CS 171: Visualization

Hanspeter Pfister
pfister@seas.harvard.edu

vi · su · al · ize
1. To form a mental image of
2. To make visible

vi · su · al · ize

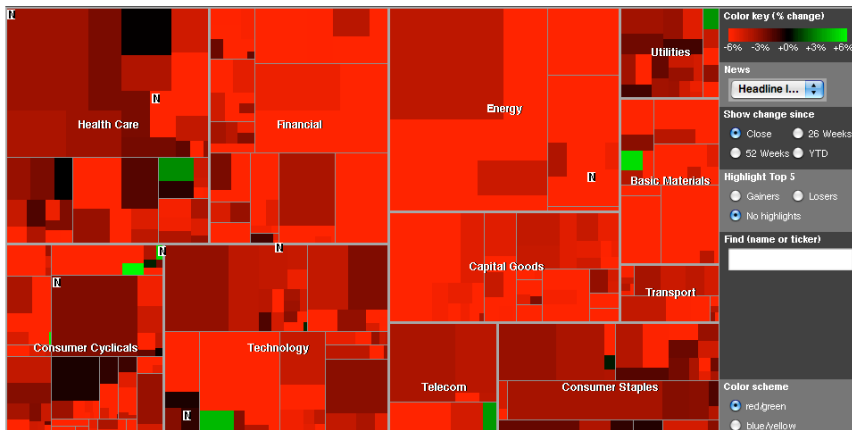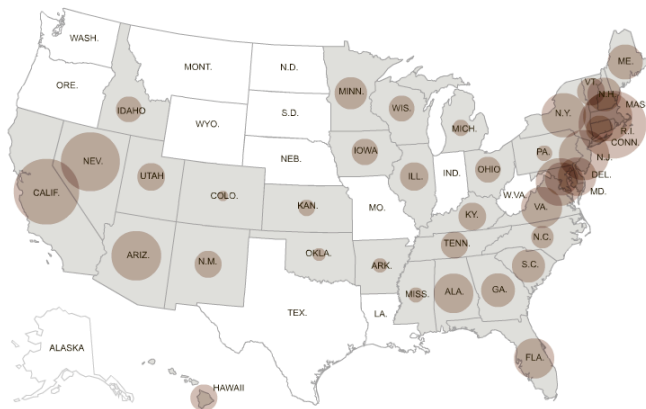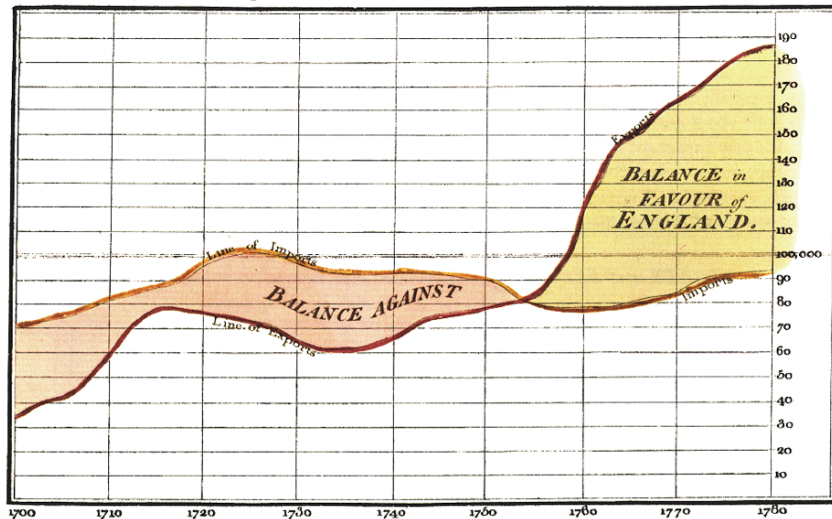1. To form a mental image of

2. To make visible

3. **To convey information through visual representations**

W. Playfair, 1786 / 1801

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.

BALANCE in FAVOUR of ENGLAND.

BALANCE AGAINST

Line of Imports

Line of Exports

Exports and Imports of SCOTLAND to and from different parts for one Year from Christmas 1780 to Christmas 1781.

Names of Places.

Jersey &c.
Ireland
Poland
Isle of Man
Greenland
Prussia
Portugal
Holland
Sweden
Guernsey
Germany
Denmark and Norway
Flanders
West Indies
America
Russia
Ireland

The Upright divisions are Ten Thousand Pounds each. The Black Lines are Exports the Ribbed lines Imports.

31

African   European

790.000 Squ Miles Asiatic

Turkish Empire

Nov 28, 2008 : ■ ^DJI 8,829.04

12K

11K

10K

9K

8K

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2008   Jul   Aug   Sep   Oct   Nov

■ **Volume 2,740,859,904**   ⊠

10B

5B

1D 5D 1M 3M **6M** YTD 1Y 2Y 5Y Max   FROM: Jun 2,2008 TO: Nov 28,2008

1928   1938   1948   1958   1968   1978   1988   1998   2008

Yahoo Finance
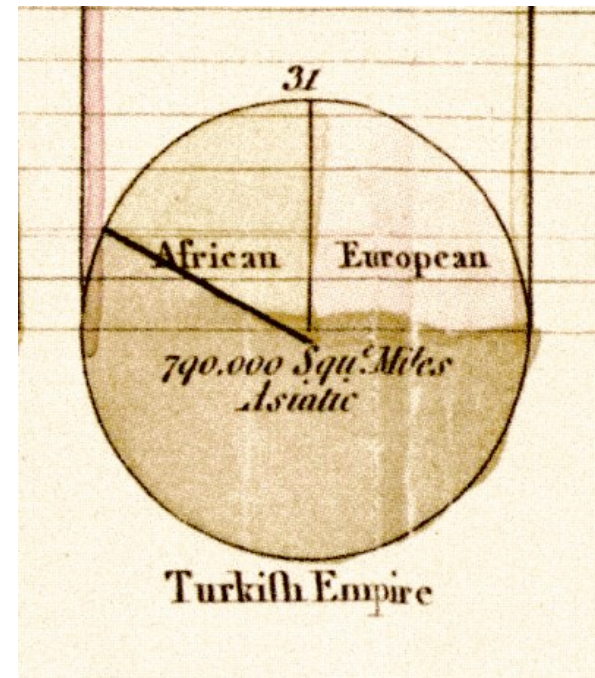
Budget Shortfalls

Share of General Fund

Revenues

Budget shortfalls for 2009 fiscal year, per capita

····· $1,000

····· $100
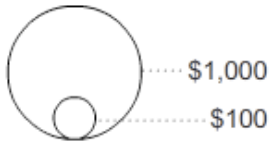
No known budget gap

Note: The map data includes gaps that states had before the 2009 fiscal year budgets were adopted and additional midyear gaps. Exact amounts of midyear budget gaps in Illinois and Wisconsin are unavailable.

