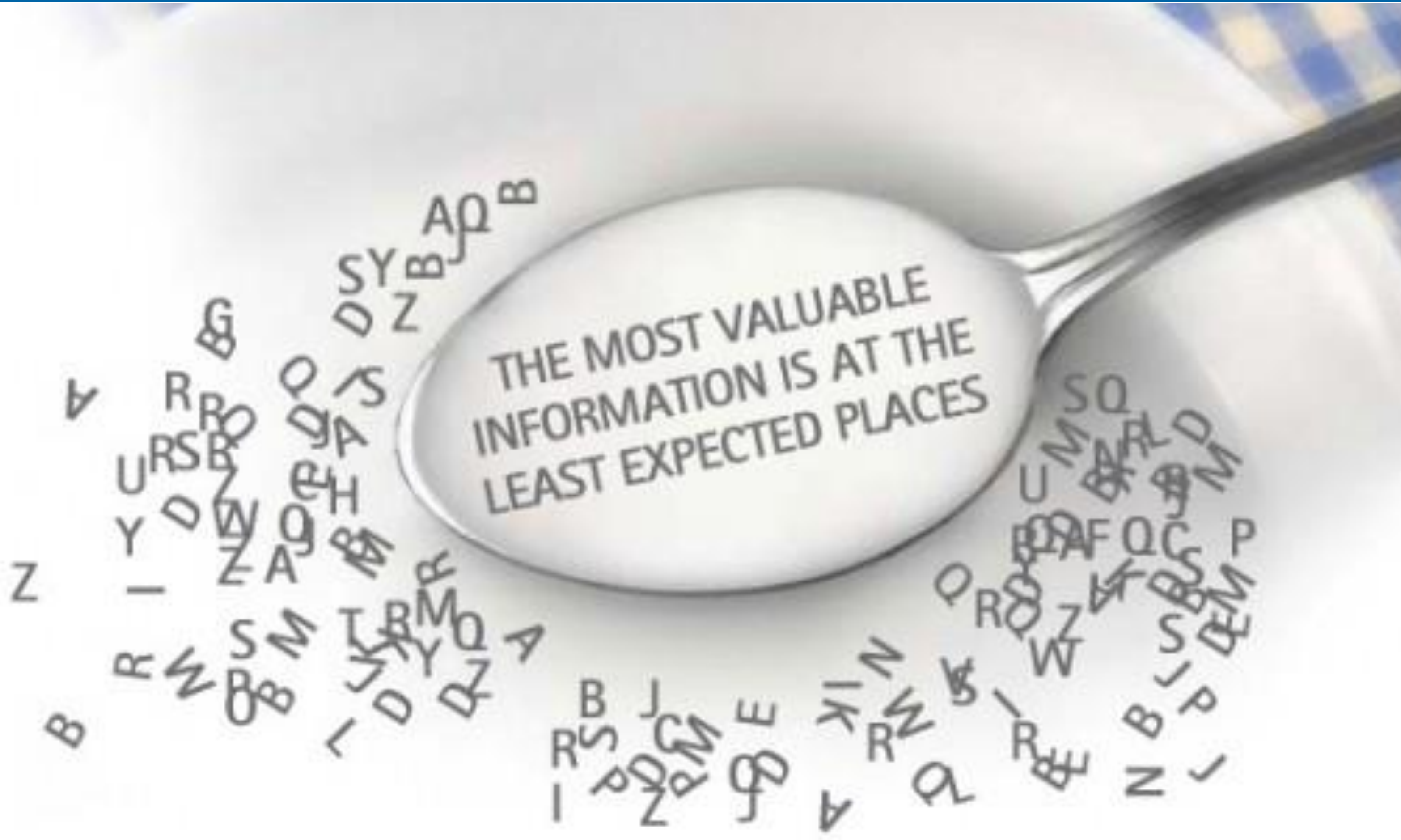
ZHAW Hochschultag



Sprachmodelle und Wort-Analogien

Mark Cieliebak

Sprachmodelle haben beeindruckende Anwendungen

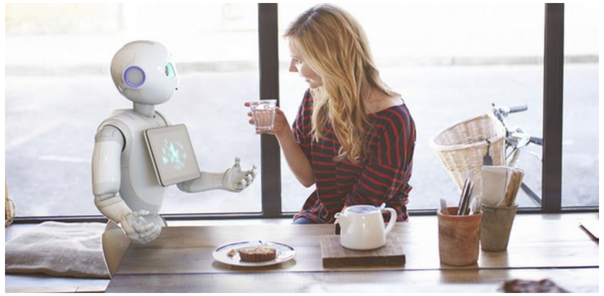
Machine Translation

Internet Search

Email Spam Detection

Social Media Monitoring

Siri & Co.



