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MINI EMLNP

INTELLIGENCE

EMNLP 2018 Paper Presentatiors

Privacy-preserving Neural Representations of Text
Maximin Coavoux, Shashi Narayan, Shay B. Cohen

Don't Give Me the Details, Just the Summary! Topic-Aware Convolutional Neural Networks for Extreme Summarization
Shashi Narayan, Shay B. Cohen, Mirella Lapata

What do character-level models learn about morphology? The case of dependency parsing
Clara Vania, Andreas Grivas, Adam Lopez

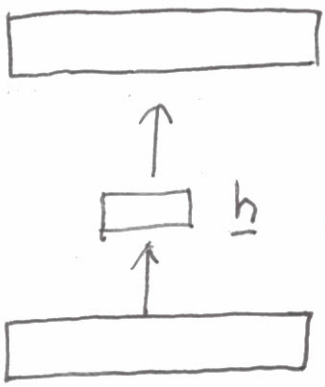
Accelerating Asynchronous Stochastic Gradient Descent for Neural Machine Translation
Nikolay Bogoychev, Marcin Junczys-Dowmunt, Kenneth Heafield, Alham Fikri Aji

Learning Unsupervised Word Translations Without Adversaries
Tanmoy Mukherjee, Makoto Yamada, Timothy Hospedales

Data Augmentation via Dependency Tree Morphing for Low-Resource Languages
Gözde Gül Sahin, Mark Steedman

Free Tickets: \UoEEdIntelligence\

Dimensionality reduction, Auto-encoders



Try to minimize

$$\sum_n \left(\underline{f}^{(n)} - \underline{x}^{(n)}\right)^T \left(\underline{f}^{(n)} - \underline{x}^{(n)}\right)$$

$$\underline{h} = g^{(1)}\left(W^{(1)}\underline{x} + \underline{b}^{(1)}\right)$$

$$\underline{f} = g^{(2)}\left(W^{(2)}\underline{h} + \underline{b}^{(2)}\right)$$

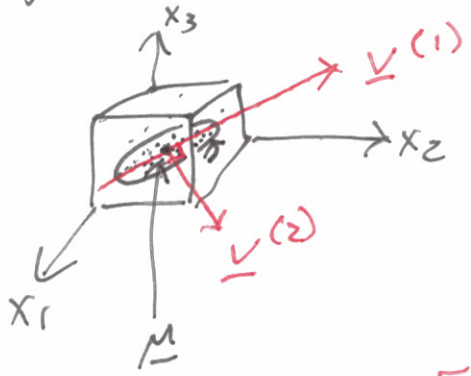
Use $g^{(1)}$ to reduce dimensionality new data

$g^{(2)}$ synthesize high-dim objects from a few numbers, $\underline{h}$

PCA

D = 3

High-dim ball of points



$v^{(k)}$ k^{th} eigen vector

$COV[X]$

(Tut2 Q4 bii)

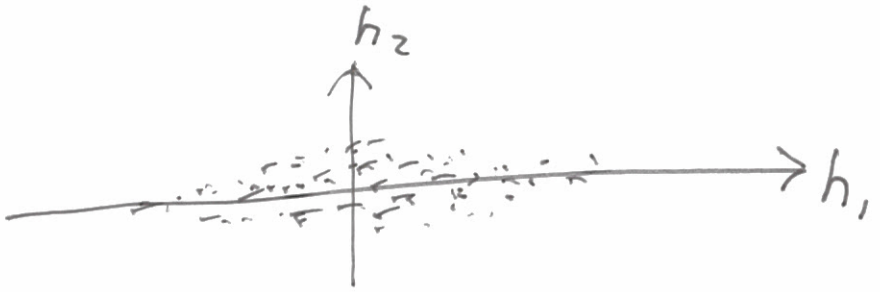
$$V = \underset{D \times K}{\begin{bmatrix} | & | & & | \\ v^{(1)} & v^{(2)} & \cdots & v^{(k)} \\ | & | & & | \end{bmatrix}}$$

eg 2

Reduce to k dim.