WASH.

ORE.

IDAHO
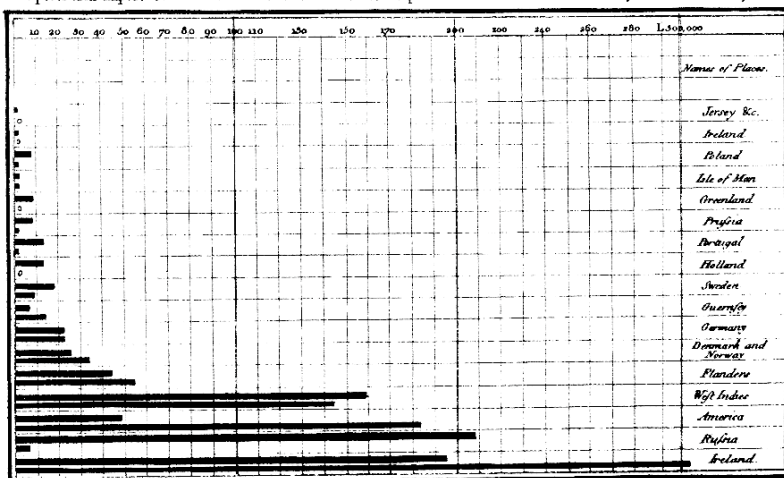
NEV.

CALIF.

UTAH

ARIZ.

N.M.

MONT.

WYO.

COLO.

N.D.

S.D.

NEB.

KAN.

OKLA.

TEX.

MINN.

IOWA

MO.

ARK.

LA.

WIS.

ILL.

IND.

MICH.

OHIO

KY.

TENN.

MISS.