Emotional Robots

Sprachmodelle lernt der Computer durch LESEN

Ein Sprachmodell

can	0.5155	0.3922	0.5028	0.0754	0.2577	0.1081	0.4506	0.8543	0.8846	0.0735	0.6193	0.4665	0.0514	0.7233	0.0099	…
cancel	0.5322	0.1210	0.3636	0.7439	0.5725	0.8717	0.6490	0.2570	0.8216	0.0379	0.7010	0.5227	0.4154	0.0208	0.6943	…
cancer	0.8428	0.8249	0.1866	0.5433	0.2363	0.2876	0.0699	0.4021	0.3536	0.5550	0.8739	0.0676	0.1677	0.6342	0.0923	…
candidate	0.8666	0.0191	0.4946	0.2295	0.7789	0.9111	0.9861	0.3346	0.3630	0.6600	0.0986	0.5848	0.5875	0.4321	0.7821	…
candy	0.3189	0.1610	0.9404	0.3530	0.4365	0.7654	0.2500	0.5182	0.6641	0.5115	0.6963	0.8893	0.2031	0.9848	0.9100	…
cannot	0.5079	0.4045	0.2266	0.5008	0.8807	0.9993	0.5658	0.1223	0.9197	0.7432	0.8146	0.0170	0.8230	0.4321	0.6223	…
cap	0.2779	0.6267	0.9160	0.1734	0.6465	0.9158	0.0069	0.8747	0.2266	0.8204	0.6730	0.8763	0.0022	0.3199	0.0484	…
capable	0.9596	0.4305	0.4793	0.6468	0.7929	0.8989	0.1347	0.5853	0.3708	0.1799	0.8231	0.8921	0.2404	0.1599	0.1314	…
capacity	0.4897	0.1339	0.4320	0.0614	0.4611	0.9287	0.5865	0.1763	0.8463	0.0545	0.1887	0.7344	0.6176	0.9512	0.4871	…
capital	0.9512	0.0833	0.3092	0.1659	0.0421	0.7639	0.1220	0.4283	0.0398	0.8058	0.1165	0.5096	0.9672	0.2341	0.5635	…
captain	0.9397	0.5857	0.9925	0.5326	0.4376	0.9716	0.8523	0.2607	0.7638	0.7493	0.9601	0.9190	0.3447	0.1245	0.2801	…
capture	0.7114	0.0676	0.3310	0.1902	0.4096	0.8521	0.4033	0.9617	0.3120	0.5190	0.6215	0.4604	0.9345	0.6947	0.8225	…
car	0.0005	0.7991	0.5120	0.9244	0.4721	0.8163	0.8615	0.4768	0.8478	0.9161	0.3891	0.7498	0.9027	0.0978	0.6483	…
card	0.9763	0.6676	0.8416	0.6266	0.9205	0.1387	0.8243	0.9596	0.0505	0.7321	0.6015	0.2792	0.1946	0.6298	0.3299	…
cardboard	0.4977	0.2042	0.2347	0.2592	0.7314	0.1503	0.8643	0.6277	0.6528	0.3211	0.4284	0.6028	0.6579	0.3438	0.8679	…
care	0.0216	0.0397	0.9104	0.6622	0.5579	0.2447	0.8156	0.5961	0.6629	0.0037	0.1661	0.2409	0.4716	0.9933	0.0993	…
career	0.0714	0.9177	0.9954	0.2542	0.1337	0.2331	0.3211	0.3326	0.1933	0.8663	0.4766	0.1594	0.7823	0.4256	0.1565	…
careful	0.6943	0.1560	0.8262	0.2898	0.7068	0.1578	0.1624	0.5662	0.3325	0.9385	0.8462	0.7486	0.5997	0.4623	0.2557	…
carefully	0.3492	0.4429	0.1664	0.9426	0.0097	0.6261	0.8424	0.6461	0.1590	0.6048	0.6842	0.8323	0.7945	0.8261	0.5518	…
careless	0.6710	0.7272	0.2733	0.3674	0.2412	0.3951	0.6925	0.4001	0.4039	0.5197	0.7726	0.7053	0.3666	0.3052	0.7626	…
carelessly	0.6089	0.5111	0.9879	0.2249	0.6800	0.8130	0.5784	0.9545	0.4779	0.0664	0.2036	0.7427	0.1030	0.9314	0.9355	…
carpet	0.3812	0.3889	0.7021	0.9725	0.7991	0.7970	0.8733	0.1727	0.1407	0.0279	0.0106	0.9758	0.9660	0.2327	0.4367	…
carrot	0.7812	0.5279	0.7392	0.4465	0.7145	0.5353	0.4155	0.7697	0.3002	0.1780	0.2044	0.8343	0.9002	0.3512	0.4127	…
carry	0.9456	0.6843	0.1344	0.8874	0.6115	0.9514	0.8838	0.8683	0.6423	0.8614	0.1560	0.2350	0.4228	0.6077	0.3519	…
case	0.3617	0.8931	0.7898	0.2338	0.9778	0.1039	0.8316	0.9361	0.2614	0.2407	0.1572	0.3231	0.2880	0.5463	0.5149	…
cash	0.4424	0.2244	0.8616	0.7564	0.3774	0.0554	0.9152	0.1166	0.1737	0.5246	0.3976	0.6901	0.1335	0.4384	0.0897	…
cast	0.5727	0.7952	0.7037	0.4403	0.8816	0.4123	0.5694	0.2182	0.8957	0.1660	0.6692	0.4932	0.9080	0.5753	0.9519	…
castle	0.0807	0.7018	0.2580	0.1742	0.4891	0.3418	0.2245	0.2096	0.6284	0.8215	0.1285	0.1792	0.5564	0.6354	0.8945	…
cat	0.2349	0.3023	0.7348	0.0680	0.3166	0.6845	0.9944	0.0718	0.4963	0.1424	0.8737	0.6351	0.5867	0.5334	0.1291	…

