

Google™ **Public Data**

Enhancing Data Discovery and Exploration

Jürgen Schwärzler

March 2011

Users interest in public data



- 1 education statistics by school
- 2 **unemployment**
- 3 population
 - population, cities
 - population, density
 - population, growth
- 4 sales tax
- 5 salaries
- 6 exchange rates
- 7 crime statistics
 - crime statistics, human trafficking
 - crime statistics, homicides
 - crime statistics, hate crime
- 8 prevalence
 - aids
 - alcohol abuse, prevalence
 - drug abuse, prevalence
- 9 GDP
 - GDP, nominal
 - GDP, real
- 10 minimum wage
- 11 disaster statistics
 - disaster statistics, hurricanes
 - disaster statistics, floods
 - disaster statistics, storms
- 12 oil price
- 13 last names
- 14 poverty statistics
- 15 mortality
 - mortality, swine flu
 - mortality, infant
 - mortality, teen suicides
- 16 election results
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- 18 cost of living
- 19 accident statistics
 - accident statistics, car/traffic
 - accident statistics, drunk driving
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- 20 gas price
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- 22 earthquake statistics
- 23 obesity statistics
- 24 solar energy
 - solar energy, production
 - solar energy, costs
- 25 baby names

Google's interest in public data



- It is part of Google's mission to organize the world's information
- Weak search results (e.g. [hiring and firing statistics for santa clara county](#))
- There is more public data that is created and collected every day that is meaningful to users



Organize the world's public data and make it universally accessible and useful.

Google public data mission



Unified metadata

- DSPL format
- Shared concepts (time, geo, etc.)

Partnerships with official providers

*Organize the world's **public data** and make it universally **accessible** and **useful**.*

Public data search

- Onebox
- *Vertical search*

Rich visualizations

- [Public Data Explorer](#)
- [Motion chart](#)

Organize the **world's public data** and
make it universally accessible and useful.