ALA.

GA.

FLA.

ME.

VT

N.H.

MASS.

N.Y.

R.I.

CONN.

PA.

N.J.

DEL.

MD.

W.VA.

VA.

N.C.

S.C.

ALASKA

HAWAII

NY Times
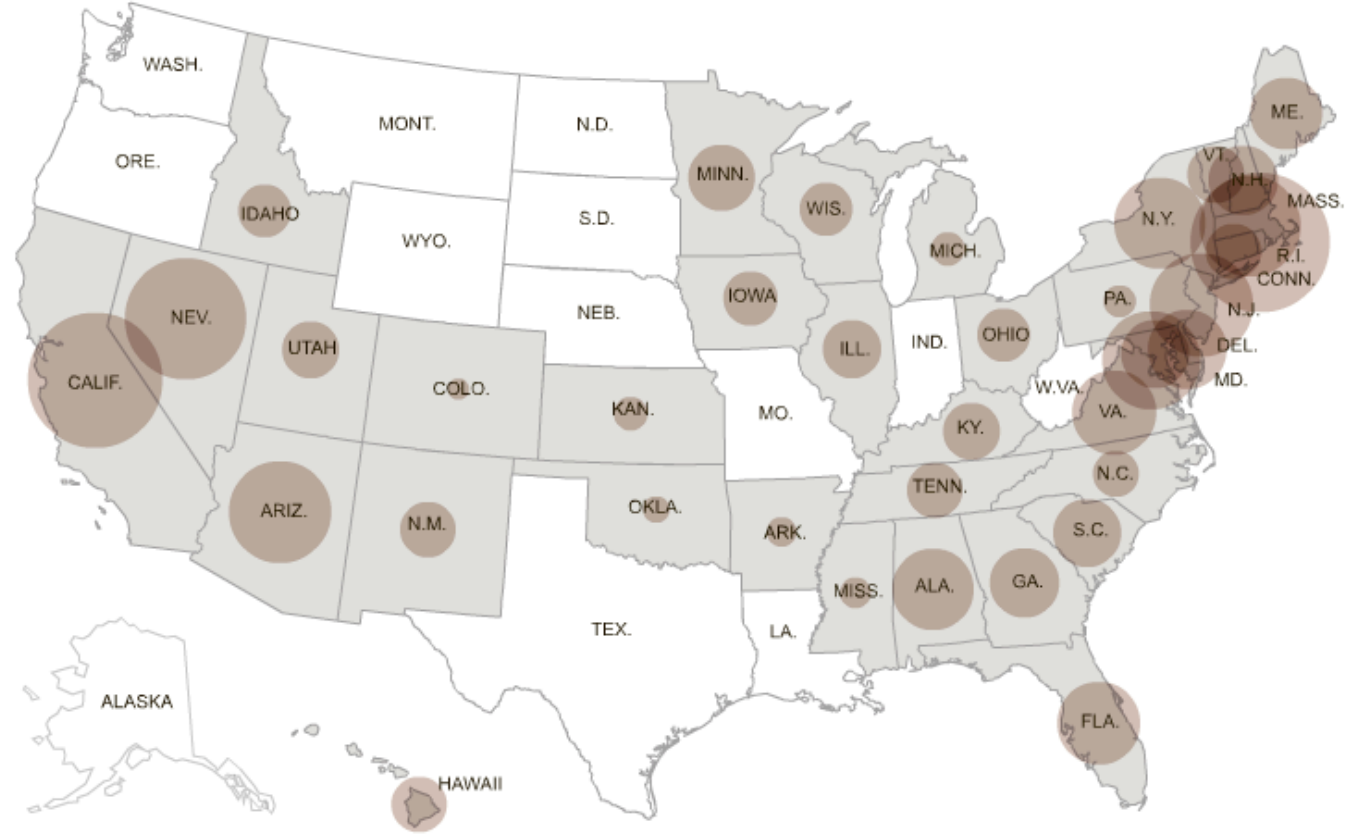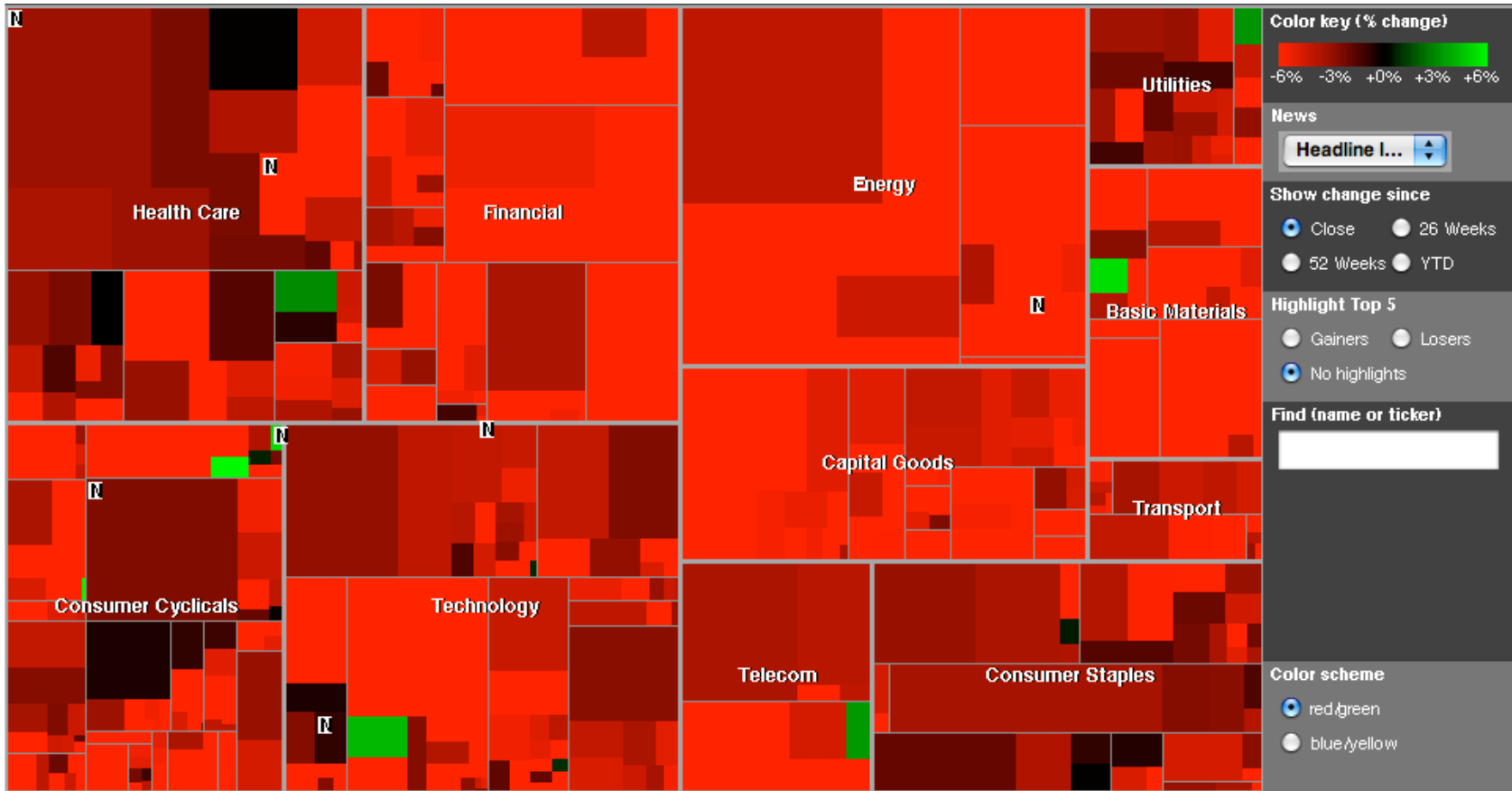
Map of the Market

