

Explorer: clustering data

- WEKA contains "clusterers" for finding groups of similar instances in a dataset
- Implemented schemes are:
 - *k*-Means, EM, Cobweb, *X*-means, FarthestFirst
- Clusters can be visualized and compared to "true" clusters (if given)





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Experiment other visualization options

Experiment different clustering parameters and algorithms



http://glaros.dtc.umn.edu/gkhome/cluto/gcluto/overview



http://glaros.dtc.umn.edu/gkhome/cluto/gcluto/overview



Download and Unzip "gcluto_1_0.zip"

gCLUTO Folders and Files (extracted)



gCLUTO "doc" Subfolder and Files





<u>1 Introduction</u>
 <u>1.1 What is gCLUTO</u>
 <u>1.2 Feetbrees</u>

For more information on CLUTO (original non-graphical version), download and Unzip "cluto-2.1.1.zip" at:

http://glaros.dtc.umn.edu/gkhome/cluto/cluto/download

gCLUTO "windows" Subfolder and Files





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	GRa2	0.660000	0.690000	1.000000	0.980000	0.980000	0.990000	0.940000	0.840000	0.890000	
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	GMFb	1.000000	0.970000	0.890000	0.940000	0.920000	0.510000	0.880000	0.750000	0.430000	
	GRa1	0.050000	0.230000	0.800000	0.620000	0.850000	0.850000	0.850000	1.000000	1.000000	
	GRa2	0.660000	0.690000	1.000000	0.980000	0.980000	0.990000	0.940000	0.840000	0.890000	
	GRa3	0.440000	0.690000	0.720000	1.000000	0.860000	0.900000	0.810000	0.570000	0.260000	~
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File Project Solution Window Help

∃ 😚 genes1-test
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Solution 1

solution 1 - Solution Results

Clustering Options							
Method: Repeated Bisection					#Clusters: 10		
CRfun: I2		Simfun: Cosine					
RowModel: None		Col Model : None			Graph Model: Asy	metric-Direct	
Col Prune: 1.000		EdgePrune: 0.000			VertexPrune: 0.00	0	
Nearest Nieghbors: 4		MinComponent: 1			CSType: Best		
#Trials: 10		#Iterations: 10					
10-way clustering: [70 of 70]							
Cluster Size		ISim	ISder	v	ESim	ESdev	
<u>0</u> 2		0.985	0.000	0	0.752	0.034	
1 2		0.949	0.00	0	0.770	0.036	
2 2		0.897	0.000	0	0.723	0.053	
3 2		0.954	0.00	0	0.817	0.051	
<u>4</u> 3		0.940	0.013	3	0.814	0.034	
<u>5</u> 29		0.968	0.00	9	0.875	0.014	
<u>6</u> 7		0.919	0.013	3	0.836	0.050	
<u>7</u> 3		0.965	0.00	5	0.884	0.007	
8 6		0.930	0.010	6	0.851	0.033	
<u>9</u> 14		0.953	0.023	2	D.885	0.029	
Go to Top							
Descriptive & Descriminating Feature	es						
Cluster 0 Size: 2 ISim: 0.985	ESim: 0.752						
Descriptive: 1	19.7%	11	19.7%	0	17.1%	3	10.3%
Descriminating: 1	14.7%	0	13.2%	11	10.5%	16	8.7%
Cluster 1 Size: 2 ISim: 0.949	ESim: 0.770						
Descriptive: 8	12.3%	13	10.5%	11	9.8%	15	9.1%
Descriminating: 3	15.8%	1	13.8%	2	13.2%	0	12.1%
Cluster 2 Size: 2 ISim: 0.897	ESim: 0.723						
Descriptive: 0	18.5%	1	15.2%	2	13.6%	4	11.5%
Descriminating: 0	15.5%	11	10.5%	13	9.7%	1	9.0%
Cluster 3 Size: 2 ISim: 0.954	ESim: 0.817						
Descriptive: 11	17.1%	3	14.8%	12	13.3%	13	11.5%