		Z1P1 (neg 1)		Z1P1 (neg 2)		Z1P1 (neg 3)		Z1M1		Z1M1-1		Z1M1-2		HDA-MB-435 (neg 1)		HDA-MB-435 (neg 2)		HEK7		HCT116 (neg 1)		HCT116 (neg 2)		PT-4		HMS		H4		PT-1		PT-10		PT-6		H10		H16					
ER status	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER	ER		
Group	#	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD	Mean Intensity	SD
beta-1	2314	21	4947	20	4147	22	1201	2	3337	27	3217	28	80	5034	16	793	80	29036	4	8534	7	1644	12	1770	11	2562	20	1212	11	1060	14	1386	3	5022	28	5296	7	1184	80				
beta-2	4610	37	7036	12	14672	11	18776	22	24163	22	25114	26	2141	14	20796	10	21090	29	39705	7	298149	33	3056	18	14208	18	32095	33	8726	70	16480	6	16480	6	25485	4	20876	16					
beta-3	9467	35	4953	22	621	80	12220	45	10466	76	9355	35	551	29	128	80	456	60	2279	39	194580	32	30	80	95208	29	5669	31	430	12	86	80	1094	40	79	80	50	80	26025	17			
beta-4	46065	74	11593	31	15421	22	7108	19	8105	29	9039	24	806	16	8987	30	48150	9	36140	10	1799454	21	1563	12	17889	9	66244	28	790	9	21180	11	6886	16	12586	7	4785	15	284852	27			
beta-5	2938	42	128	80	499	80	123	80	172	41	144	80	20	80	9700	171	423	80	286	60	21932	38	779	25	136	80	266	80	62	80	114	80	10609	66	17487	31	12242	61	350	80			
beta-6	56425	14	11648	12	74332	5	302809	10	156402	10	158487	11	18794	5	2167884	33	367894	4	995429	8	2096835	15	16465	6	1198642	11	604261	11	157022	7	872822	4	995794	9	885847	11	190001	7	326685	15			
beta-7	2731	31	1392	21	5305	15	4940	32	80	80	414	12	29	80	80	80	80	80	80	80	80	4500	15	16780	31	2631	32	4675	27	140	80	1018	18	7072	81	1580	21	45	80	999	67	887	80
beta-8	21470	4	11749	29	786	80	15096	4	8070	11	3542	11	364	40	58724	18	180	80	16336	6	95283	14	1168	19	6370	16	4326	16	13072	15	20472	21	11871	6	603	8	927	80					
beta-9	9048	19	16891	3	3000	80	3870	12	4476	12	33	12	1276	16	1208	9	4478	3	470	80	833	208	4	1870	80	333	120	1189	12	456	16	1124	15	1524	15	1347	15	61798	15				
beta-10	10027	12	5946	12	65471	6	7238	15	6312	11	7116	6	4256	18	4596	27	6433	13	20880	4	95180	17	2560	21	10684	9	4236	9	2565	15	10050	10	28508	10	37854	7	12347	7	38647	11			
beta-11	4141	18	92	80	478	80	80	80	74	80	561	9	20	80	2896	21	7894	16	275	40	10634	55	27	80	730	8	74	80	677	37	70	80	80	32	14	214	34	35	80	175	80		
beta-12	8997	48	908	34	641	80	5983	58	4831	46	180	80	356	20	1750	70	264	80	250	80	4687	28	29	80	106	80	149	80	1667	61	370	20	7956	63	5286	37	49	80	109	80			
beta-13	46922	7	50832	18	71499	16	315642	8	279817	12	48227	28	1948	4	23867	17	84930	11	136290	9	675381	9	9728	8	388779	7	38879	4	34802	48	10847	6	495719	9	115869	10	9129	9	54237	10			
beta-14	14419	27	2618	16	1401	80	5935	20	2881	4	1296	64	30	80	3396	33	15505	8	8919	4	1296	34	581	23	2328	18	215	80	66	80	10201	8	4797	63	232	80	3297	14	2043	20			
beta-15	12150	15	2339	20	21684	34	4978	17	4923	13	1404	31	650	10	20930	4	1402	11	9170	7	11050	5	1368	23	12382	5	3781	8	653	29	5739	7	5213	22	10571	20	4300	13	251	80			
beta-16	52491	5	54910	11	66915	28	33427	8	19402	10	13940	15	10325	17	10349	22	16486	13	30790	6	17675	16	2382	16	47474	6	100023	6	2062	22	170275	10	107959	5	10797	9	79323	4	64815	19			
beta-17	6997	17	4296	41	1897	80	1392	42	474	29	62	80	27	80	24394	23	15640	15	15186	6	38815	14	438	30	6205	33	19526	28	1224	25	26780	2	26945	4	58317	7	7119	6	7640	5			
beta-18	12201	18	1682	43	800	80	4900	38	2336	16	2885	20	80	80	1333	81	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	2814	19	
beta-19	22776	4	20079	17	160200	4	120491	6	98840	14	49033	8	9241	10	127601	17	154705	15	294958	6	729171	3	8980	8	74161	12	32045	9	78952	5	989735	6	583192	7	364950	7	21746	3	18033	8			
beta-20	7325	3	17889	15	1763	80	3321	25	1910	19	1330	80	890	37	32685	17	5354	35	22553	9	226494	14	596	29	31899	24	8147	9	36	80	4504	49	1548	37	6493	53	801	12	20481	12			
beta-21	6277	45	1141	54	1267	80	3706	27	10532	64	6407	15	6097	13	7400	15	549	58	40927	15	569	58	3212	10	4402	11	375	12	3994	6	10783	8	2953	25	1970	45	603	8	12649	7			
beta-22	3370	18	119	80	828	80	3262	27	820	17	800	18	80	80	3716	57	1977	32	7219	64	6380	55	941	18	3516	64	61	80	80	2652	26	1785	44	2543	32	623	11	270	80				
beta-23	2381	44	1779	4	846	80	53	80	36	80	75	80	75	43	1741	55	2179	35	26178	4	17091	4	31	80	554	34	131	80	1838	11	2361	20	1750	26	880	7	32	80	17881	12			
beta-24	5681	28	1531	33	780	80	833	22	881	13	904	22	80	80	968	28	190	80	1686	45	29927	26	30	80	18144	4	8977	25	29	80	1460	5	1990	33	49	80	722	35	20963	14			
beta-25	1052	7	278	80	1090	80	1381	31	474	44	41	80	20	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55	80	55		
beta-26	3772	31	9788	25	1062	80	1321	15	428	32	1805	20	736	17	579	24	300	80	14018	3	384584	42	748	27	43450	9	8741	17	932	32	57	80	683	48	30	80	46	80	19990	5			
beta-27	2896	27	1972	34	848	80	3096	21	320	80	1327	20	44	80	13789	17	86323	7	59389	15	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	36218	4	
beta-28	7788	19	80	80	36	80	990	24	1154	12	1154	12	20	80	24	28	2524	2	1862	30	9058	39	1089	16	1687	50	3012	20	561	30	80	139	80	1305	24	80	80	3181	26				
beta-29	5402	35	9518	10	20508	5	3995	23	2029	30	2029	30	1136	18	4915	54	8921	20	359785	7	148223	3	1444	20	49484	2	11859	10	51948	4	1464465	3	372042	3	10660	5	146420	3	146420	3			
beta-30	161206	14	28485	6	119735	6	168000	3	156622	19	40565	6	8523	18	107852	26	40488	5	852982	6	477864	26	84994	8	84994	8	11234	6	17811	7	107021	9	120796	12	23495	18	30682	3	37390	15			
beta-31	6115	33	659	25	1132	80	159	80	3221	13	149	80	20	80	14715	25	3480	18	74274	9	398808	4	587	52	28740	4	82017	4	109	80	23487	5	21882	9	14854	56	24786	7	46219	8			
beta-32	18025	23	1661	54	970	80	14908	14	8691	18	3053	13	216	42	18127	29	5608	13	23563	28	24248	20	990	17	7975	32	2817	26	44	80	5145	8	1171	22	3415	26	2781	22	4991	18			
beta-33	88	80	648	34	1360	80	57	80	80	55	80	20	80	42	80	1617	40	30529	9	10789	9	24	80	64525	9	10789	9	24	80	64525	9	10789	9	24	80	64525	9	10789	9	24	80	64525	9
beta-34	2451	30	8247	12	11987	20	3900	28	55	80	2122	8	1407	25	579	26	4115	8	64025	17	19174	20	1899	32	9216	12	8952	6	5061	13	67001	5	42127	7	33822	7	4088	45	21503	5			
beta-35	8149	5	30637	13	189135	12	24068	6	5841	5	5635	2	1379	18	12627	11	2294	24	489474	4	2502124	8	2422	8	16099	9	96464	7	1093	34	88481	5	53090	5	56694								