Microsoft Excel - sd_evac_bgs3.dbf

File Edit View Insert Format Tools Data Window Help Adobe PDF

Arial   10

A1   ObjectID

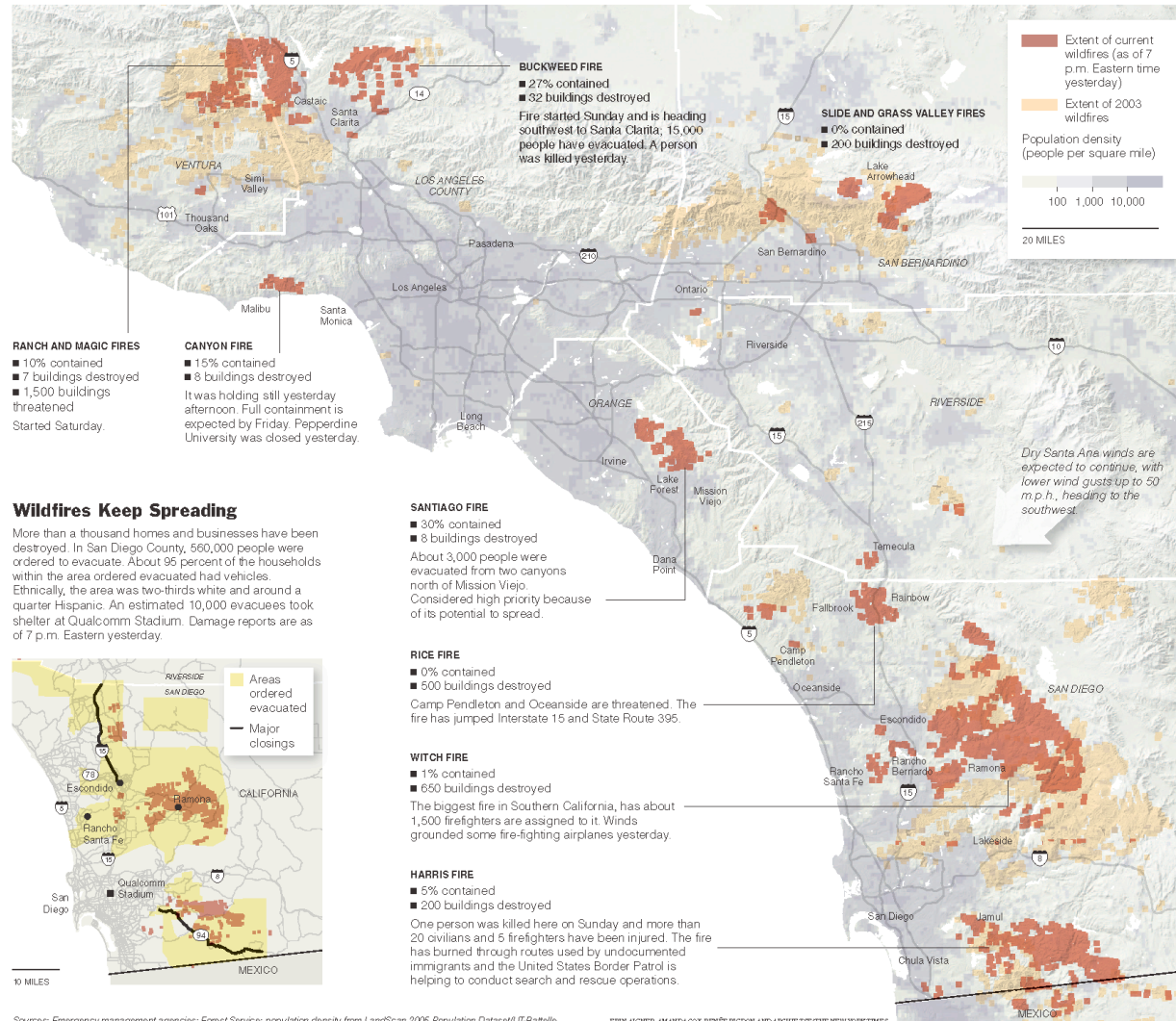|	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	ObjectID	ST	CNT	STCOI	TRACT	B	FIPS	POP2000	POP2005	POP00_SQMI	POP05_SQMI	WHITE	BLACK	AMERI_ES	ASIAN
2	25044	06	073	06073	003207	3	060730032073	2033	2160	3835.8	4075.5	1244	133	13	213
3	25306	06	073	06073	008324	1	060730083241	1856	1803	1874.7	1821.2	1616	12	10	140
4	25307	06	073	06073	008324	2	060730083242	424	445	6057.1	6357.1	394	1	1	19
5	25308	06	073	06073	008324	3	060730083243	660	688	6600.0	6880.0	590	4	0	48
6	25309	06	073	06073	008324	4	060730083244	1908	1994	3028.6	3165.1	1712	15	2	102
7	25310	06	073	06073	008324	5	060730083245	554	556	7914.3	7942.9	511	11	0	18
8	25311	06	073	06073	008324	6	060730083246	568	613	7100.0	7662.5	518	7	0	28
9	25312	06	073	06073	008324	7	060730083247	812	833	5075.0	5206.3	724	7	2	42
10	25313	06	073	06073	008327	1	060730083271	2836	3321	1524.7	1785.5	2414	12	1	292
11	25314	06	073	06073	008327	2	060730083272	2179	2614	3961.8	4752.7	1769	8	4	316
12	25315	06	073	06073	008328	1	060730083281	2291	2707	836.1	988.0	1930	11	3	267
13	25316	06	073	06073	008329	1	060730083291	4334	4919	4422.4	5019.4	3589	35	10	471
14	25317	06	073	06073	008330	1	060730083301	5429	5958	9201.7	10098.3	4341	13	3	888
15	25318	06	073	06073	008331	1	060730083311	2554	2676	6902.7	7232.4	2100	21	1	324
16	25319	06	073	06073	008332	1	060730083321	3412	4226	4805.6	5952.1	2659	11	0	593
17	25322	06	073	06073	008335	1	060730083351	1124	2113	8028.6	15092.9	806	17	3	237
18	25323	06	073	06073	008335	2	060730083352	3966	7484	1129.9	2132.2	2340	41	5	1347
19	25324	06	073	06073	008336	1	060730083361	975	1071	8863.6	9736.4	685	14	1	228
20	25325	06	073	06073	008336	2	060730083362	1565	1512	7452.4	7200.0	1221	31	6	209
21	25327	06	073	06073	008337	2	060730083372	1014	1011	7242.9	7221.4	608	22	5	306
22	25487	06	073	06073	009504	1	060730095041	784	780	2613.3	2600.0	694	8	0	52
23	25765	06	073	06073	013410	1	060730134101	1228	1327	160.7	173.7	897	67	9	67
24	25766	06	073	06073	013410	2	060730134102	1133	1218	1691.0	1817.9	866	43	3	85
25	25767	06	073	06073	013410	3	060730134103	1131	1481	4039.3	5289.3	908	29	1	102
26	25770	06	073	06073	013411	3	060730134113	836	746	3344.0	2984.0	651	26	2	74
27	25798	06	073	06073	013504	1	060730135041	862	848	5746.7	5653.3	473	125	3	134

sd_evac_bgs3

Ready

Matthew Ericson, NY Times

Communicate

BUCKWEED FIRE
- 27% contained
- 32 buildings destroyed

Fire started Sunday and is heading southwest to Santa Clarita; 15,000 people have evacuated. A person was killed yesterday.

SLIDE AND GRASS VALLEY FIRES
- 0% contained
- 200 buildings destroyed

Extent of current wildfires (as of 7 p.m. Eastern time yesterday)

Extent of 2003 wildfires

Population density (people per square mile)

100 1,000 10,000

20 MILES

RANCH AND MAGIC FIRES
- 10% contained
- 7 buildings destroyed
- 1,500 buildings threatened

Started Saturday.

CANYON FIRE
- 15% contained
- 8 buildings destroyed

It was holding still yesterday afternoon. Full containment is expected by Friday. Pepperdine University was closed yesterday.

Wildfires Keep Spreading

More than a thousand homes and businesses have been destroyed. In San Diego County, 560,000 people were ordered to evacuate. About 95 percent of the households within the area ordered evacuated had vehicles. Ethnically, the area was two-thirds white and around a quarter Hispanic. An estimated 10,000 evacuees took shelter at Qualcomm Stadium. Damage reports are as of 7 p.m. Eastern yesterday.

Areas ordered evacuated

Major closings

10 MILES

SANTIAGO FIRE
- 30% contained
- 8 buildings destroyed

About 3,000 people were evacuated from two canyons north of Mission Viejo. Considered high priority because of its potential to spread.

RICE FIRE
- 0% contained
- 500 buildings destroyed

Camp Pendleton and Oceanside are threatened. The fire has jumped Interstate 15 and State Route 395.

WITCH FIRE
- 1% contained
- 650 buildings destroyed

The biggest fire in Southern California, has about 1,500 firefighters are assigned to it. Winds grounded some fire-fighting airplanes yesterday.

HARRIS FIRE
- 5% contained
- 200 buildings destroyed

One person was killed here on Sunday and more than 20 civilians and 5 firefighters have been injured. The fire has burned through routes used by undocumented immigrants and the United States Border Patrol is helping to conduct search and rescue operations.

Dry Santa Ane winds are expected to continue, with lower wind gusts up to 50 m.p.h., heading to the southwest.

