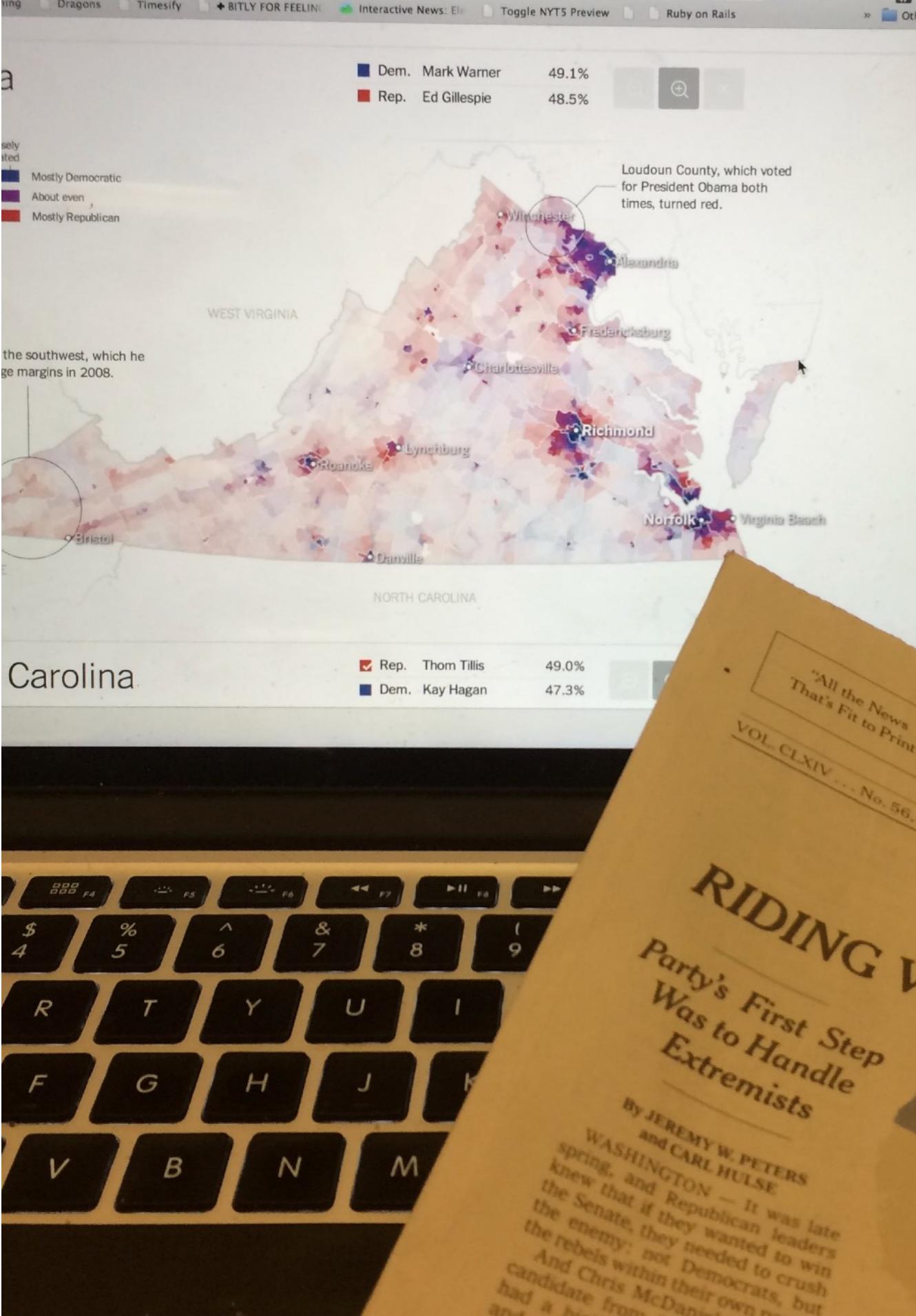
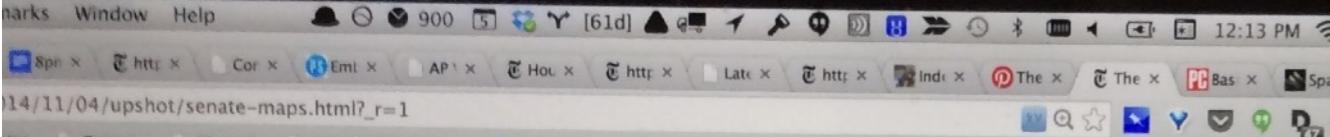