Tornadoes Produced For Each Landfall Tropical Cyclone 1990-2001											
* Unable to confirm tornadoes due to straightline wind damage											
Year	Storm Name	Classification	Min Pressure	Max Wind Speed	F0	F1	F2	Unclassified	TOTAL		
2001	Allison	TS			18	5	0	0	23		
	Barry	TS			0	0	0	0	0		
TOTAL					18	5	0	0	23		
2000	Gordon	H1			3	2	0	1	6		
	Helene	TS			5	2	0	0	7		
TOTAL					8	4	0	1	13		
1999	Harvey	TS			1	1	0	0	2		
	Irene	H3			2	2	1	1	6		
	Floyd	H4			13	2	2	2	19		
	Dennis	H2			0	0	1	0	1		
	Bret	H4			3	0	0	0	3		
TOTAL					19	5	4	3	31		
1998	Bonnie	H3			4	3	0	0	7		
	Charley	TS			0	0	0	0	0		
	Earl	H2			6	2	1	0	9		
	Frances	TS			7	3	1	0	11		
	Georges	H5			20	8	0	0	28		
	Hermine	TS			1	1	0	0	2		
	Mitch	H5			3	2	1	0	6		
TOTAL					41	19	3	0	63		
1997	Danny	H1			4	3	2	0	9		
TOTAL					4	3	2	0	9		
1996	Arthur	TS			0	0	0	0	0		
	Bertha*	H3			1	3	0	5	9		
	Fran	H3			1	0	0	0	0		
	Josephine	TS			15	0	1	0	16		
TOTAL					17	3	1	5	25		
1995	Allison	H1			1	5	0	0	6		
	Dean	TS			1	0	0	0	1		
	Erin	H1			10	2	0	0	12		
	Jerry	TS			2	0	0	0	2		
	Opal	H4			16	1	1	0	18		
TOTAL					30	8	1	0	39		
1994	Alberto	TS			0	0	0	0	0		
	Beryl	TS			0	0	1	13	14		
	Gordon	H1			0	0	0	0	0		
TOTAL					0	0	1	13	14		
1993	Arlene	TS			0	0	0	0	0		
TOTAL					0	0	0	0	0		