Sources: Emergency management agencies; Forest Service; population density from LandScan 2005 Population Dataset/UT-Battelle

ERIN AIGNER, AMANDA COX, RENÉE RIGDON AND ARCHIE TSE/THE NEW YORK TIMES

Matthew Ericson, NY Times

Answer Questions

The Boston Globe

Historic victory

Obama elected nation's first African-American president in a romp

McCain falters on GOP terrain; Democrats increase clout in Congress

New era beginning for party in power

Shift in tone will bring a watershed for nation

Election 2008

Among blacks, joy and tears at journey's end

boston.com

The New York Times
Election 2008

UPDATE IN
0:11

RELOAD

MAP | STATES | NETWORK CALLS

365 | 0 undecided | **173**

OBAMA ✓ | 270 electoral votes to win | McCAIN

D R
Lead
Win

5:12 — Begich (D) Wins Alaska Senate Race

3:57 — McCain Wins in Mo.

2:07 — Merkley (D) Wins Ore. Senate Race

12:34 — Obama Wins in N.C.

256 +21 seats | **House »** | -21 seats **175**

58 +7 seats | **Senate »** | -7 seats **40**

CNN ElectionCenter2008

RESULTS FROM CNN »

Electoral votes: Obama **365** ✓ | McCain **173**
(270 to win)

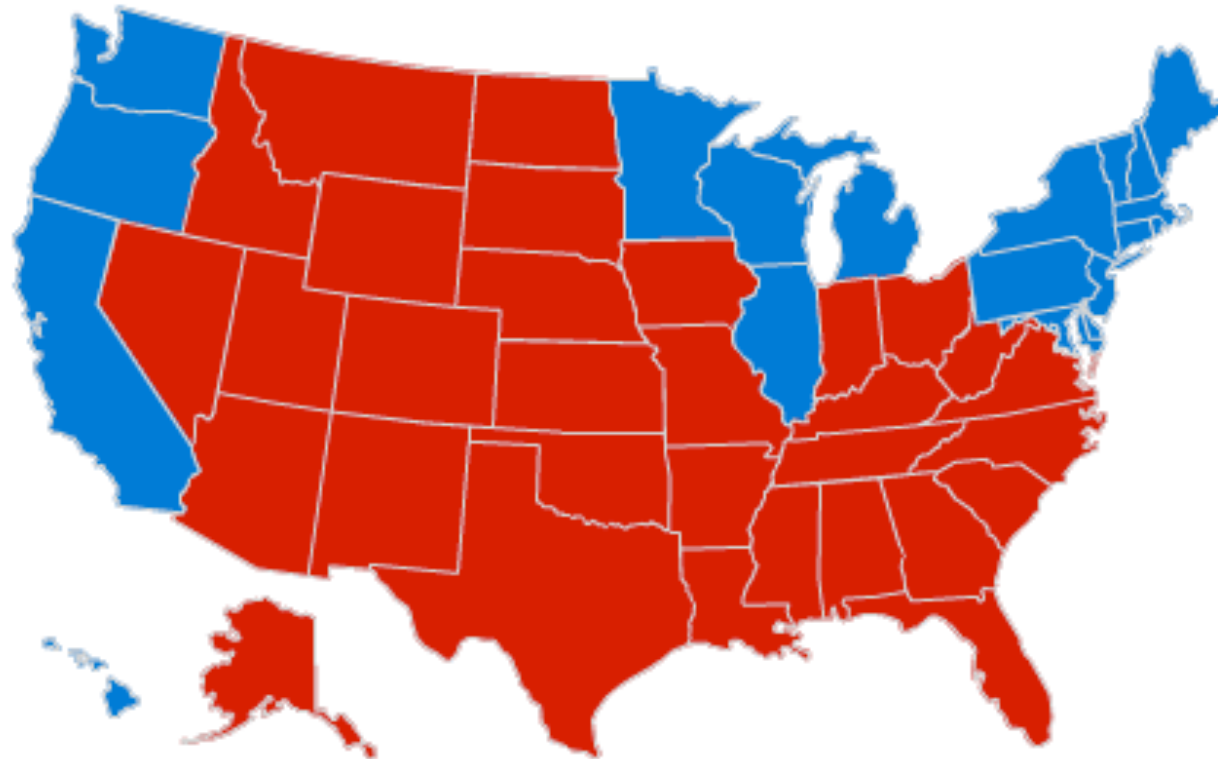■ Obama ■ McCain ■ Still voting ■ Processing