# SOFTWARE DEVELOPER

---

*Jacob Harris*



# SOFTWARE DEVELOPER?

- I write algorithms (or “code”) that tells computers how to do things they need to do
- Many names: programmer, software developer, software engineer, creative technologist, software architect, information specialist, etc.
- What things? I mostly build websites, but software is **everywhere** and someone has written that code.

# HOW YOU LEARN TO PROGRAM

.....



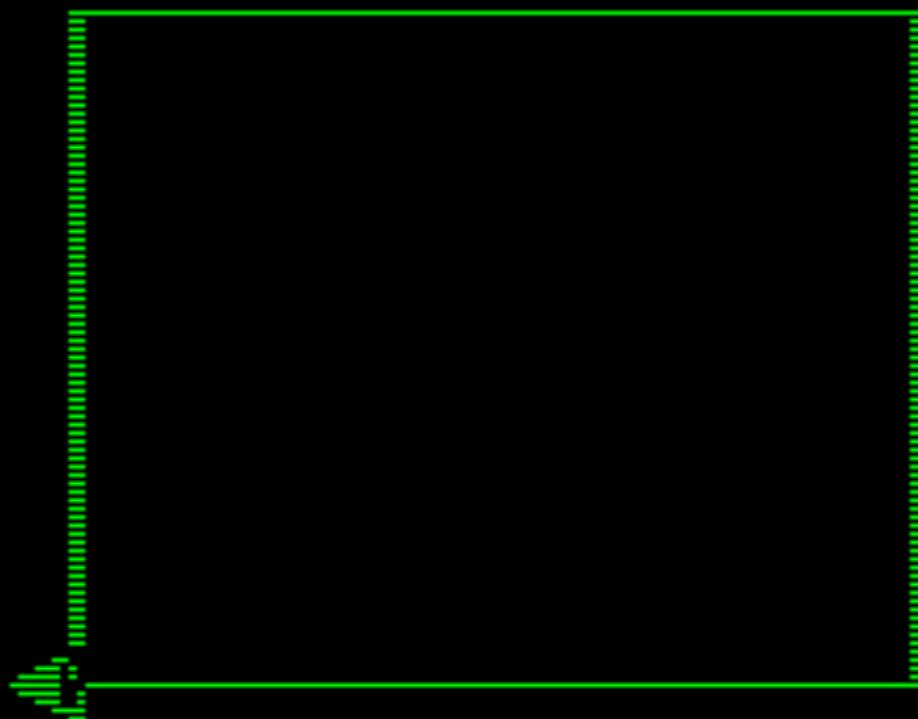
Did you know every snowflake is a different shape? Let's create a new shape! We'll draw a parallelogram 4 times, turning right by 90 degrees between each parallel side.

Blocks      Workspace: 8 / 10 blocks

set color [ ]  
set color [random color]  
repeat (???) [ ]  
do [ ]  
  
when run  
repeat (4) [ ]  
do  
repeat (2) [ ]  
do  
move [forward] by [100] pixels  
turn [right] by [60] degrees  
move [forward] by [100] pixels  
turn [right] by [120] degrees  
turn [right] by [90] degrees

