workshop09

February 3, 2019

```
In [100]: library(tidyverse)
          library(arules)

          # Plot size deppening on your screen resolution to 5 x 3
          options(repr.plot.width=4, repr.plot.height=4)
```

1 Welcome to Workshop 9

1.0.1 Exercise 1: Replicate the slide example

Read the shopping basket

```
In [18]: basket.tr <- read.transactions("BasketsCsv.csv", sep = ",")
          basket.tr
```

transactions in sparse format with
 10 transactions (rows) and
 15 items (columns)

Let's inspect some transactions

```
In [24]: inspect(head(basket.tr, 4))
```

```
     items
[1] {Bread,
     Cream,
     Eggs,
     Fruit,
     Jam,
     Milk}
[2] {Bread,
     Cheese,
     Cream,
     crisps,
     Eggs,
     Fruit,
     Jam,
```

```
      Milk,
      Vegetables}
[3] {Beer,
      Cream,
      Fruit,
      MapleSyrup}
[4] {Bread,
      Cream,
      Fruit,
      Jam,
      Softdrink,
      Steak}
```

How to see the most frequent items?

The `eclat()` takes in transactions object and gives the most frequent items in the data, based the support you provide to the supp argument. The `maxlen` defines the maximum number of items in each item set of frequent items:

```
In [25]: frequentItems <- eclat (basket_tr, parameter = list(supp = 0.5, maxlen = 3)) # calculat
         inspect(frequentItems)

Eclat

parameter specification:
 tidLists support minlen maxlen            target   ext
    FALSE     0.5      1      3 frequent itemsets FALSE

algorithmic control:
 sparse sort verbose
      7   -2    TRUE

Absolute minimum support count: 5

create itemset ...
set transactions ...[15 item(s), 10 transaction(s)] done [0.00s].
sorting and recoding items ... [5 item(s)] done [0.00s].
creating bit matrix ... [5 row(s), 10 column(s)] done [0.00s].
writing  ... [11 set(s)] done [0.00s].
Creating S4 object  ... done [0.00s].
      items               support count
[1]   {Fruit,Softdrink} 0.5      5
[2]   {Cream,Fruit,Jam} 0.5      5
[3]   {Fruit,Jam}       0.5      5
[4]   {Cream,Jam}       0.5      5
[5]   {Fruit,Milk}      0.6      6
[6]   {Cream,Fruit}     0.6      6
[7]   {Fruit}           0.9      9
```
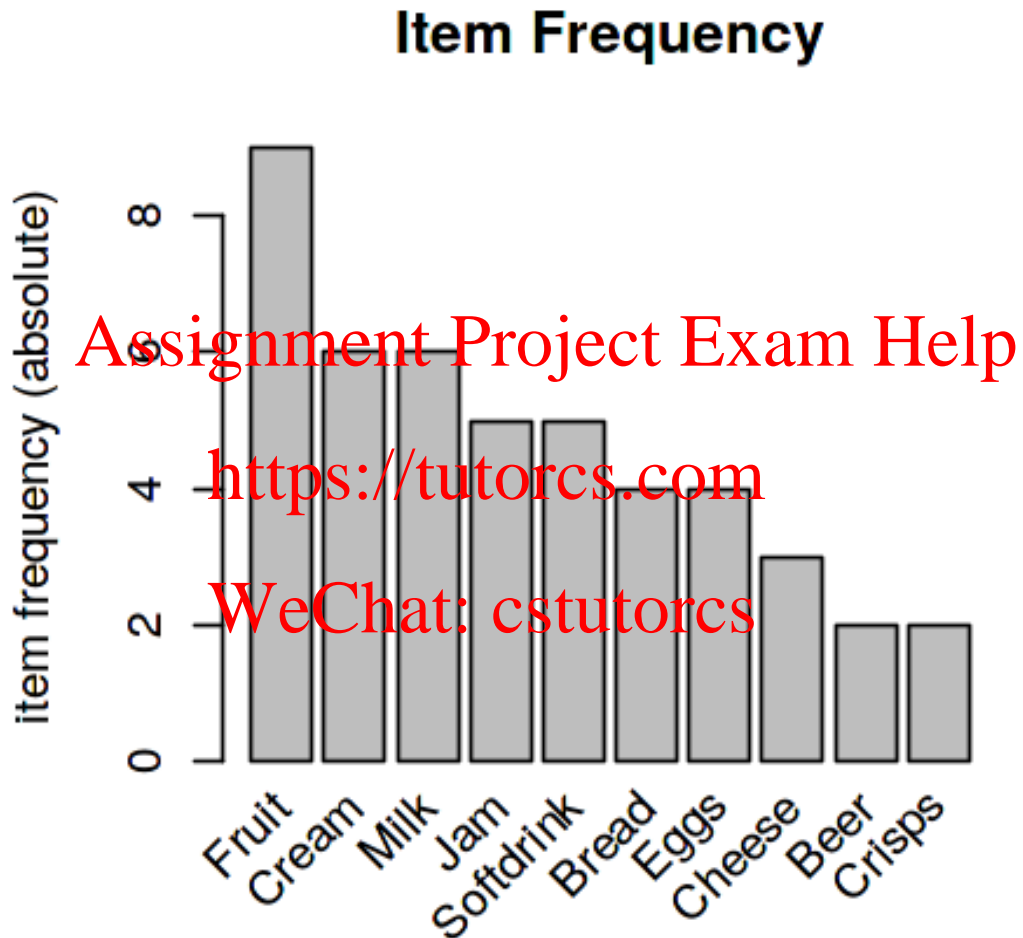
```
[8]  {Cream}           0.6      6
[9]  {Milk}            0.6      6
[10] {Jam}             0.5      5
[11] {Softdrink}       0.5      5
```