VT
NH
MA
CT
RI
NJ
DE
MD
DC

Larger Map

Stories:
• **Latest election news**
• Political Ticker: **Bush says some voters backed Obama â€˜because of meâ€™**
Results:
**President | Senate | House | Governor
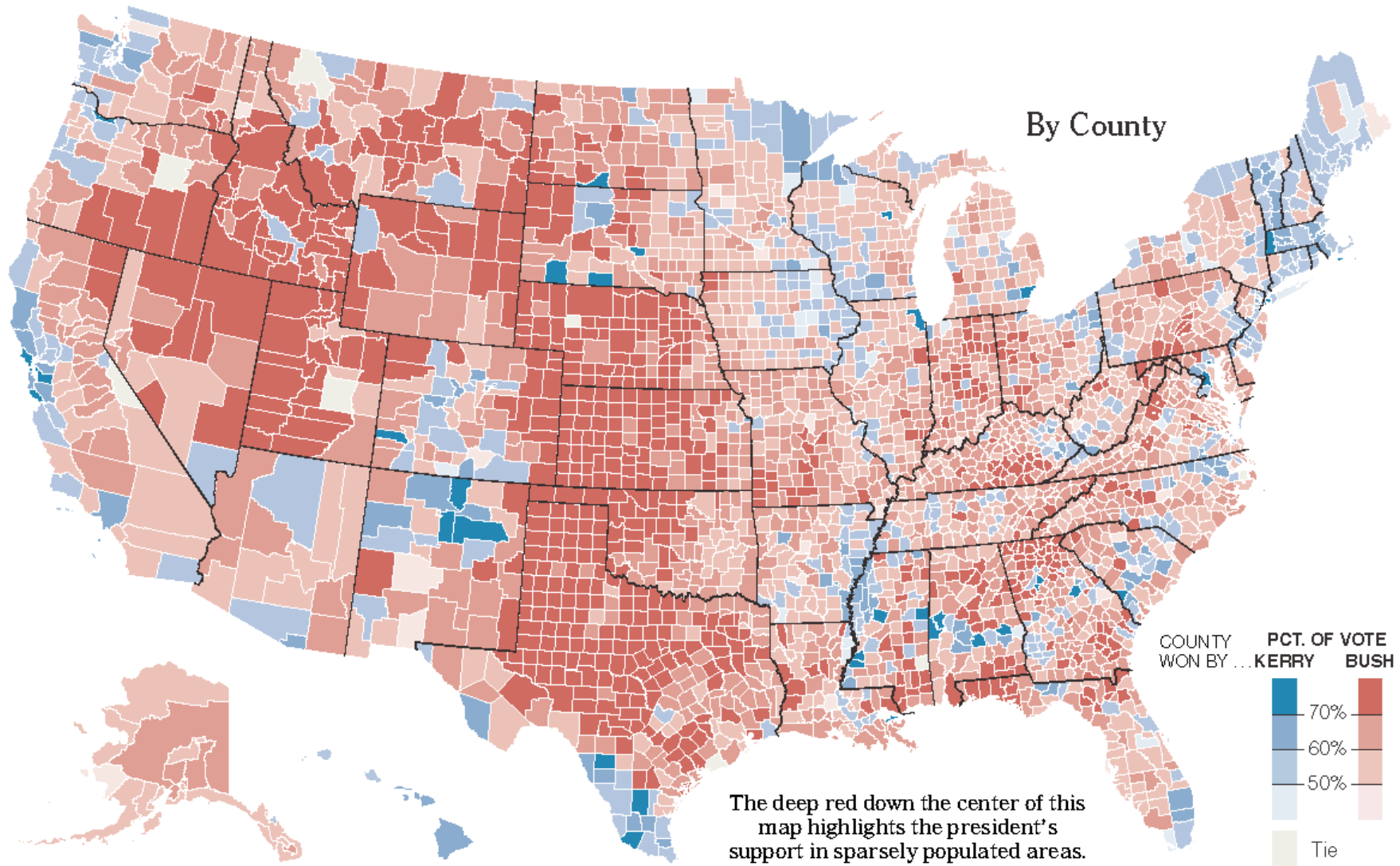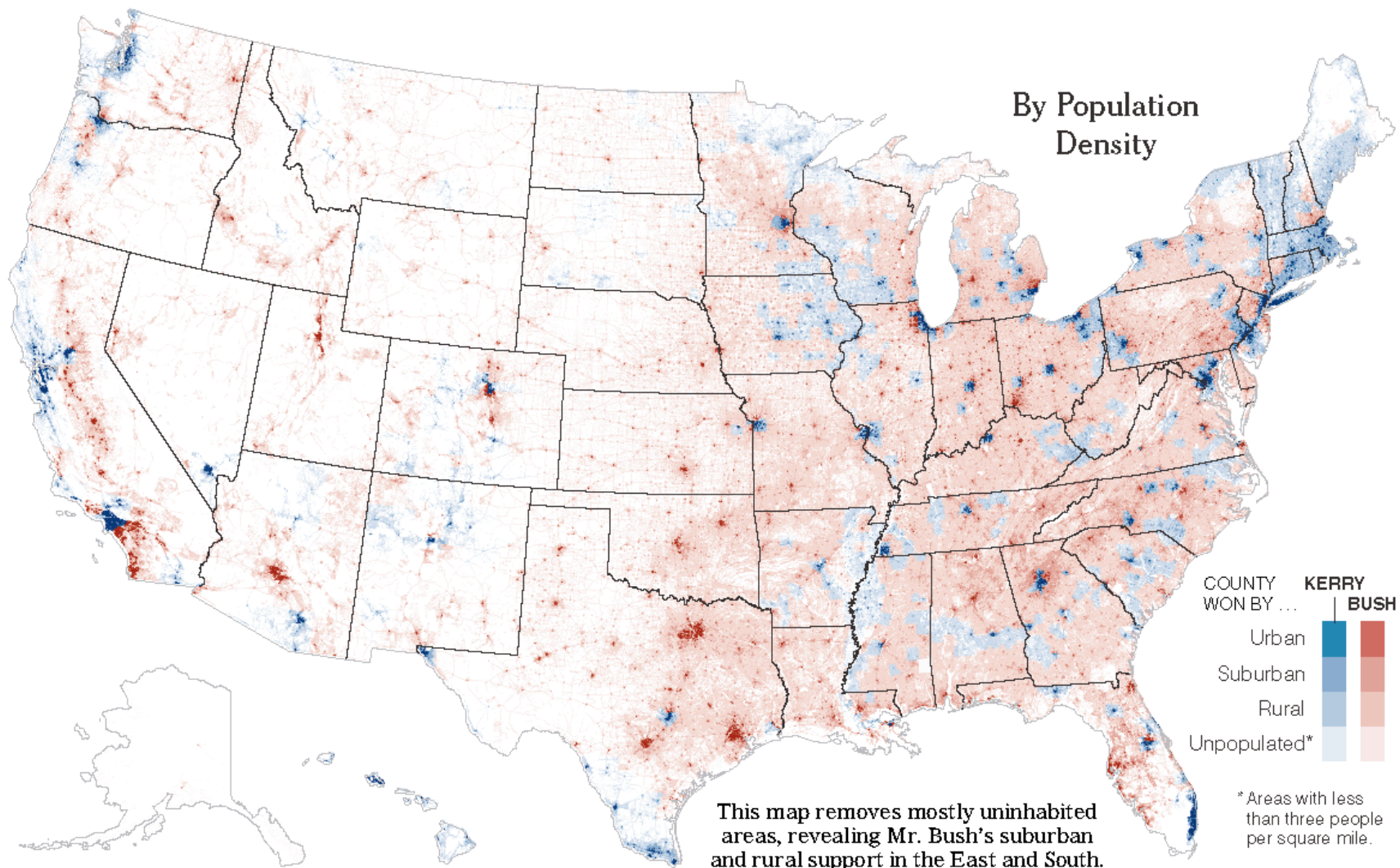Exit polls | Your Races | By State** ▾

2004 Elections

2004 Popular Vote

Bush — 62 million

Kerry — 59 million

Amount of red and blue shown on map

Bush — 2,500,000 mi^2

Kerry — 525,000 mi^2

By County

COUNTY WON BY ...
PCT. OF VOTE
KERRY   BUSH

70%
60%
50%

Tie

The deep red down the center of this map highlights the president's support in sparsely populated areas.

Matthew Ericson, NY Times

By Population
Density

COUNTY WON BY ...   **KERRY** **BUSH**

Urban

Suburban

Rural

Unpopulated*

* Areas with less
than three people
per square mile.

This map removes mostly uninhabited
areas, revealing Mr. Bush's suburban
and rural support in the East and South.

Matthew Ericson, NY Times

Uncover Patterns

755

Steroids or Not, the Pursuit Is On

Barry Bonds is taking aim at the career home run record. He needs only six more to tie Babe Ruth and 47 to equal Hank Aaron.

Lines are cumulative home runs.