# HOW I LEARNED TO PROGRAM

---



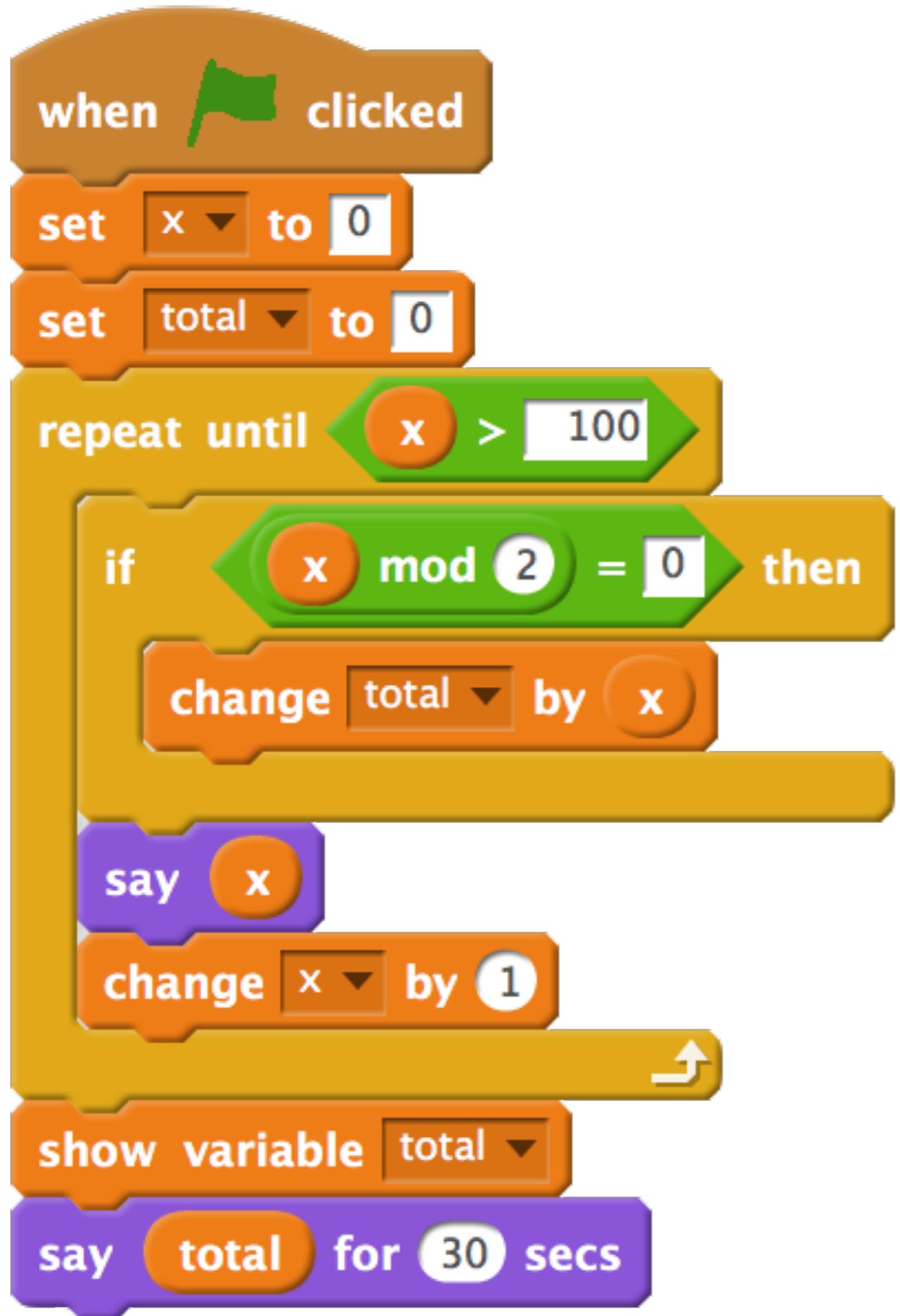
2FD 100  
2RT 90  
2FD 100  
2

# WHAT IS AN ALGORITHM?

---

How I'd tell a computer to make a PB&J sandwich:

- Remove two pieces of bread and lay them flat on the work surface so that the tops of both pieces are next to each other.
- Remove the lids of both the peanut butter and jelly jars and retrieve two knives
- Select one of the knives and use it to spread peanut butter evenly to cover the top surface of one piece of bread. Stop once the surface is covered
- Select the other knife and spread jelly evenly to cover the surface of the other piece of bread. Stop once the surface is covered.
- Pick up slice with peanut butter, rotate it 180° and place it on jelly slice so that tops of bread are aligned and peanut butter is touching the jelly side of the bread.
- Move the assembled sandwich to a plate and use one of the knives to make a cut across the sandwich so that it is in two halves
- Put the lids back on the jars of peanut butter and jelly
- Put the knives in the sink



## AN ALGORITHM IN SCRATCH

.....