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Text Understanding with Deep Learning

what is a car

Explain: <car>

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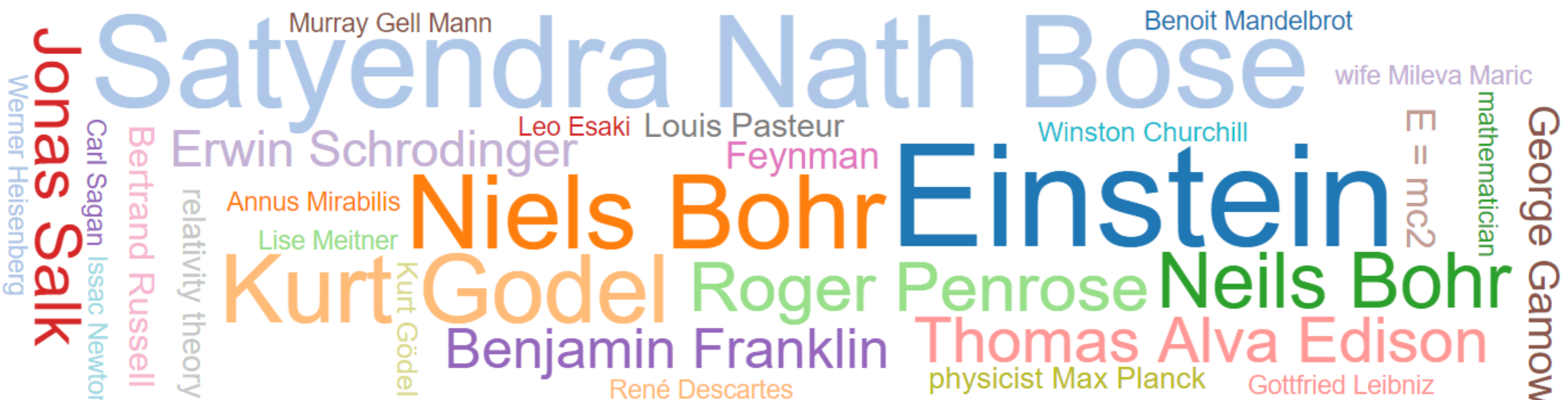
Text Understanding with Deep Learning