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gCluto - [solution 1]						
File Project Solution Window	Help					_ 8
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Save	Options				101 1 10	
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Recluster	None	30	nirun: Cosine		Graph Model: Asymetri	o-Direct
Create Matrix Visual	lization	Ec	daePrupe: 0.000		Vertex Prune: 0.000	0-Direct
Create Mountain Vis	ualization abbors: 4	Mi	inComponent: 1		CSTupe: Best	
	#Trials: 10	##	terations: 10		,	
	10-way clustering: [70 of 70]					
	Cluster Size	IS	im	ISdev	ESim	ESdev
	<u>0</u> 2	0.9	985	0.000	0.752	0.034
	1 2	0.9	949	0.000	0.770	0.036
	2 2	0.4	897	0.000	0.723	0.053
	3 2	0.0	954	0.000	0.817	0.051
	<u>4</u> 3	0.9	940	0.013	0.814	0.034
	<u>6</u> 29	0.0	968	0.009	0.875	0.014
	<u>6</u> 7	.0	919	0.013	0.836	0.050
	<u>/</u> 3	0.1	960	0.005	U.884	0.007
	<u>e</u> 0 0 14	0.3	930	0.022	0.005	0.020
	Go to Top	0.3	900	0.022	0.000	0.029
	Descriptive & Description Fest	1505				
	Cluster 0 Size: 2 ISim: 0.985	ESim: 0.752				
	Descriptive: 1	19.7% 11	19.7%	D	17.1% 3	10.3%
	Descriminating: 1	14.7% 0	13.2%	11	10.5% 16	8.7%
	Cluster 1 Size: 2 ISim: 0.949	ESim: 0.770				
	Descriptive: 8	12.3% 13	10.5%	11	9.8% 15	9.1%
	Descriminating: 3	15.8% 1	13.8%	2	13.2% 0	12.1%
	Cluster 2 Size: 2 ISim: 0.897	ESim: 0.723				
	Descriptive: 0	18.5% 1	15.2%	2	13.6% 4	11.5%
	Descriminating: 0	15.5% 11	10.5%	13	9.7% 1	9.0%
	Cluster 3 Size: 2 ISim: 0.954	ESim: 0.817				
	Descriptive: 11	17.1% 3	14.8%	12	13.3% 13	11.5%