- Here's a Scratch program to add up all even numbers between 1 and 100
- The main loop adds 1 to  $x$  until  $x$  is greater than 100
- The  $x \text{ mod } 2 = 0$  is how we check if  $x$  is even. It means “check if the remainder of dividing  $x$  by 2 is 0”
- If  $x$  is even, then we add the value of  $x$  to our *total* variable
- When loop ends,  $total = 2550$

C

```
int total = 0;
for (int i=1; i <= 100; i++) {
    if (i % 2 == 0) {
        total += i;
    }
}
```

Go

```
total := 0
for i := range 100 {
    if i % 2 == 0 {
        total = total + i
    }
}
```

JavaScript

```
var total = 0;
for (var i = 1; i <= 100; i++) {
    if (i % 2 == 0) {
        total += i;
    }
}
```

## OTHER LANGUAGES

.....

- Here's how I'd write that Scratch program in some other programming languages I use
- They look kinda similar to each other (all have loops we use to add up *total*)
- But notice the ways they look different. Different programming languages have different rules and different abilities.

# REALLY DIFFERENT STYLES

---

*Rust*

```
let evens = (1..100).filter(|&x| x % 2 == 0);
let total = evens.fold(0, |sum, x| sum + x);
```

*Python*

```
total = sum([i for i in range(100) if x % 2 == 0])
```

*Ruby*

```
total = (1..100).select(:even?).reduce(:+)
```

*Haskell*

```
let total = sum [x | x <- [1..100], even x]
```

*Clojure*

```
(def total (+ (range 0 101 2))))
```

# WHAT ACTUAL CODE LOOKS LIKE

---

```
class Auction < ActiveRecord::Base
  include AuctionScopes
  belongs_to :user
  belongs_to :customer
  has_many :bids
  has_many :bidders, through: :bids
  has_and_belongs_to_many :skills

  enum published: { unpublished: 0, published: 1, archived: 2 }
  enum type: { sealed_bid: 0, reverse: 1 }

  validates :delivery_due_at, presence: true
  validates :ended_at, presence: true
  validates :purchase_card, presence: true
  validates :start_price, presence: true
  validates :started_at, presence: true
  validates :title, presence: true
  validates :user, presence: true
  validates :billable_to, presence: true
  validates :summary, presence: true, if: :published?
  validates :description, presence: true, if: :published?

  def user_is_contracting_officer_if_above_micropurchase
    if user && !user.contracting_officer? &&
      start_price > AuctionThreshold::MICROPURCHASE
      errors.add(
        :start_price,
        I18n.t(
          'activerecord.errors.models.auction.
            user_is_contracting_officer_if_above_micropurchase'))
```

*This is in Ruby.*

*This project is 40,000 lines.*

*That's considered small.*



## LINES OF CODE

.....

- Just like you could write a poem, a book, or an encyclopedia, programs can come in all sizes
- But most code is written one line at a time over by programmers working alone or as part of a team
- This is Margaret Hamilton, who wrote the software for the Apollo 11 moon lander, next to a print-out of all the software for that mission



ELECTION 2013

Live Coverage

New York

New Jersey

Virginia

Exit Polls

# New York City Mayor

CANDIDATE	PARTY	VOTES	PCT.
✓ Bill de Blasio	Dem.	752,604	<b>73.3%</b>
Joseph J. Lhota	Rep.	249,121	<b>24.3</b>
Others		24,443	<b>2.4</b>