Locality	Taxonomic Raw Abundance											Lithology		
	<i>Diacodexis</i>	<i>Hypododus</i>	<i>Haplomylus</i>	<i>Ectocion</i>	<i>Phenacodus</i>	<i>Homogalax</i>	<i>Hyracotherium</i>	<i>Cantius</i>	<i>Tetonius</i>	<i>Esthonyx</i>	<i>Crocodylia</i> indet.	Sum	Paleosol	Sandstone
FG 083	2	9	0	1	2	0	17	1	1	0	9	42	1.76	5.94
FG 084	11	30	14	4	9	30	81	25	2	7	8	221	2.19	11.36
FG 085	1	3	1	3	1	4	15	1	0	2	0	31	2.64	10.42
FG 090	0	1	0	0	2	4	6	0	1	1	0	15	1.74	5.48
MP 023	12	28	20	1	5	4	43	10	0	2	19	144	1.00	11.95
MP 025	1	5	1	0	3	3	14	2	1	0	9	39	1.41	18.95
MP 034	1	23	5	0	2	0	11	4	0	1	2	49	2.13	0.95
MP 035	3	1	1	0	1	0	5	0	0	1	5	17	1.40	2.50
MP 046	2	7	1	0	1	1	3	6	0	0	1	22	1.74	9.82
MP 130	2	8	5	0	2	5	15	4	1	3	4	49	1.27	0.00
MP 131	0	4	1	0	0	0	0	0	0	0	0	5	1.59	4.21
MP 133	0	11	6	2	1	1	5	4	0	0	0	30	1.39	13.79
MP 149	9	28	5	1	6	13	31	4	0	2	26	125	1.48	7.46
MP 198	0	0	0	0	0	2	5	2	0	1	1	11	1.11	0.77
MP 199	2	0	2	1	2	0	2	1	0	0	0	10	1.52	5.70
MP 200	0	1	1	1	1	3	14	0	0	0	3	24	1.34	8.18
MP 201	5	25	11	2	1	3	35	6	2	1	10	101	1.44	15.05
MP 205	2	2	1	1	0	0	6	0	0	0	0	12	1.68	9.35
MP 206	5	7	0	1	1	0	6	0	0	0	1	21	1.04	1.67
MP 208	0	0	6	0	0	3	13	0	0	1	3	26	1.06	18.92
MP 213	5	6	3	3	2	4	21	2	0	0	3	49	1.74	16.47
MP 215	0	5	2	0	0	0	4	2	0	0	2	15	1.47	9.33
MP 220	0	1	0	0	1	3	7	1	0	1	7	21	1.27	11.30
MP 222	1	3	0	2	2	0	7	3	0	0	3	21	0.98	14.00
MP 223	11	40	20	4	9	4	105	13	0	10	21	237	1.38	10.80
MP 225	3	5	2	0	4	0	14	6	0	6	2	42	1.37	12.78
MP 226	7	9	6	2	0	0	9	6	1	2	3	45	1.35	6.67
MP 227	0	6	2	0	0	0	0	2	0	1	0	11	1.06	11.04
MP 228	6	13	1	4	3	2	32	1	1	1	4	68	2.05	8.73
MP 229	5	20	11	1	0	2	14	7	0	1	1	62	1.25	25.60
MP 230	0	0	1	0	0	0	1	1	0	0	0	3	1.48	10.00
MP 231	1	6	6	0	0	4	4	3	1	0	5	30	1.44	4.94
MP 232	0	3	0	1	0	0	3	1	0	0	0	8	1.22	13.33
MP 245	9	21	14	7	4	1	51	10	8	2	34	161	1.51	4.84
MP 246	2	1	1	0	0	0	2	1	0	0	0	7	1.10	0.00
MP 247	0	4	3	0	3	1	7	0	1	1	4	24	1.61	13.91
MP 250	0	2	1	3	1	1	14	0	0	0	3	25	2.18	2.13
MP 251	10	8	4	1	2	4	18	8	0	3	0	58	2.09	5.52
MP 252	5	3	6	4	4	4	23	4	0	2	8	63	0.98	10.26
MP 267	2	0	1	0	0	0	7	2	1	0	0	13	1.60	12.94
MP 269	2	1	4	3	1	3	5	1	1	1	0	22	1.41	18.97
MP 270	2	9	8	1	0	3	9	8	1	1	0	42	1.58	1.11
MP 273	4	6	9	4	0	2	27	6	2	3	8	71	1.71	15.53
MP 276	2	0	0	0	1	1	3	0	0	2	3	12	1.33	11.19
MP 277	2	10	4	2	1	0	24	7	1	2	0	53	2.13	8.21
MP 278	3	5	3	0	3	3	7	0	0	0	0	31	2.26	4.70