$$\underset{D \times 1}{x} \longrightarrow \underset{K \times 1}{V^T(x - \mu)} = h$$

μ: Training set mean



$$H = X \; V + \ldots$$

$N \times k \quad N \times D \quad D \times k$

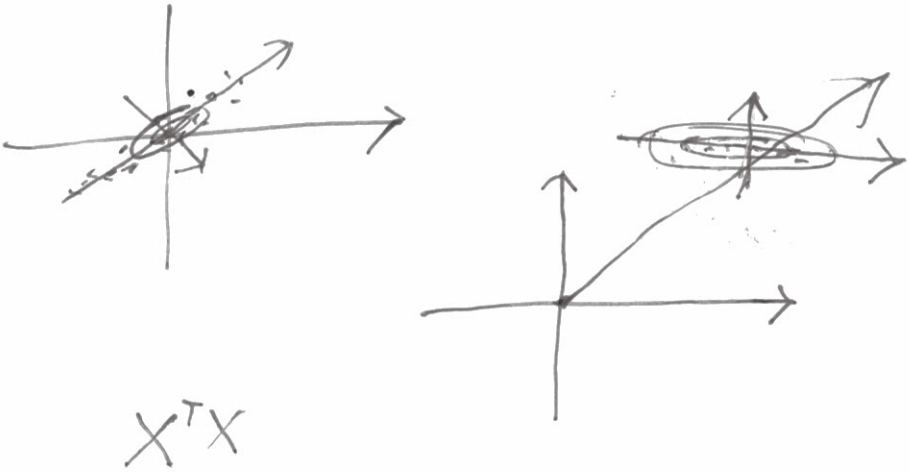
sort out mean

Reconstruct into D-dimensions

$$\underset{D \times 1}{\hat{\underline{x}}} = \underset{D \times k}{V} \; \underset{k \times 1}{\underline{h}} + \underline{\mu}$$

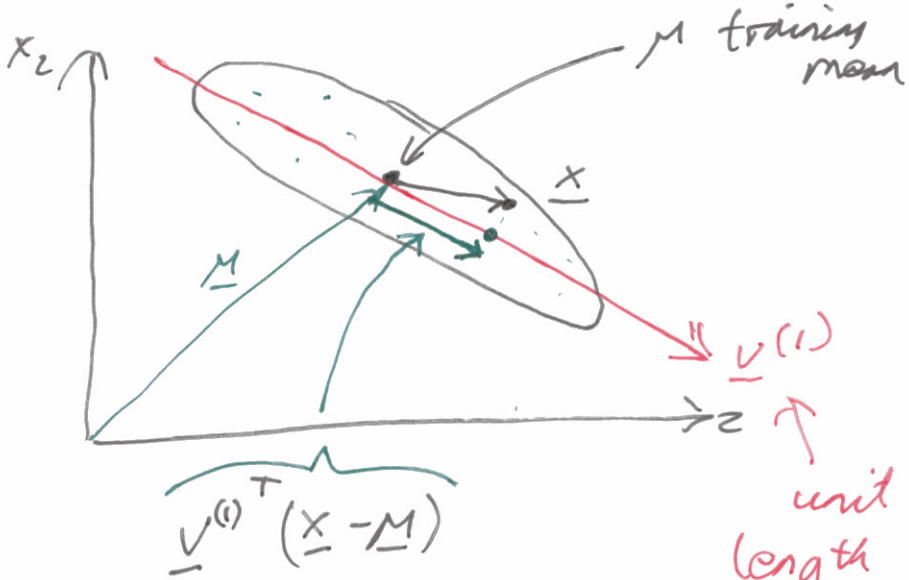
Projection: $\hat{\underline{x}} = V V^T (\underline{x} - \mu) + \underline{\mu}$

Why do the centering?