SHOW ALL ▾

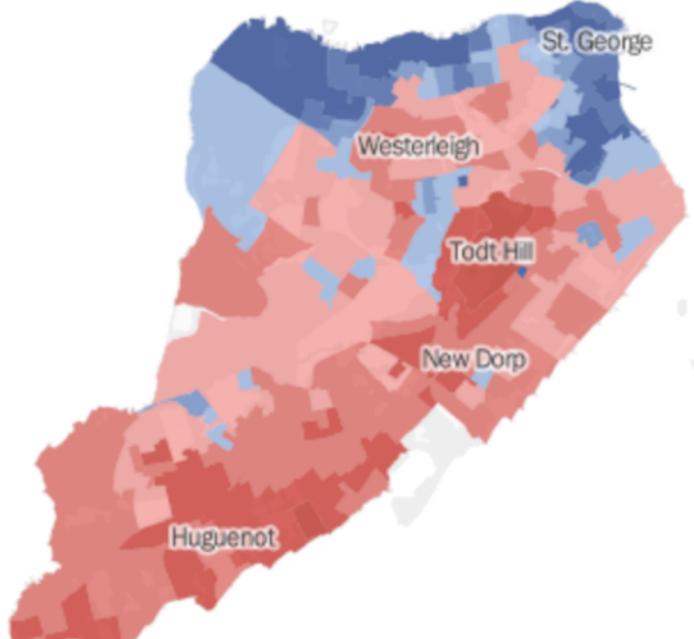
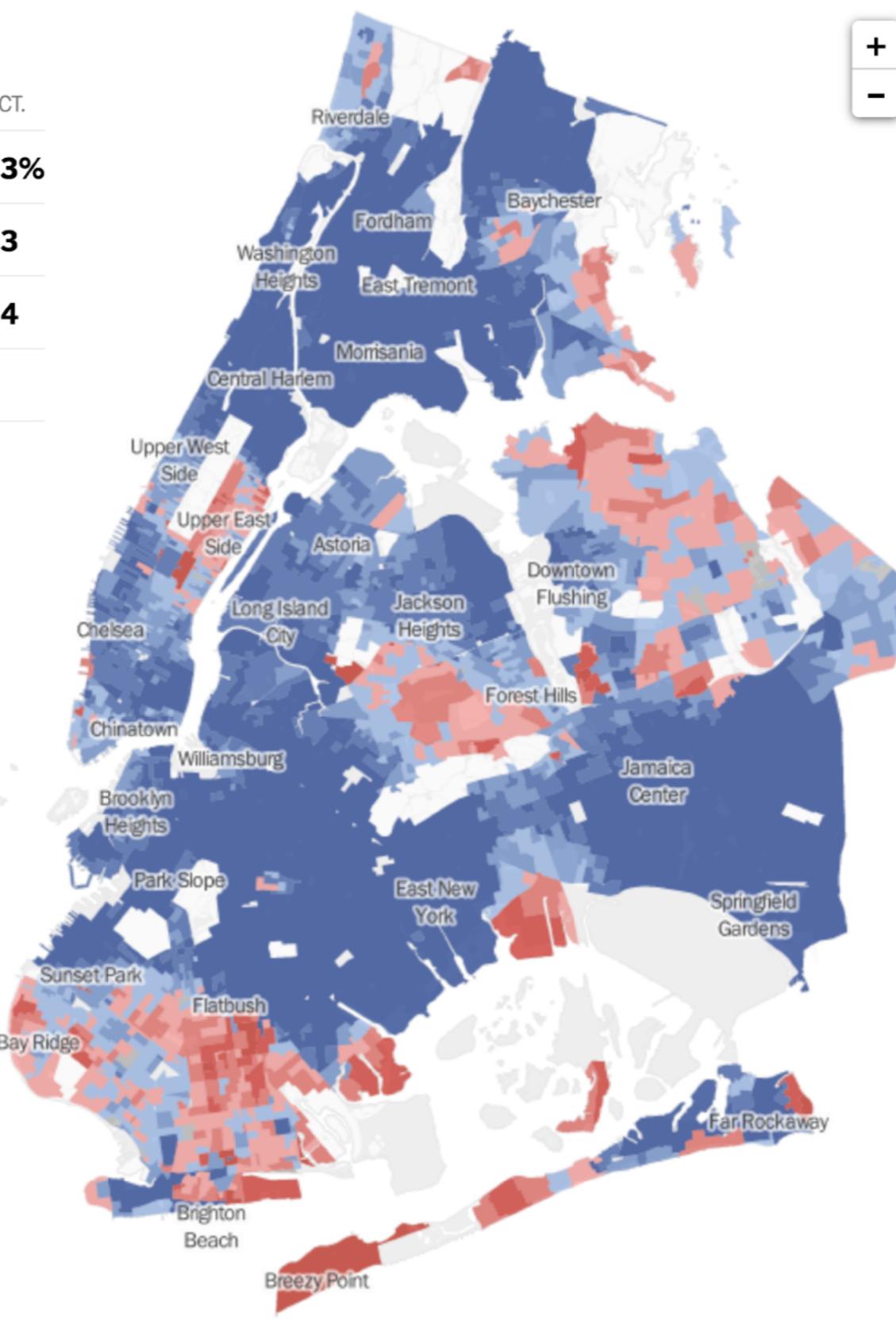
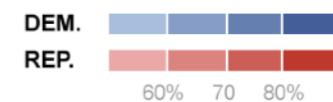
99% reporting