- Public statistics is the most expensive content produced
 - tax funded
 - curated by professionals
- Users can't find it
 - numerous formats (pdf, html, db's, behind interfaces, subscriptions, etc.) --> hard to index
 - hard to use: costly to use, expertise required
- Work with data providers to curate, visualize and publish statistical data

*Organize the world's public data and
make it **universally accessible** and
useful.*

Accessible (1)



Example: [unemployment rate illinois](#)



unemployment rate illinois



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unemployment rate illinois **by county**

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[Unemployment rate, Illinois](#)



8.8% of the labor force - Not seasonally adjusted - Dec 2010

Source: U.S. Bureau of Labor Statistics

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www.google.com/publicdata

[\[PDF\] Illinois Unemployment Rate in December 2010](#) ☆ 🔍

File Format: PDF/Adobe Acrobat - [Quick View](#)

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*Organize the world's public data and
make it universally accessible and
useful.*

"The greatest value of a picture is when it forces us to notice
what we never expected to see."

- John W. Tukey (1977)

Useful (1)



Unemployment in the USA

Unemployment in the U.S. Visualization

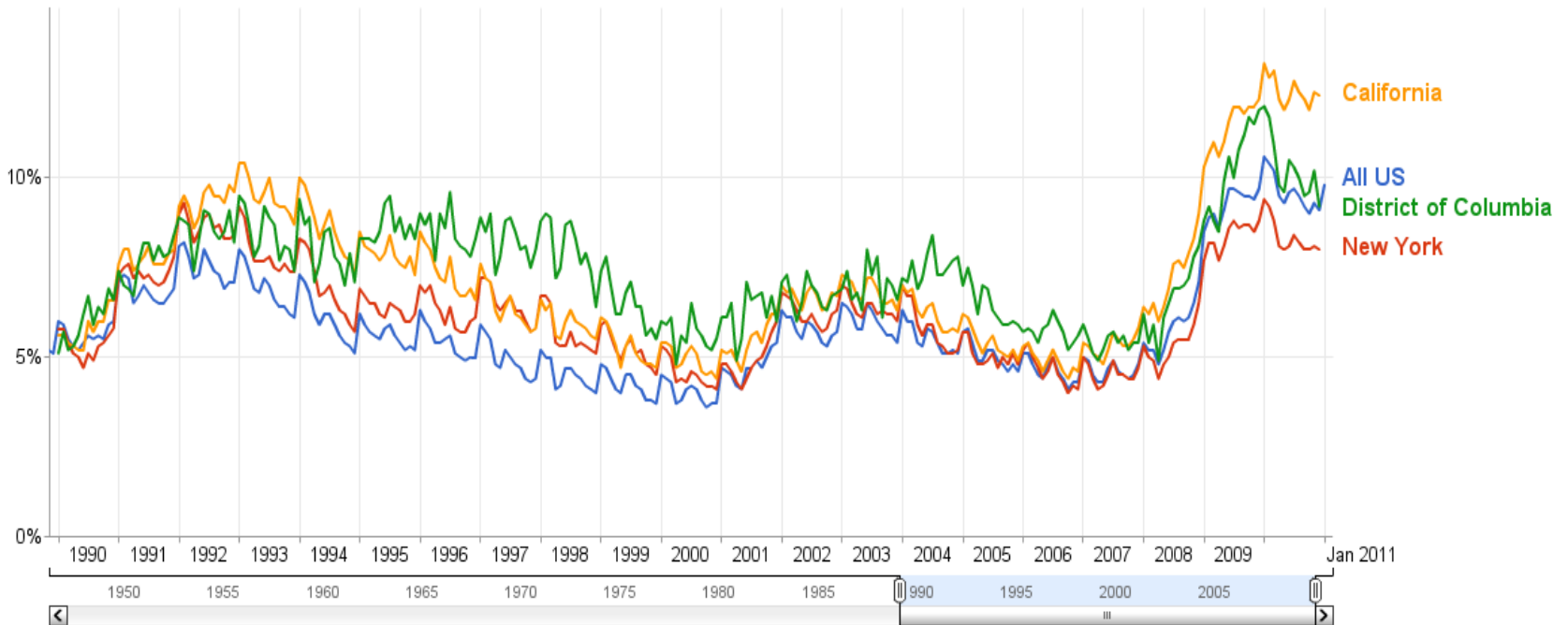
[Link](#)