Using other data sets

Preparing the data

Opening "housing.dat" in Excel

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10 0.17004 12.5 7.87 0 0.524 6.004 85.9 6.5921 5 311 15.2 386.71 17.1 18. 11 0.22489 12.5 7.87 0 0.524 6.307 94.3 6.3467 5 311 15.2 392.52 20.45 11 12 0.11747 12.5 7.87 0 0.524 6.809 82.9 6.267 5 311 15.2 396.9 15.71 21. 14 0.62976 0 8.14 0 0.538 5.949 61.8 4.7075 4 307 21 396.9 8.26 20. 15 0.63796 0 8.14 0 0.538 5.935 29.3 4.4619 4 307 21 386.26 6.82 23. 16 0.6739 0 8.14 0 0.538 5.935 29.3 4.4986 4 307 21 386.85 6.58 23. 17 1.05393 0 8.14 0 0.538 5.456 <td>9</td> <td>0.21</td> <td>124</td> <td>12.5</td> <td>7.87</td> <td>0</td> <td>0.524</td> <td>4 5.631</td> <td>100</td> <td>6.0821</td> <td>5</td> <td>311</td> <td>15.2</td> <td>386.63</td> <td>29.93</td> <td>16.5</td>	9	0.21	124	12.5	7.87	0	0.524	4 5.631	100	6.0821	5	311	15.2	386.63	29.93	16.5
11 0.22489 12.5 7.87 0 0.524 6.377 94.3 6.3467 5 311 15.2 392.52 20.45 1 12 0.11747 12.5 7.87 0 0.524 6.089 82.9 6.2267 5 311 15.2 396.9 13.27 18. 13 0.09378 12.5 7.87 0 0.524 5.889 39 5.4509 5 311 15.2 396.9 15.71 21. 14 0.62976 0 8.14 0 0.538 6.096 84.5 4.4619 4 307 21 386.9 8.20 10.5 18. 16 0.62739 0 8.14 0 0.538 5.936 29.3 4.4986 4 307 21 386.56 6.68 23. 17 1.05393 0 8.14 0 0.538 5.456 36.6 3.7965 4 307 21 386.57 14.67 17. 19 0.80271 0 8.14 0 0.538	10	0.17	004	12.5	7.87	0	0.524	4 6.004	85.9	6.5921	5	311	15.2	386.71	17.1	18.9
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19 0.80271 0 8.14 0 0.538 5.456 36.6 3.7965 4 307 21 288.99 11.69 20. 20 0.7258 0 8.14 0 0.538 5.727 69.5 3.7965 4 307 21 390.95 11.28 18. 21 1.25179 0 8.14 0 0.538 5.57 98.1 3.7979 4 307 21 396.57 21.02 13. 22 0.85204 0 8.14 0 0.538 5.965 89.2 4.0123 4 307 21 396.57 21.02 13. 23 1.23247 0 8.14 0 0.538 5.813 100 4.0952 4 307 21 394.54 19.88 14. 25 0.75026 0 8.14 0 0.538 5.959 85.7 4.4546 4 307 21 394.33 16.3 16.3 15.3 26 0.84054 0 8.14 0 0.538 <t< td=""><td>18</td><td>0.7</td><td>842</td><td>0</td><td>8.14</td><td>0</td><td>0.538</td><td>B 5.99</td><td>81.7</td><td>4.2579</td><td>4</td><td>307</td><td>21</td><td>386.75</td><td>14.67</td><td>17.5</td></t<>	18	0.7	842	0	8.14	0	0.538	B 5.99	81.7	4.2579	4	307	21	386.75	14.67	17.5
20 0.7258 0 8.14 0 0.538 5.727 69.5 3.7965 4 307 21 390.95 11.28 18. 21 1.25179 0 8.14 0 0.538 5.575 98.1 3.7979 4 307 21 376.57 21.02 13. 22 0.86204 0 8.14 0 0.538 5.965 89.2 4.0123 4 307 21 376.57 21.02 13. 23 1.23247 0 8.14 0 0.538 5.813 100 4.0952 4 307 21 396.9 18.72 15. 24 0.98843 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 394.33 16.3 15. 25 0.75026 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 393.42 16.51 13. 27 0.67191 0 8.14 0 0.538 6.813 <t< td=""><td>19</td><td>0.80</td><td>271</td><td>0</td><td>8.14</td><td>0</td><td>0.538</td><td>B 5.456</td><td>36.6</td><td>3.7965</td><td>4</td><td>307</td><td>21</td><td>288.99</td><td>11.69</td><td>20.2</td></t<>	19	0.80	271	0	8.14	0	0.538	B 5.456	36.6	3.7965	4	307	21	288.99	11.69	20.2