NOV 6, 2013

Precinct-level data is updated every 10 minutes. City-wide totals may update sooner.

## LEADER'S SHARE OF VOTE



## SHARE THIS VIEW

<http://www.nytimes.com>

## FIND YOUR AREA

Go

## VIEW BY

## Precinct Winner

Size of Lead

Neighborhoods

## FILTER MAP

## All precincts

White areas

Hispanic areas

Black areas

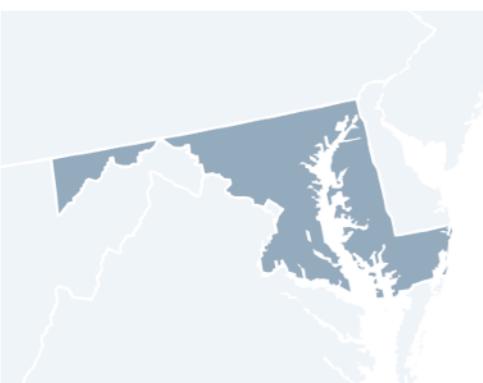
Asian areas

Average income

Homeowners

Vote in 2009

## Location



Maryland ▼

## Time period

2004 ▼ to 2014 ▼

## Type of crime

### Violent Crime

All Violent Crime

Homicide

Rape

**Robbery**

Aggravated Assault

### Property Crime

All Property Crime

# Maryland, Robbery

Maryland reports summary (SRS) data to the FBI.

In 2014, 154 Maryland law enforcement agencies reported data to the FBI, out of a total of 191. For that year, these statistics cover 81% of the state's agencies or about 5,976,407 people.

## UCR resources

[Maryland UCR Program](#)

[Download participation and population data](#)

## Robbery rate in Maryland, 2004–2014

2014

Maryland's robbery rate was higher than that of the United States, and in 2014 was 142.9 incidents per 100,000 people.

	Rate	Total
Maryland	142.9	8,815
United States	80.3	260,607



HOW IT WORKS

GET YOUR PASS

PLAN A TRIP



**Hey fourth graders! See  
America's natural wonders  
and historic sites for free.**

LET'S GO!



## Every Kid in a Park

You and your family get free access to hundreds of parks, lands, and waters for an entire year.