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Location

- Alabama
 - Arizona
 - Arkansas
 - California
 - Colorado
 - Connecticut
 - Delaware
 - District of Columbia
 - Florida
 - Georgia
 - Hawaii
 - Idaho
 - Illinois
 - Indiana
 - Iowa
 - Kansas
 - Kentucky
 - Louisiana
 - Maine
- [Clear selections](#)

Unemployment rate - Not Seasonally Adjusted

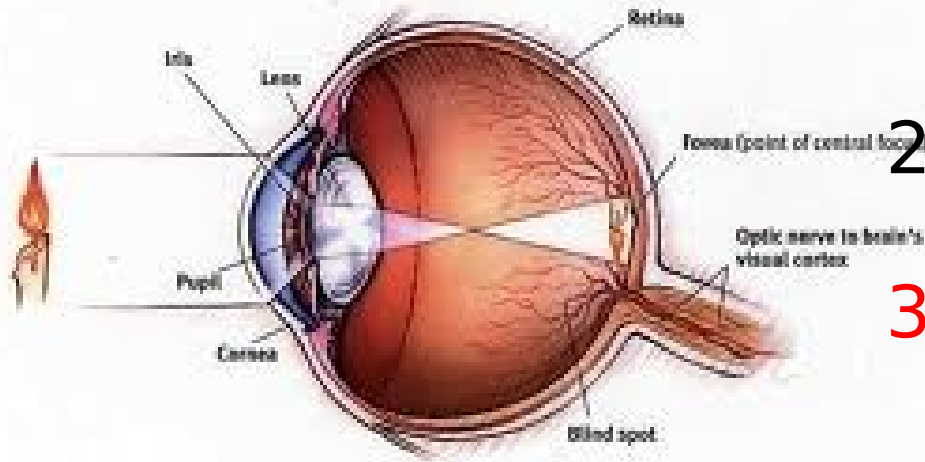


Data from: [U.S. Bureau of Labor Statistics](#)
Last updated: February 4, 2011

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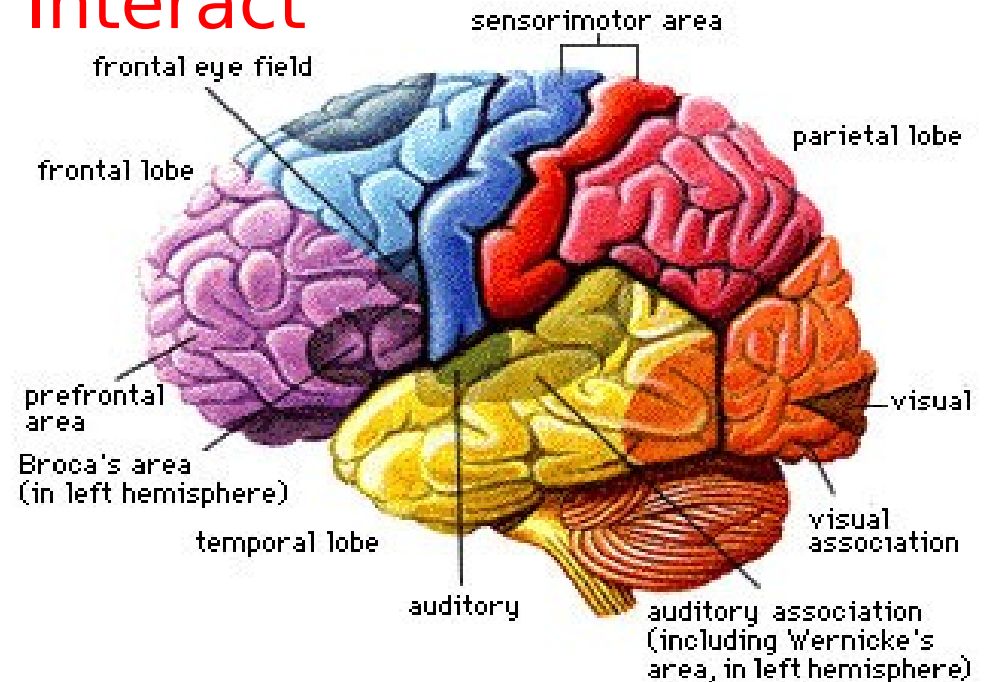
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Map visualization Embedding, Sharing



1. Listening learners <> Reading about a statistical result
2. Seeing learners <> Looking at a visualization
3. Touch / experience learners <> Interact

Lady Gaga and Justin Bieber are always only 1 click away!