$X^T X$

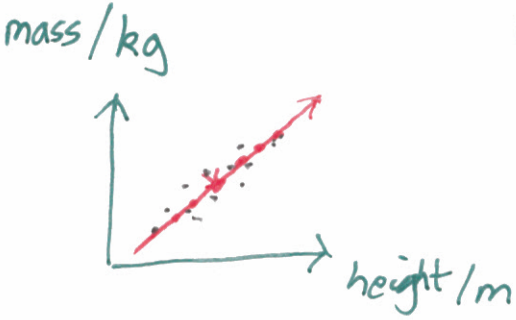
Special case: $D = 2,\ k = 1$

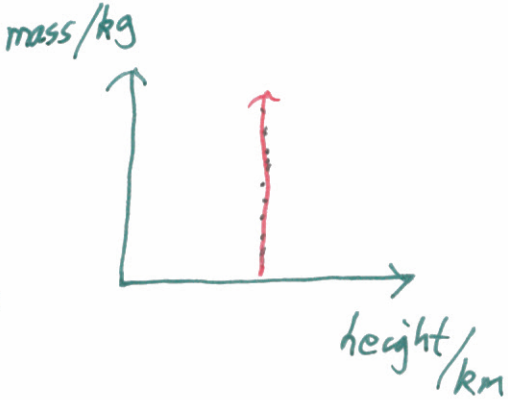


Reconstruct:

$$\underline{v}^{(1)}\left[\underline{v}^{(1)T}(\underline{x} - \underline{M})\right] + \underline{M}$$

Units of Features matters





Matlab: axis square

Python: plt.axis('square')

Gaussian model for PCA

Assume there is process in k-dimensions

$$\underset{k\times 1}{\underline{h}^{(n)}} \sim \mathcal{N}(\underline{0}, \mathbb{I}_k)$$

$$\underset{D\times 1}{\underline{x}^{(n)}} = \underset{D\times k}{V}\,\underset{k\times 1}{\underline{h}^{(n)}} + \underline{\mu} + \text{Gaussian noise, zero mean, cov } \sigma^2_{noise}\mathbb{I}_D$$

Model $\Rightarrow$

$$\underline{x} \sim \mathcal{N}(\underline{\mu}, VV^T + \sigma^2_{noise}\mathbb{I}_D)$$

$$\begin{aligned} \text{cov}[V\underline{h}^{(n)}] &= \mathbb{E}[V\underline{h}^{(n)}\underline{h}^{(n)T}V^T] \\ &= V\underbrace{\mathbb{E}[\underline{h}^{(n)}\underline{h}^{(n)T}]}_{\mathbb{I}_k}V^T \\ &= VV^T \end{aligned}$$

$p(y=1 \mid \underline{x}=\bullet) = \text{NaN}$

× class 1

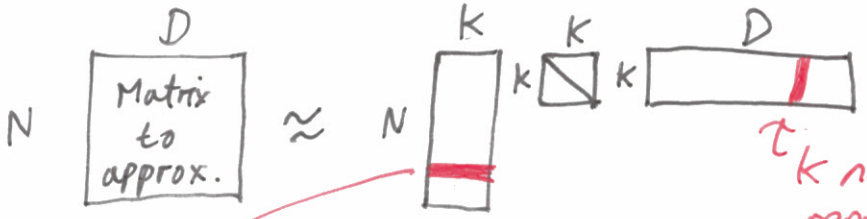
○ class 0

"Probabilistic PCA"

"Factor Analysis", noise arbitrary diagonal covariance

Truncated SVD

SVD it's a standard linear algebra method



k number representing the features.

$$X \approx U \; S \; V^T$$

$N \times K$

Low dimensional transformed data

same as in PCA (If X centred.)

