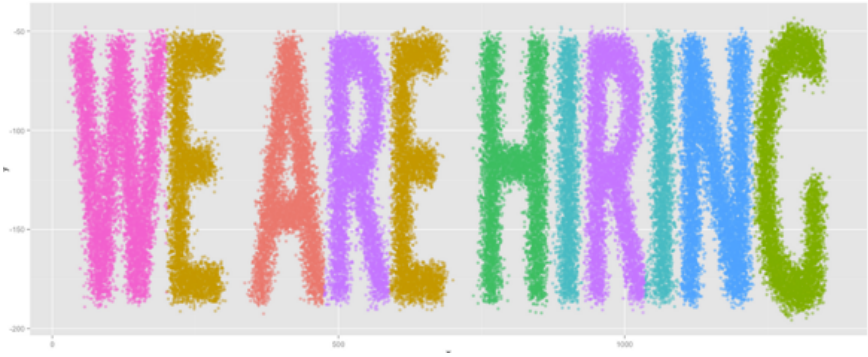

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