***Organize the world's public data and
make it universally accessible and useful.***

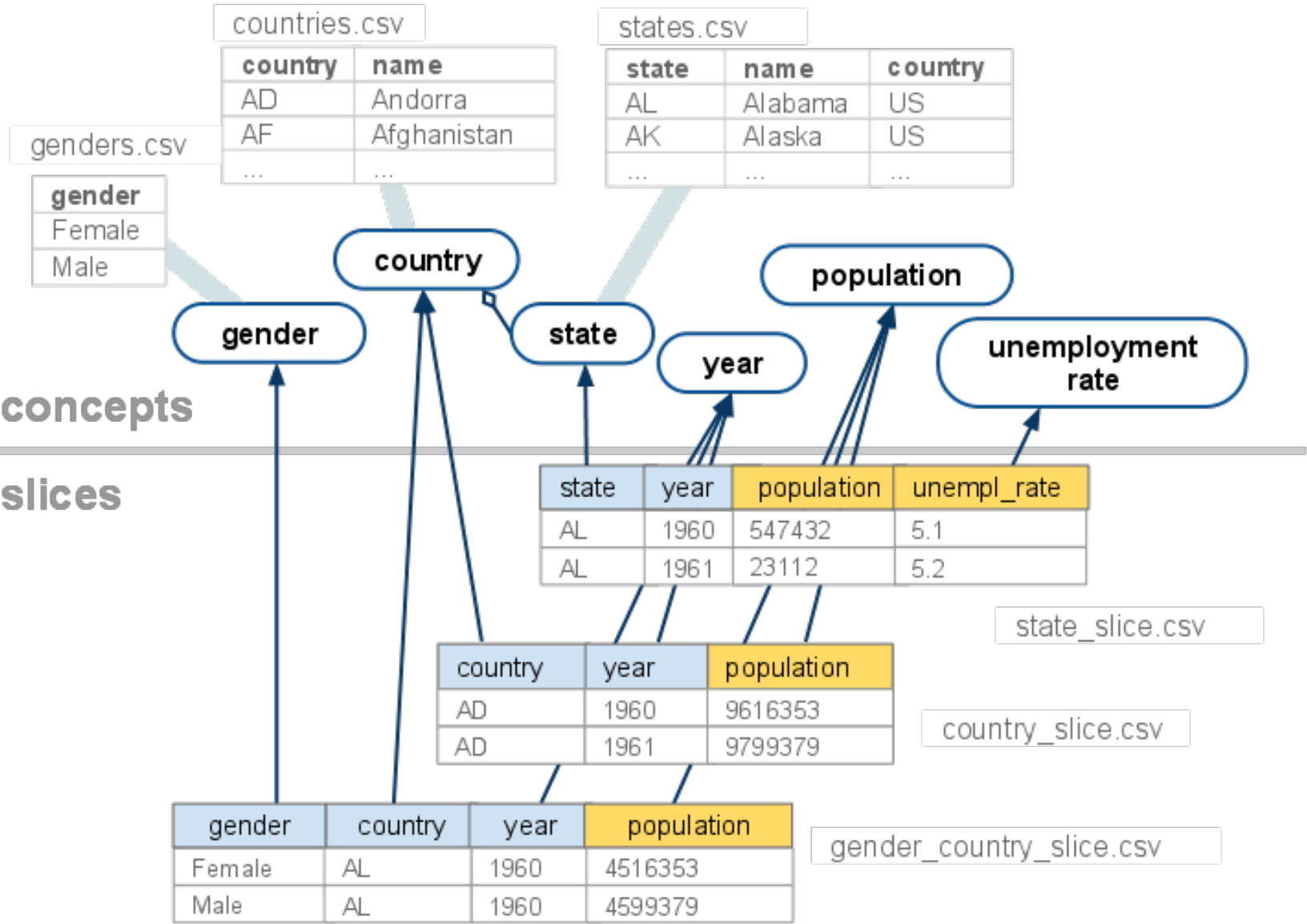
Dataset Publishing Language (DSPL)