# WRITING CODE FOR FUN

---

```
begin
  terms = meter_from_sentence(sentence)

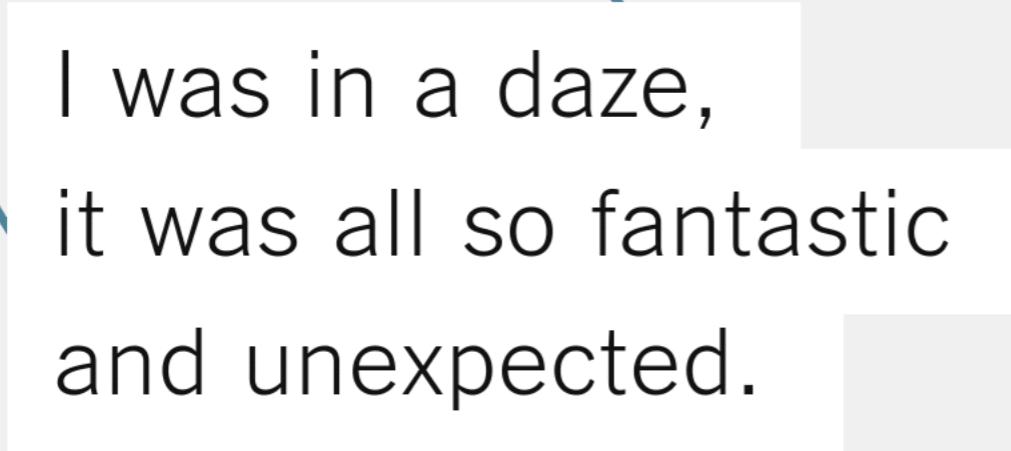
  lines = []
  meters = []

  seek_line(lines, meters, 5, terms)
  seek_line(lines, meters, 7, terms)
  seek_line(lines, meters, 5, terms)
  seek_eol(terms)

  meter = meters.join(" ")
  close_quotes(lines)

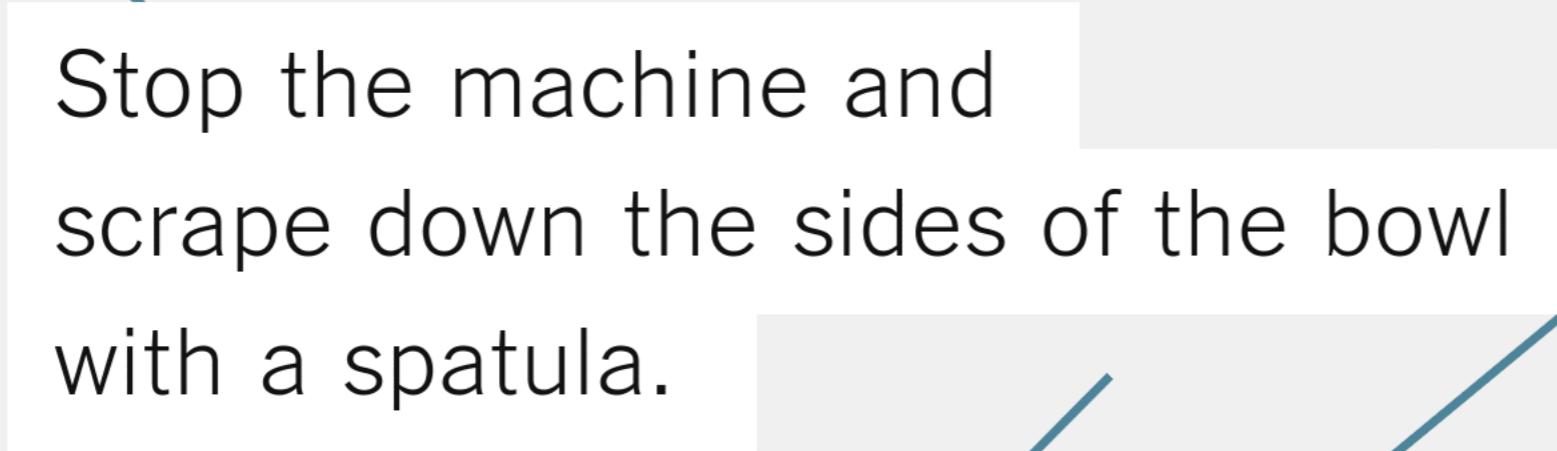
  create_match(article, lines, meter, awkward_matches)
rescue MissingTermsError => ex
  return nil
rescue LineMismatch
  return nil
end
```

*Can you guess what this does?*



Injustice Treated  
Like a Thriller  
January 14, 2015

I was in a daze,  
it was all so fantastic  
and unexpected.



Carrot Purée

December 4, 2012

Stop the machine and  
scrape down the sides of the bowl  
with a spatula.

# QUESTIONS?