21 1.25179 0 8.14 0 0.538 5.57 98.1 3.7979 4 307 21 376.57 21.02 13. 22 0.85204 0 8.14 0 0.538 5.965 89.2 4.0123 4 307 21 392.53 13.83 19. 23 1.23247 0 8.14 0 0.538 6.142 91.7 3.9769 4 307 21 392.53 13.83 19. 24 0.98843 0 8.14 0 0.538 5.813 100 4.0952 4 307 21 394.54 19.88 14. 25 0.75026 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 394.54 19.88 14. 26 0.84054 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 394.54 16.51 13. 27 0.67191 0 8.14 0 0.538 6.607	20	0.7	258	0	8.14	0	0.538	3 5.727	69.5	3.7965	4	307	21	390.95	11.28	18.2
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24 0.98843 0 8.14 0 0.538 5.813 100 4.0952 4 307 21 394.54 19.88 14. 25 0.75026 0 8.14 0 0.538 5.599 94.1 4.3996 4 307 21 394.54 19.88 14. 26 0.84054 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 394.33 16.51 15. 27 0.67191 0 8.14 0 0.538 5.813 90.3 4.682 4 307 21 396.38 1.481 16. 28 0.95577 0 8.14 0 0.538 6.047 88.8 4.4534 4 307 21 306.38 17.28 14. 29 0.77299 0 8.14 0 0.538 6.674 87.3 4.239 4 307 21 387.94 12.8 18. 30 1.00245 0 8.14 0 0.538 5.713 <	23	1.23	247	0	8.14	0	0.538	B 6.142	91.7	3.9769	4	307	21	396.9	18.72	15.2
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26 0.84054 0 8.14 0 0.538 5.599 85.7 4.4546 4 307 21 303.42 16.51 13. 27 0.67191 0 8.14 0 0.538 5.813 90.3 4.682 4 307 21 376.88 14.81 16.51 13. 28 0.95577 0 8.14 0 0.538 6.047 88.8 4.4534 4 307 21 376.88 14.81 16. 29 0.77299 0 8.14 0 0.538 6.674 87.3 4.239 4 307 21 380.38 12.8 18. 30 1.00245 0 8.14 0 0.538 5.713 94.1 4.233 4 307 21 380.23 11.98 2 31 1.13081 0 8.14 0 0.538 5.713 94.1 4.233 4 307 21 360.17 22.6 12. 32 1.15081 0 0.538 5.713 94.1 <t< td=""><td>25</td><td>0.75</td><td>026</td><td>0</td><td>8.14</td><td>0</td><td>0.538</td><td>B 5.924</td><td>94.1</td><td>4.3996</td><td>4</td><td>307</td><td>21</td><td>394.33</td><td>16.3</td><td>15.6</td></t<>	25	0.75	026	0	8.14	0	0.538	B 5.924	94.1	4.3996	4	307	21	394.33	16.3	15.6
27 0.67191 0 8.14 0 0.538 5.813 90.3 4.682 4 307 21 376.88 14.81 16. 28 0.95577 0 8.14 0 0.538 6.047 88.8 4.4534 4 307 21 306.38 17.28 14. 29 0.77299 0 8.14 0 0.538 6.674 87.3 4.239 4 307 21 306.38 17.28 14. 30 1.00245 0 8.14 0 0.538 6.674 87.3 4.239 4 307 21 380.23 11.98 2 31 1.13081 0 8.14 0 0.538 5.713 94.1 4.233 4 307 21 360.17 22.6 12. 33 1.35/72 0 8.14 0 0.538 5.072 100 4.175 4 307 21 360.17 22.6 12. 34 1.35/72 0 8.14 0 0.538 5.072 100<	26	0.84	054	0	8.14	0	0.538	5.599	85.7	4.4546	4	307	21	303.42	16.51	13.9
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In this example, I will eliminate:

- First column: empty
- Last column: predicted value (don't need it for clustering

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2	0.02731	• · ·	0 7.07	0	0.469	6.42	1 78.9	4.9671	2	242	17.8	396.9	9.14			= =
3	0.02729		0 7.07	0	0.469	7.18	5 61.1	4.9671	2	242	17.8	392.83	4.03			
4	0.03237		0 2.18	0	0.458	6.998	8 45.8	6.0622	3	222	18.7	394.63	2.94			
5	0.06905		0 2.18	0	0.458	7.14	7 54.2	6.0622	3	222	18.7	396.9	5.33			
6	0.02985		0 2.18	0	0.458	6.4	3 58.7	6.0622	3	222	18.7	394.12	5.21			
7	0.08829	12.	.5 7.87	0	0.524	6.012	2 66.6	5.5605	5	311	15.2	395.6	12.43			
8	0.14455	12.	.5 7.87	0	0.524	6.172	2 96.1	5.9505	5	311	15.2	396.9	19.15			
9	0.21124	12.	.5 7.87	0	0.524	5.63	1 100	6.0821	5	311	15.2	386.63	29.93			
10	0.17004	12.	.5 7.87	0	0.524	6.004	4 85.9	6.5921	5	311	15.2	386.71	17.1			
11	0.22489	12.	.5 7.87	0	0.524	6.377	7 94.3	6.3467	5	311	15.2	392.52	20.45			
12	0.11747	12.	.5 7.87	0	0.524	6.00	9 82.9	6.2267	5	311	15.2	396.9	13.27			
13	0.09378	12.	.5 7.87	0	0.524	5.88	9 39	5.4509	5	311	15.2	390.5	15.71			
14	0.62976		0 8.14	0	0.538	5.949	9 61.8	4.7075	4	307	21	396.9	8.26			
15	0.63796		0 8.14	0	0.538	6.096	6 84.5	4.4619	4	307	21	380.02	10.26			_
16	0.62739		0 8.14	0	0.538	5.83	4 56.5	4.4986	4	307	21	395.62	8.47			
17	1.05393		0 8.14	0	0.538	5.93	5 29.3	4.4986	4	307	21	386.85	6.58			_
18	0.7842		0 8.14	0	0.538	5.99	9 81.7	4.2579	4	307	21	386.75	14.67			
19	0.80271		0 8.14	0	0.538	5.45	6 36.6	3.7965	4	307	21	288.99	11.69			
20	0.7258		0 8.14	0	0.538	5.72	7 69.5	3.7965	4	307	21	390.95	11.28			_
21	1.25179		0 8.14	0	0.538	5.5	7 98.1	3.7979	4	307	21	376.57	21.02			
22	0.85204		0 8.14	0	0.538	5.96	5 89.2	4.0123	4	307	21	392.53	13.83			_
23	1.23247		0 8.14	0	0.538	6.14	2 91.7	3.9769	4	307	21	396.9	18.72			
24	0.98843		0 8.14	U	0.538	5.81	3 100	4.0952	4	307	21	394.54	19.88			
25	0.75026		0 8.14	U	0.538	5.92	4 94.1	4.3996	4	307	21	394.33	16.3			-
26	0.84054		0 8.14	U	0.538	5.59	9 85.7	4.4546	4	307	21	303.42	16.51			
27	0.6/191		0 8.14	U	0.538	5.81.	3 90.3	4.682	4	307	21	376.88	14.81			
20	0.955//		0 0.14	U	0.530	6.04	68.8	4.4534	4	307	21	306.38	17.28			
29	1.00245		0 0.14	U	0.530	6.49	4 94.4	4.4547	4	307	21	387.94	12.8			
30	1.00245		0 0.14	0	0.530	5.0/4	4 07.3	4.239	4	307	21	300.23	11.98			-
31	1.13081		0 8.14	0	0.538	5.71.	3 94.1	4.233	4	307	21	300.17	12.04			~
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4	0.02723	0	2.18											2.94			
5	0.06905	0	2.18	2										5.33			
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7	0.08829	12.5	7.87	Documents										12.43			
8	0.14455	12.5	7.87											19.15			
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26	0.84054	U	8.14	U	0.538 5	CSV (Comma delimite	ed)			2	1 30	J3.42	16.51			
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20	0.955/7	U	0.14	U	0.530 0	0.047	04.4	4.4534	4	307	2	1 30	0.30	17.28			
29	1.00245	0	0.14	0	0.536 6	0.495	94.4	4.4547	4	307	2	1 30	07.94	12.0			_
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Create a new project in gCLUTO