who is Albert Einstein

Explain: <Albert Einstein>



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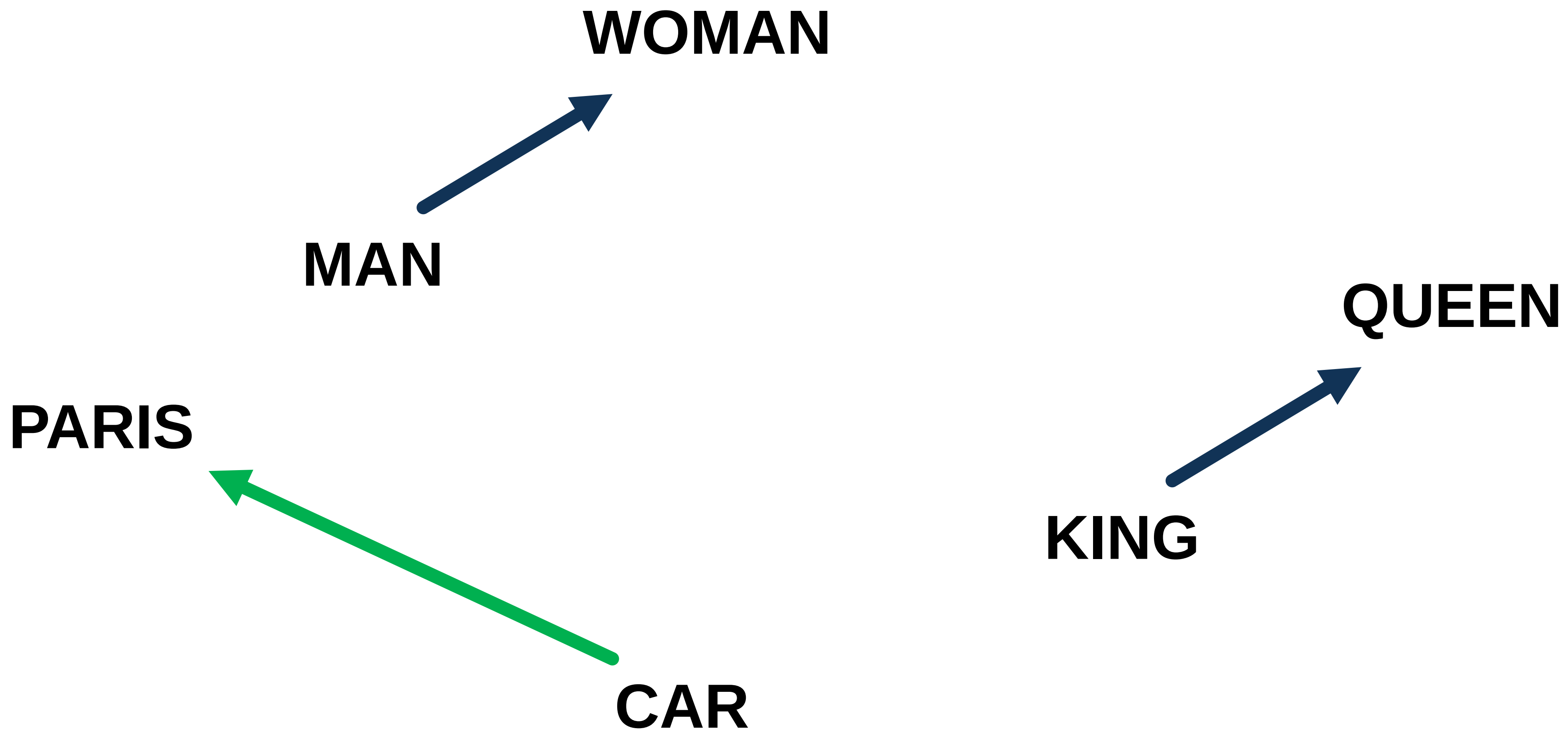
What is Zurich