k numbers representing a data item

Truncated SVD

$$\begin{bmatrix} X_{11} & X_{12} & \cdots & X_{1D} \\ X_{21} & X_{22} & \cdots & X_{2D} \\ X_{31} & X_{32} & \cdots & X_{3D} \\ X_{41} & X_{42} & \cdots & X_{4D} \\ X_{51} & X_{52} & \cdots & X_{5D} \\ \vdots & \vdots & \ddots & \vdots \\ X_{N1} & X_{N2} & \cdots & X_{ND} \end{bmatrix} \approx$$

```
% PCA via SVD,
% for zero-mean X:
[U, S, V] = svd(X, 0);
U = U(:, 1:K);
S = S(1:K, 1:K);
V = V(:, 1:K);
X_kdim = U*S;
X_proj = U*S*V';
```

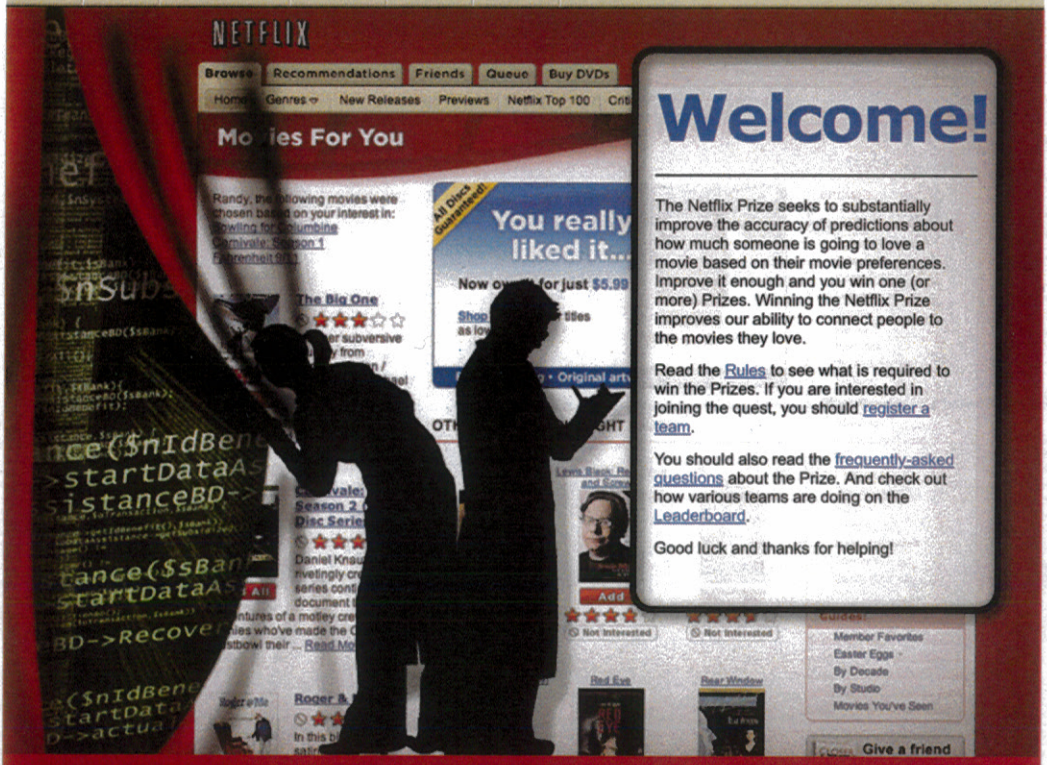
$$\begin{bmatrix} U_{11} & \cdots & U_{1K} \\ U_{21} & \cdots & U_{2K} \\ U_{31} & \cdots & U_{3K} \\ U_{41} & \cdots & U_{4K} \\ U_{51} & \cdots & U_{5K} \\ \vdots & \ddots & \vdots \\ U_{N1} & \cdots & U_{NK} \end{bmatrix} \begin{bmatrix} S_{11} & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & S_{KK} \end{bmatrix} \begin{bmatrix} V_{11} & V_{21} & \cdots & V_{D1} \\ \vdots & \vdots & \ddots & \vdots \\ V_{1K} & V_{2K} & \cdots & V_{DK} \end{bmatrix}$$

$$X \approx U \qquad S \qquad V^\top$$

NETFLIX

Netflix Prize

Home | Rules | Leaderboard | Register | Update | Submit | Download



Welcome!