- Designed for interactive exploration and visualization
- Released under BSD, open source license
- Combines *data tables* (CSV) with *metadata* (XML)
- Works best with categorical, time series data ...
... but can represent generic collections of tables too

Metadata contents

- Dataset info (name, description, URL, etc.)
- Provider info (name, description, URL, etc.)
- **Concepts**
 - Dimensions (e.g., "time", "country", "gender", "state") --> canonical concepts
 - Metrics (e.g., "population", "unemployment")
- **Slices**
- **Tables**
- **Topics**

Organize (2)



Organize (3)



```
<?xml version="1.0" encoding="UTF-8"?>
<dspl xmlns="http://schemas.google.com/dspl/2010" ...>
...
<info>
  <name>
    <value>My statistics</value>
  </name>
  <description>
    <value>Some very interesting statistics about countries</value>
  </description>
  <url>
    <value>http://www.stats-bureau.com/mystats/info.html</value>
  </url>
</info>

<provider>
  <name>
    <value>Bureau of Statistics</value>
  </name>
  <url>
    <value>http://www.stats-bureau.com</value>
  </url>
</provider> ....
```

- Bundle (zip) xml + csv files
- Upload on <http://www.google.com/publicdata/admin>
- --> Instant visualization!

See <http://code.google.com/apis/publicdata> for more details

LEHD project

Local Employment Dynamics for the State of Maine

All data

[By Age Group \(24\)](#)

[By County \(24\)](#)

[By Gender \(24\)](#)

[By Industry \(24\)](#)

[By Metro \(24\)](#)




[By WIA \(24\)](#)

US Census LED Quarterly Workforce Indicator report. Prepared by the US Census Bureau LED Program/Google based on data downloaded from the US Census Bureau LED Program.

Data from [U.S. Census Bureau LED Program](#) - Last updated: Jan 11, 2011

Data

[A1 - Beginning of Quarter Employment:Counts](#) -  -  - 

[A2 - End of Quarter Employment:Counts](#) -  -  - 

[A3 - Full-Quarter Employment\(Stable\):Counts](#) -  -  - 

[A4 - Employment - Reference Quarter:Counts](#) -  -  - 

[B1 - Hires All:Counts](#) -  -  - 

[B2 - Hires New:Counts](#) -  -  - 

[B3 - Hires Recalls:Counts](#) -  -  - 

[B4 - Separations:Counts](#) -  -  - 

[B5 - Hires All \(Stable\):Counts](#) -  -  - 

[B6 - Hires New \(Stable\):Counts](#) -  -  - 

[B7 - Separations \(Stable\):Counts](#) -  -  - 

[B8 - Turnover \(Stable\):Ratio](#) -  -  - 

[C1 - Firm Job Gains:Counts](#) -  -  - 

[C2 - Firm Job Loss:Counts](#) -  -  - 

[C3 - Firm Job Change:Net Change](#) -  -  - 

[C4 - Firm Job Gains \(Stable\):Counts](#) -  -  - 




[C5 - Firm Job Loss \(Stable\):Counts](#) -  -  - 

[C6 - Firm Job Change \(Stable\):Net Change](#) -  -  - 

[D1 - Full-Quarter Employment \(Stable\): Average Monthly Earnings](#) -  -  - 

[D2 - End of Quarter Employment: Average Monthly Earnings](#) -  -  - 

[D3 - Hires All \(Stable\): Average Monthly Earnings](#) -  -  - 

[D4 - Hires New \(Stable\): Average Monthly Earnings](#) -  -  - 

[D5 - Separations \(Stable\): Average Monthly Earnings](#) -  -  - 

[D6 - Hires All: Average Change-in Monthly Earnings](#) -  -  - 

Summary

Improving public data benefits providers and users



Public data providers

- Broader distribution and scale
- Compelling visualizations of data ([application embed](#))
- Google manages traffic
- Language support
- Enabled data feed (synchronization)
- Internal use: visual quality control
- Low development costs

Users

- Enhanced discovery
- Greater ability to explore data
- Share and embed visualizations

School comparisons



Where should I send my daughter to school?

Poverty



Are our policy and economic decisions improving people's lives?

Global warming



What impact are we having on the environment?

Thank you!
jurgen@google.com