Explain: <Zurich>

Mit Wort-Analogien das Sprachmodell verstehen



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Text Understanding with Deep Learning

man is to king as woman is to

Relation of <man> <king> and <woman>

man is to king as

woman is to **queen**

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Text Understanding with Deep Learning

painter is to Picasso as composer is to

Relation of <painter> <Picasso> and <composer>

painter is to

composer is to

Mozart	0.66
Beethoven	0.66
composers	0.62
Leonard Bernstein	0.60
JS Bach	0.59
Diabelli Variations	0.59
Tchaikovsky	0.59

Automatische Modelle "verstehen" Zusammenhänge

Relationship	Example 1	Example 2	Example 3
France - Paris	Italy: Rome	Japan: Tokyo	Florida: Tallahassee
big - bigger	small: larger	cold: colder	quick: quicker
Miami - Florida	Baltimore: Maryland	Dallas: Texas	Kona: Hawaii
Einstein - scientist	Messi: midfielder	Mozart: violinist	Picasso: painter
Sarkozy - France	Berlusconi: Italy	Merkel: Germany	Koizumi: Japan
copper - Cu	zinc: Zn	gold: Au	uranium: plutonium
Berlusconi - Silvio	Sarkozy: Nicolas	Putin: Medvedev	Obama: Barack
Microsoft - Windows	Google: Android	IBM: Linux	Apple: iPhone
Microsoft - Ballmer	Google: Yahoo	IBM: McNealy	Apple: Jobs
Japan - sushi	Germany: bratwurst	France: tapas	USA: pizza

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Text Understanding with Deep Learning

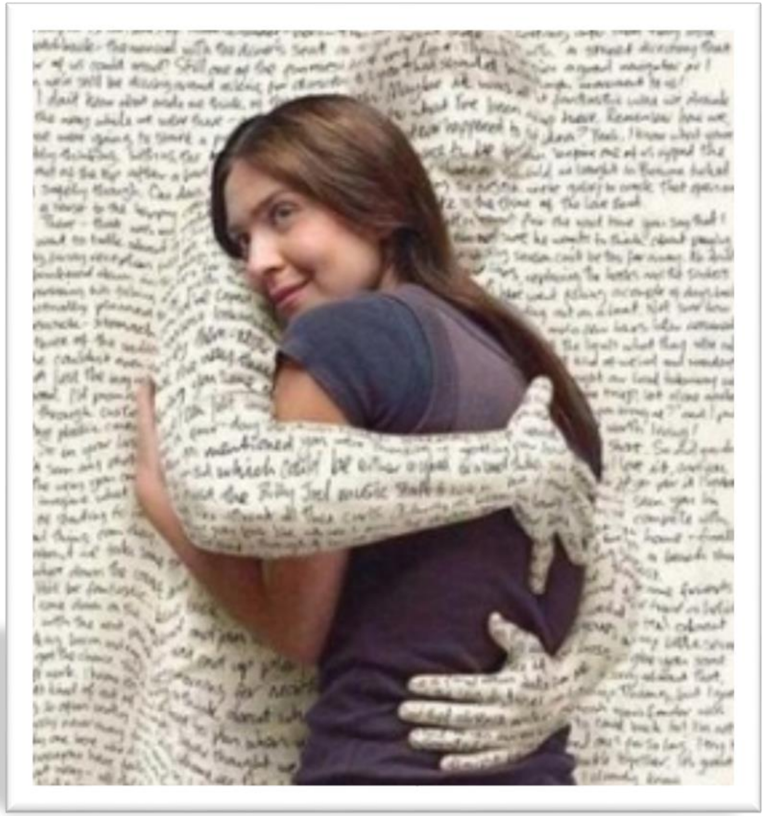
Tell me the sentiment of "This is a nice day"

Sentiment of <"This is a nice day">

Sentiment

Sentiment	Confidence
Positive	
Neutral	
Negative	

Vielen Dank für Ihre Aufmerksamkeit



Live-Demo

Die Demo wird betrieben von der SpinningBytes AG, einem Spin-off der ZHAW.

www.spinningbytes.com/demos