The Netflix Prize seeks to substantially improve the accuracy of predictions about how much someone is going to love a movie based on their movie preferences. Improve it enough and you win one (or more) Prizes. Winning the Netflix Prize improves our ability to connect people to the movies they love.

Read the Rules to see what is required to win the Prizes. If you are interested in joining the quest, you should register a team.

You should also read the frequently-asked questions about the Prize. And check out how various teams are doing on the Leaderboard.

Good luck and thanks for helping!

FAQ | Forum | Netflix Home

NETFLIX

Netflix Prize

COMPLETED

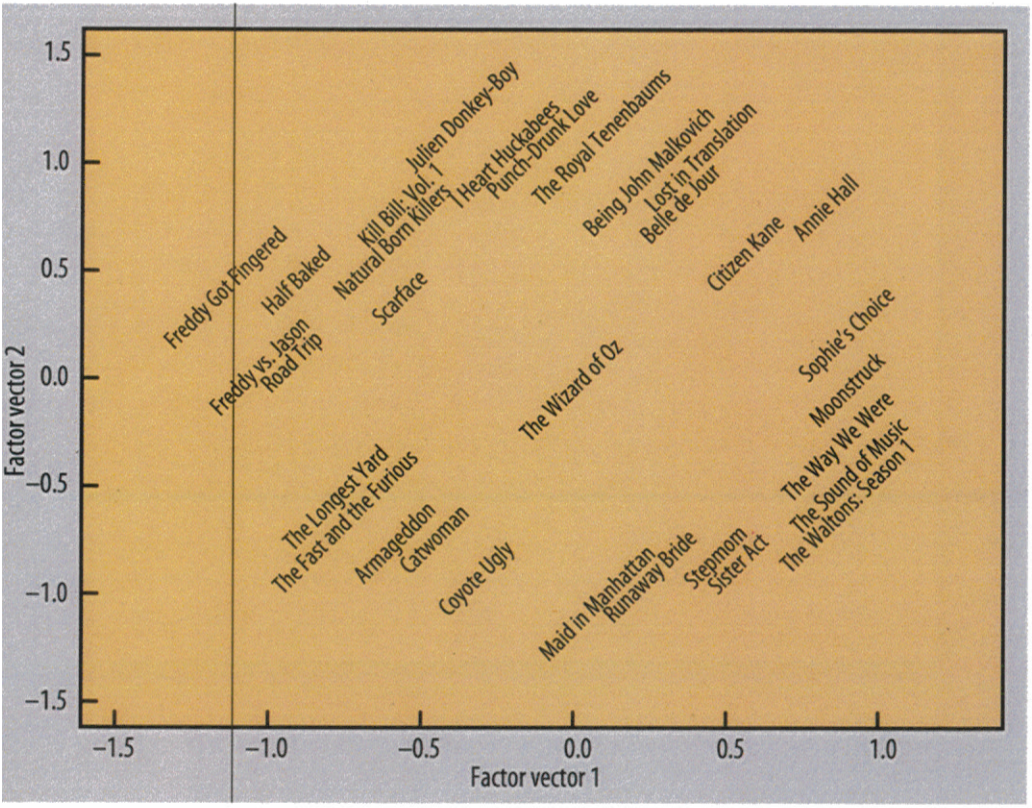
Home Rules Leaderboard Update

Leaderboard

Showing Test Score. Click here to show quiz score

Rank	Team Name	Best Test Score	% Improvement	Best Submit Time
Grand Prize - RMSE = 0.8567 - Winning Team: BellKor's Pragmatic Chaos				
1	BellKor's Pragmatic Chaos	0.8567	10.06	2009-07-26 18:18:28
2	The Ensemble	0.8567	10.06	2009-07-26 18:38:22
3	Grand Prize Team	0.8582	9.90	2009-07-10 21:24:40
4	Opera Solutions and Vandelay United	0.8588	9.84	2009-07-10 01:12:31
5	Vandelay Industries !	0.8591	9.81	2009-07-10 00:32:20
6	PragmaticTheory	0.8594	9.77	2009-06-24 12:06:56
7	BellKor in BigChaos	0.8601	9.70	2009-05-13 08:14:09
8	Dace	0.8612	9.59	2009-07-24 17:18:43
9	Feeds2	0.8622	9.48	2009-07-12 13:11:51
10	BigChaos	0.8623	9.47	2009-04-07 12:33:59