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Import data into the currect project

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housing cluster csv		1	2	3	4	5	6	7	8	9	^
	1	0.006320	18.000000	2.310000		0.538000	6.575000	65.199997	4.090000	1.000000	
	2	0.027310		7.070000		0.469000	6.421000	78.900002	4.967100	2.000000	
	3	0.027290		7.070000		0.469000	7.185000	61.099998	4.967100	2.000000	
	4	0.032370		2.180000		0.458000	6.998000	45.799999	6.062200	3.000000	
	5	0.069050		2.180000		0.458000	7.147000	54.200001	6.062200	3.000000	
	6	0.029850		2.180000		0.458000	6.430000	58.700001	6.062200	3.000000	
	7	0.088290	12.500000	7.870000		0.524000	6.012000	66.599998	5.560500	5.000000	
	8	0.144550	12.500000	7.870000		0.524000	6.172000	96.099998	5.950500	5.000000	
	9	0.211240	12.500000	7.870000		0.524000	5.631000	100.000000	6.082100	5.000000	
	10	0.170040	12.500000	7.870000		0.524000	6.004000	85.900002	6.592100	5.000000	
	11	0.224890	12.500000	7.870000		0.524000	6.377000	94.300003	6.346700	5.000000	
	12	0.117470	12.500000	7.870000		0.524000	6.009000	82.900002	6.226700	5.000000	
	13	0.093780	12.500000	7.870000		0.524000	5.889000	39.000000	5.450900	5.000000	
	14	0.629760		8.140000		0.538000	5.949000	61.799999	4.707500	4.000000	
	15	0.637960		8.140000		0.538000	6.096000	84.500000	4.461900	4.000000	
	16	0.627390		8.140000		0.538000	5.834000	56.500000	4.498600	4.000000	
	17	1.053930		8.140000		0.538000	5.935000	29.299999	4.498600	4.000000	
	18	0.784200		8.140000		0.538000	5.990000	81.699997	4.257900	4.000000	
	19	0.802710		8.140000		0.538000	5.456000	36.599998	3.796500	4.000000	
	20	0.725800		8.140000		0.538000	5.727000	69.500000	3.796500	4.000000	
	21	1.251790		8.140000		0.538000	5.570000	98.099998	3.797900	4.000000	
	22	0.852040		8.140000		0.538000	5.965000	89.199997	4.012300	4.000000	
	23	1.232470		8.140000		0.538000	6.142000	91.699997	3.976900	4.000000	
	24	0.988430		8.140000		0.538000	5.813000	100.000000	4.095200	4.000000	
	25	0.750260		8.140000		0.538000	5.924000	94.099998	4.399600	4.000000	
	26	0.840540		8.140000		0.538000	5.599000	85.699997	4.454600	4.000000	
	27	0.671910		8.140000		0.538000	5.813000	90.300003	4.682000	4.000000	
	28	0.955770		8.140000		0.538000	6.047000	88.800003	4.453400	4.000000	
	29	0.772990		8.140000		0.538000	6.495000	94.400002	4.454700	4.000000	
	30	1.002450		8.140000		0.538000	6.674000	87.300003	4.239000	4.000000	~
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	1	0.006320	18.000000	2.310000		0.538000	6.575000	65.199997	4.090000	1.000000	
	2	0.027310		7.070000		0.469000	6.421000	78.900002	4.967100	2.000000	
	Edit Clustering	Options							4.967100	2.000000	
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		10				/		10.00000	4.257900	4.000000	_
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									4.012300	4.000000	-
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L	20	0.040540		0.140000		0.500000	5 500000	05 00007	4.399600	4.000000	_
	26	0.840340		8.140000		0.538000	5.533000	80.633337	4.404600	4.000000	_
	27	0.055770		0.140000		0.538000	0.013000	90.300003	4.662000	4.000000	-
	28	0.300770		0.140000		0.538000	6.047000 C 495000	08.800003	4.453400	4.000000	-
	29	1.002450		0.140000		0.00000	6.430000 6.674000	07 200002	4.404700	4.000000	_
	30	1.002400		8.140000		0.036000	0.074000	07.300003	4.233000	4.00000	>
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	1	0.006320	18.000000	2.310000		0.538000	6.575000	65.199997	4.090000	10
	2	0.027310		7.070000		0.469000	6.421000	78.900002	4.967100	8
	3	0.027290		7.070000		0.469000	7.185000	61.099998	4.967100	8
	4	0.032370		2.180000		0.458000	6.998000	45.799999	6.062200	8
	5	0.069050		2.180000		0.458000	7.147000	54.200001	6.062200	8
	6	0.029850		2.180000		0.458000	6.430000	58.700001	6.062200	8
	7	0.088290	12.500000	7.870000		0.524000	6.012000	66.599998	5.560500	12
	8	0.144550	12.500000	7.870000		0.524000	6.172000	96.099998	5.950500	12
	9	0.211240	12.500000	7.870000		0.524000	5.631000	100.000000	6.082100	12
	10	0.170040	12.500000	7.870000		0.524000	6.004000	85.900002	6.592100	12
	11	0.224890	12.500000	7.870000		0.524000	6.377000	94.300003	6.346700	12
	12	0.117470	12.500000	7.870000		0.524000	6.009000	82.900002	6.226700	12
	13	0.093780	12.500000	7.870000		0.524000	5.889000	39.000000	5.450900	6
	14	0.629760		8.140000		0.538000	5.949000	61.799999	4.707500	12
	15	0.637960		8.140000		0.538000	6.096000	84.500000	4.461900	12
	16	0.627390		8.140000		0.538000	5.834000	56.500000	4.498600	12
	17	1.053930		8.140000		0.538000	5.935000	29.299999	4.498600	6
	18	0.784200		8.140000		0.538000	5.990000	81.699997	4.257900	12
	19	0.802710		8.140000		0.538000	5.456000	36.599998	3.796500	7
	20	0.725800		8.140000		0.538000	5.727000	69.500000	3.796500	12
	21	1.251790		8.140000		0.538000	5.570000	98.099998	3.797900	12
	22	0.852040		8.140000		0.538000	5.965000	89.199997	4.012300	12
	23	1.232470		8.140000		0.538000	6.142000	91.699997	3.976900	12
	24	0.988430		8.140000		0.538000	5.813000	100.000000	4.095200	12
	25	0.750260		8.140000		0.538000	5.924000	94.099998	4.399600	12
	26	0.840540		8.140000		0.538000	5.599000	85.699997	4.454600	7
	27	0.671910		8.140000		0.538000	5.813000	90.300003	4.682000	12
	28	0.955770		8.140000		0.538000	6.047000	88.800003	4.453400	7
Γ	29	0.772990		8.140000		0.538000	6.495000	94.400002	4.454700	12
	30	1.002450		8.140000		0.538000	6.674000	87.300003	4.239000 💌	12
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