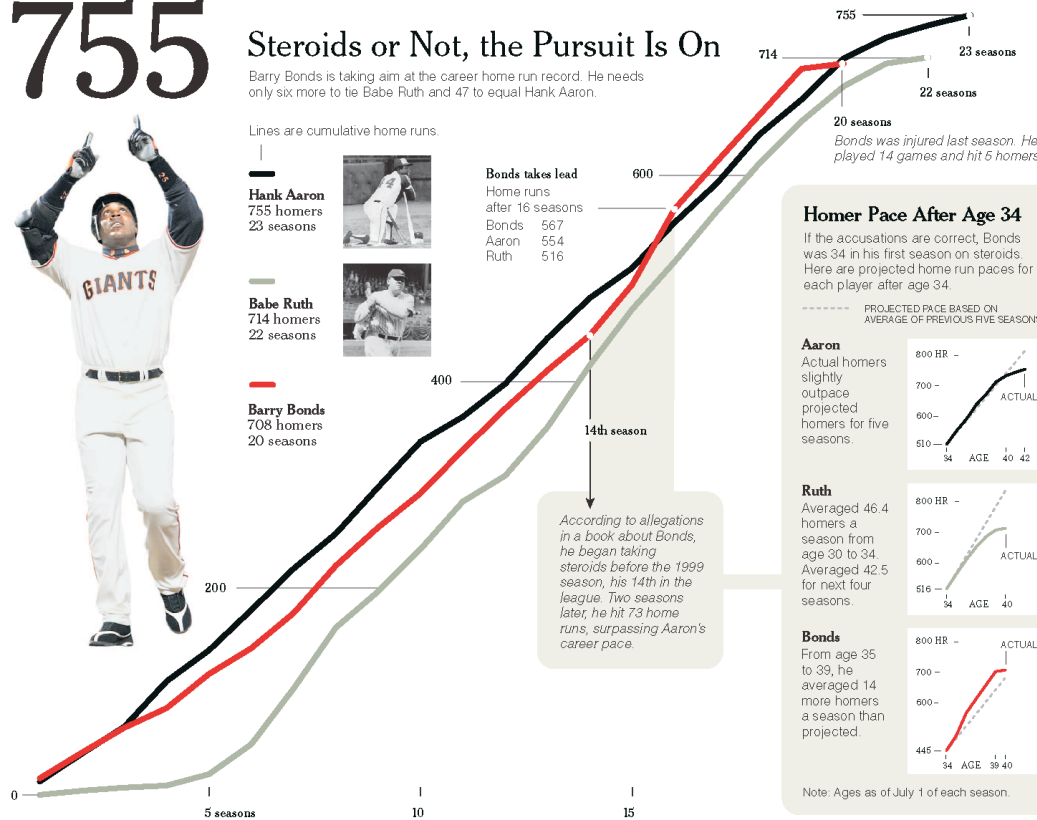**Hank Aaron**
755 homers
23 seasons

Babe Ruth
714 homers
22 seasons

Barry Bonds
708 homers
20 seasons

Bonds takes lead
Home runs after 16 seasons
Bonds 567
Aaron 554
Ruth 516

600

400

200

0

14th season

According to allegations in a book about Bonds, he began taking steroids before the 1999 season, his 14th in the league. Two seasons later, he hit 73 home runs, surpassing Aaron's career pace.

755

714

23 seasons

22 seasons

20 seasons
Bonds was injured last season. He played 14 games and hit 5 homers.

5 seasons   10   15

Homer Pace After Age 34

If the accusations are correct, Bonds was 34 in his first season on steroids. Here are projected home run paces for each player after age 34.

- - - - PROJECTED PACE BASED ON AVERAGE OF PREVIOUS FIVE SEASONS

Aaron
Actual homers slightly outpace projected homers for five seasons.

800 HR
700
600
510
34   AGE   40 42
ACTUAL
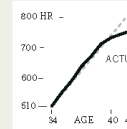
Ruth
Averaged 46.4 homers a season from age 30 to 34. Averaged 42.5 for next four seasons.

800 HR
700
600
516
34   AGE   40
ACTUAL
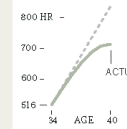
Bonds
From age 35 to 39, he averaged 14 more homers a season than projected.
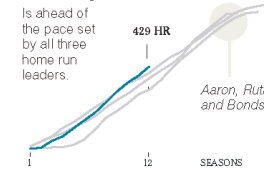
800 HR   ACTUAL
700
600
445
34   AGE   39 40
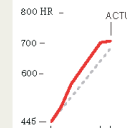
Note: Ages as of July 1 of each season.

Others Taking Aim

Alex Rodriguez ▲
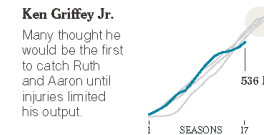Is ahead of the pace set by all three home run leaders.

429 HR

Aaron, Ruth and Bonds

1   12   SEASONS

Albert Pujols
Averaging 40 homers a season, he has started stronger than the three leaders did.
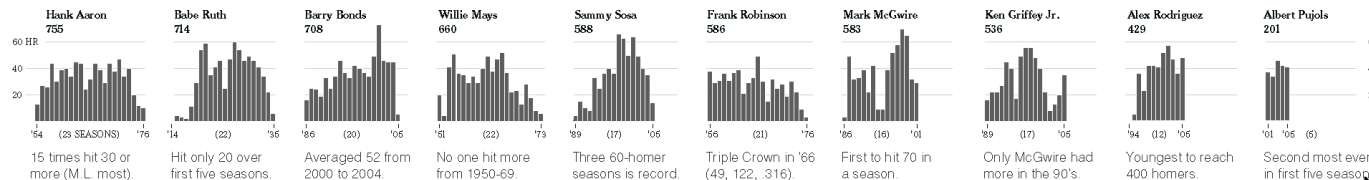
201 HR

1   5   SEASONS
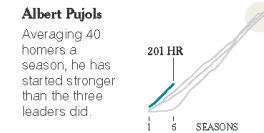
Ken Griffey Jr.
Many thought he would be the first to catch Ruth and Aaron until injuries limited his output.