11	Opera Solutions	0.8623	9.47	2009-07-24 00:34:07
12	BellKor	0.8624	9.46	2009-07-26 17:19:11
Progress Prize 2008 - RMSE = 0.8627 - Winning Team: BellKor in BigChaos				
13	xiangliang	0.8642	9.27	2009-07-15 14:53:22
14	Gravity	0.8643	9.26	2009-04-22 18:31:32
15	Ces	0.8651	9.18	2009-06-21 19:24:53
16	Invisible Ideas	0.8653	9.15	2009-07-15 15:53:04
17	Just a guy in a garage	0.8662	9.06	2009-05-24 10:02:54
18	J Dennis Su	0.8666	9.02	2009-03-07 17:16:17
19	Craig Carmichael	0.8666	9.02	2009-07-25 16:00:54
20	acmehill	0.8668	9.00	2009-03-21 16:20:50
21	MonteCarlo	0.8669	8.99	2009-03-24 10:45:14
22	IDEA2	0.8669	8.99	2009-03-25 15:37:59
23	just_a_student	0.8675	8.92	2009-07-17 08:37:11
24	Howbert	0.8677	8.90	2009-07-26 07:13:00
25	My Brain and His Chain	0.8678	8.89	2008-09-30 02:19:47
26	Newman!	0.8681	8.86	2009-07-26 14:31:51
27	When Gravity and Dinosaurs Unite	0.8686	8.81	2008-02-29 06:48:56
28	Newman and Kramer !	0.8691	8.76	2009-07-23 23:46:20
29	Wojtek Kulik	0.8693	8.73	2009-07-24 14:20:15
30	See No Evil	0.8696	8.70	2009-07-20 13:58:43
31	netflixwinner	0.8697	8.69	2009-07-22 16:49:07
32	bbame	0.8699	8.67	2009-07-25 05:17:26
33	Peterrock	0.8702	8.64	2009-07-24 09:36:29
34	basho	0.8703	8.63	2009-07-26 00:44:48
35	bostonguy	0.8706	8.60	2009-07-24 08:52:22
36	krazy kanary	0.8708	8.58	2009-07-23 05:28:00
37	Jim Beckman	0.8709	8.57	2009-04-13 02:10:58
38	blednotik	0.8711	8.55	2009-04-18 23:28:42
39	md	0.8714	8.51	2009-01-19 17:53:42
40	GreenCircle	0.8714	8.51	2009-02-17 21:01:19

217	black_tea	0.8898	6.58	2008-11-03 20:49:06
218	lucky_13	0.8901	6.55	2008-10-09 17:09:17
219	blue_cup	0.8901	6.55	2008-10-09 23:19:05
220	DandA	0.8902	6.54	2009-01-31 14:19:12
221	OS_001	0.8905	6.51	2008-03-04 08:31:02
222	wrnf2008	0.8905	6.51	2009-07-24 15:03:22
223	Bozo_The_Clown	0.8908	6.48	2007-04-06 17:50:49
224	Remco	0.8909	6.47	2007-04-02 15:53:02
225	swallow	0.8909	6.47	2008-01-25 03:26:34
226	faceupdown	0.8910	6.46	2008-11-05 03:15:56
227	Adam Bull	0.8910	6.46	2009-04-28 22:26:49
228	pawko	0.8911	6.45	2009-07-26 18:26:48
229	SteveYoo	0.8913	6.43	2009-05-31 16:01:37
230	precious_diamond	0.8914	6.41	2008-08-12 21:31:31
231	Intelligent Agent	0.8915	6.40	2009-06-03 16:22:30
232	niko	0.8917	6.38	2008-12-13 17:21:56
233	MaximisedExpectations	0.8918	6.37	2009-07-05 13:25:01
234	sweaterr	0.8919	6.36	2009-04-02 18:39:13
235	Asylum Residents	0.8920	6.35	2007-06-14 17:45:14
236	vdicarlo	0.8921	6.34	2007-03-25 05:12:17
237	simonfunk	0.8921	6.34	2007-03-27 04:10:45
238	top_112	0.8921	6.34	2008-01-23 02:56:14
239	Slartibartfast	0.8922	6.33	2008-02-20 05:09:34
240	nemo	0.8923	6.32	2008-01-22 03:20:32
241	richard	0.8924	6.31	2008-01-23 02:47:07
242	PeanutButterLovers	0.8924	6.31	2009-07-07 18:23:13
243	Magnificent7	0.8926	6.29	2009-07-26 14:25:03
244	ahan	0.8927	6.28	2007-09-27 20:05:59
245	mokidao	0.8927	6.28	2007-09-27 20:19:57
246	patience	0.8928	6.27	2008-09-18 03:59:43
247	Team2403	0.8930	6.25	2008-03-12 07:07:10
248	green_tea	0.8931	6.24	2008-11-03 20:17:20
249	kouburgs	0.8932	6.23	2009-06-29 12:48:47
250	top ranker	0.8934	6.20	2008-02-29 18:12:48
251	Jaime_Carsten	0.8934	6.20	2008-09-09 21:12:00
252	CS_JH	0.8935	6.19	2008-09-09 20:36:44
253	Schumarzi	0.8937	6.17	2008-02-22 01:59:04
254	Christinas_Team	0.8939	6.15	2008-09-09 20:13:08
255	Pattern Excavator	0.8940	6.14	2007-11-02 16:22:01
256	Smultron	0.8944	6.10	2009-02-09 20:13:08
257	Need a job	0.8945	6.09	2009-07-26 05:48:01
258	Gerald Schwab	0.8946	6.08	2009-07-05 18:39:03
259	Zazpiak Bat	0.8948	6.06	2007-06-14 21:04:51
260	Learnflix	0.8948	6.06	2007-07-02 21:17:37
261	Atomic Rapadura	0.8950	6.04	2007-06-10 21:54:29
262	pgolle	0.8950	6.04	2007-09-11 05:08:49
263	Donkey Power	0.8950	6.04	2007-09-13 05:31:00
264	NYU Michael	0.8950	6.04	2009-07-25 14:04:58
265	Witi	0.8952	6.02	2007-09-09 14:28:53
266	The Gaussian Screen	0.8952	6.02	2007-10-23 21:25:16
267	W	0.8952	6.02	2007-11-28 17:36:34
268	Lucky VT	0.8952	6.02	2009-07-24 13:05:19
269	Rapadura	0.8956	5.97	2007-07-06 15:03:48
270	beluga	0.8956	5.97	2007-12-26 06:36:20
271	Rego Park	0.8957	5.96	2009-07-20 15:09:15
272	Dori.	0.8958	5.95	2009-06-28 04:33:34
273	Doron Rippel	0.8958	5.95	2009-07-03 21:41:42
274	DGrant	0.8958	5.95	2009-07-03 21:50:59
275	Spring Force	0.8959	5.94	2007-05-04 16:29:40



From Koren et al. (2009)