536 HR

1   SEASONS   17

Differing Paths to the Top of the Charts
The top seven players on the career home run list, along with a look at Griffey (12th), Rodriguez (37th) and Pujols (tied 257th).
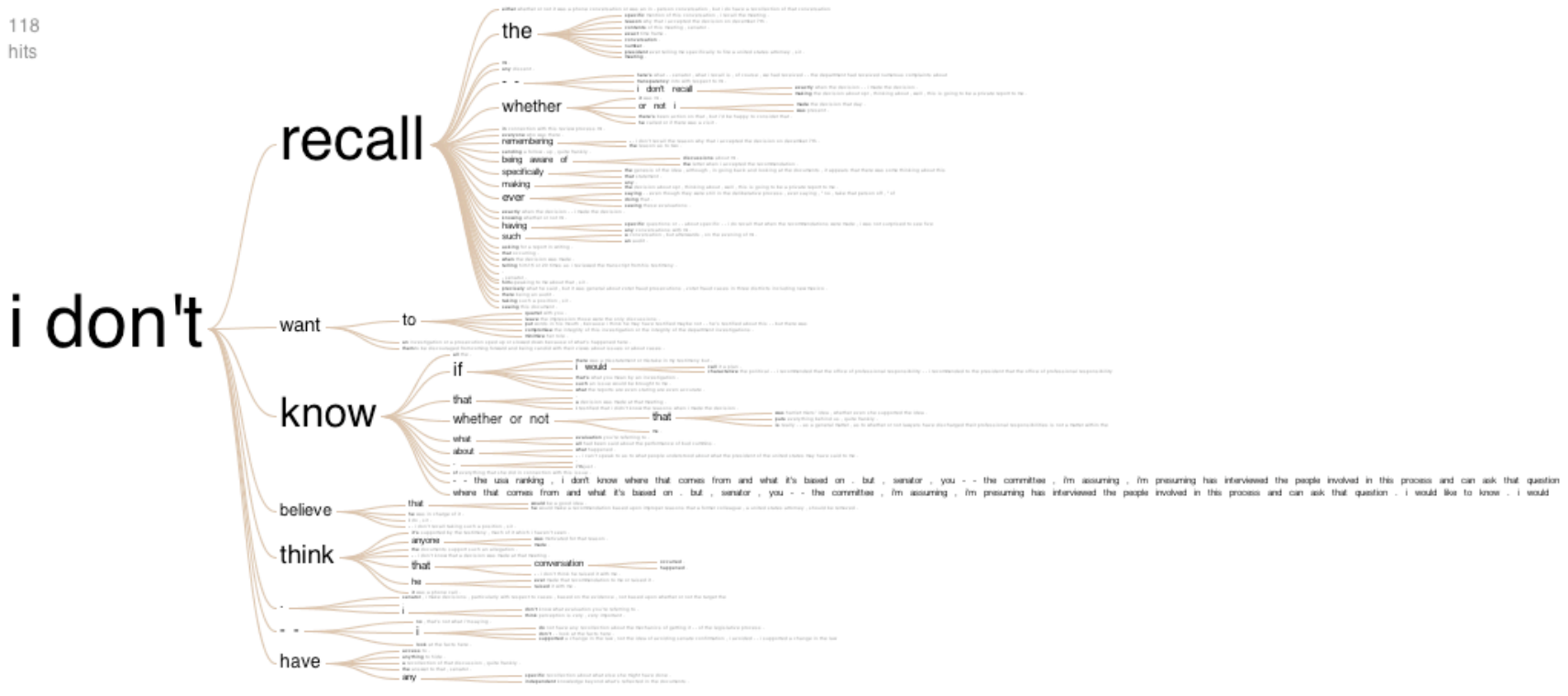
Hank Aaron
755
60 HR
40
20
'54   (23 SEASONS)   '76
15 times hit 30 or more (M.L. most).

Babe Ruth
714
'14   (22)   '35
Hit only 20 over first five seasons.

Barry Bonds
708
'86   (20)   '05
Averaged 52 from 2000 to 2004.

Willie Mays
660
'51   (22)   '73
No one hit more from 1950-69.

Sammy Sosa
588
'89   (17)   '05
Three 60-homer seasons is record.

Frank Robinson
586
'56   (21)   '76
Triple Crown in '66 (49, 122, .316).

Mark McGwire
583
'86   (16)   '01
First to hit 70 in a season.

Ken Griffey Jr.
536
'89   (17)   '05
Only McGwire had more in the 90's.

Alex Rodriguez
429
'94   (12)   '05
Youngest to reach 400 homers.

Albert Pujols
201
'01 '05 (5)
Second most ever in first five seasons.

60
40
20

Amanda Cox and Joe Ward/The New York Times

Matthew Ericson, NY Times

GIANTS

118 hits

i don't

recall
the
whether
i don't recall
or not i

want
to

know
if
that
whether or not
what
about

believe

think
that
anyone
his

i

have
any

Many Eyes

Inspire

CS 171 Goals

- Principles of effective visualizations

- Overview of visualization applications

- Implementing interactive visualizations
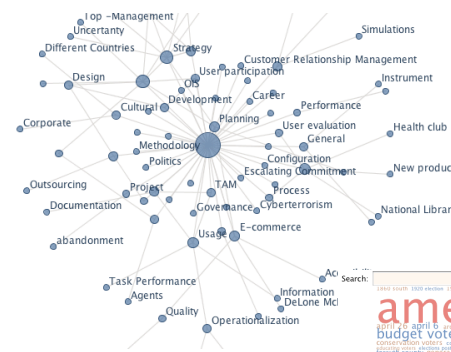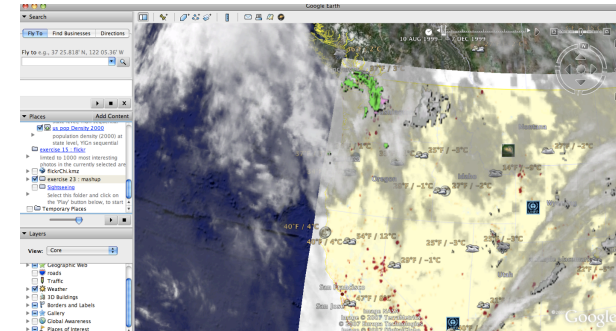
- Take your programming a step further

Act I: Foundations

- Data Models

- Visual Perception & Cognitive Principles

- Color Encoding

- Design Principles

- Interaction Design

Act II: Visualizations

- Charts & Graphs

- Maps & Google Earth

- Trees and Networks

- High-dimensional Data

- Text and Documents

- Images and Video

Act III: Guest Lectures

- Daniel Wigdor: Interaction

- Frank van Ham: Graph Visualization

- Jock Macinlay: Tableau

- B. Wong & J. Iwasa: Life Science Visualization

- Miriah Meyer: Scientific Visualization

- Gordon Kindlmann: Medical Visualization

- Martin Wattenberg: Social Visualization

- Ben Fry: Visualization & The Arts

cs171.org

- Lectures: M, W 1:00 - 2:30 pm

- All lectures available online (live & archived)

- Four homework, one mid-term exam

- Final project (alone or in teams of two)