In [56]: itemFrequencyPlot(basket.tr, topN=10, type="absolute", main="Item Frequency")

Let's now perform item rule mining:

In [57]: basket.apriori <-apriori(basket.tr,
                         parameter = list(supp   = 0.5,
                                          conf   = 0.8,
                                          minlen = 2))

```
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen
        0.8    0.1    1 none FALSE            TRUE       5     0.5      2
 maxlen target    ext
     10  rules FALSE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 5

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[15 item(s), 10 transaction(s)] done [0.00s].
sorting and recoding items ... [5 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 done [0.00s].
writing ..[9 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

The output from this command gives all kinds of details of what has been done and how long it takes, but the output that interests us can be obtained with the command:

```
In [58]: inspect(basket.apriori)

      lhs             rhs       support confidence lift     count
[1] {Softdrink}   => {Fruit} 0.5       1.0000000  1.111111 5
[2] {Jam}         => {Cream} 0.5       1.0000000  1.666667 5
[3] {Cream}       => {Jam}   0.5       0.8333333  1.666667 5
[4] {Jam}         => {Fruit} 0.5       1.0000000  1.111111 5
[5] {Milk}        => {Fruit} 0.6       1.0000000  1.111111 6
[6] {Cream}       => {Fruit} 0.6       1.0000000  1.111111 6
[7] {Cream,Jam}   => {Fruit} 0.5       1.0000000  1.111111 5
[8] {Fruit,Jam}   => {Cream} 0.5       1.0000000  1.666667 5
[9] {Cream,Fruit} => {Jam}   0.5       0.8333333  1.666667 5
```

Thus the output consists of nine association rules. * The column lhs provides their antecedents, rhs provides their consequents. * The column support provides the support of the total itemset for that transaction (e.g. from rule 1, the support of the itemset {softdrink, fruit} is 0.5). * The next column (confidence) tells us that a shopping basket that contains jam is sure to contain cream. For example (rules 2 and 3), 100% of the time if there is Jam there is Cream, but only 83% of the time, if there is Cream there is Jam. Of course these figures are just for the current data set. In the future, we don't expect that every time cream is purchased, so will jam. * The final column (lift) tells us for example (association rule 2) that the likelihood of cream when there is jam is 1.667 (or 5/3) times the likelihood among all transactions.

4

Now let's have a look at the parameters that can be specified in the apriori command. These are all requirements that must be fulfilled by an association rule if they are to be listed.
* `supp = 0.5` means that the support of the total itemset must be at least 0.5; * `conf = 0.8` means that if the antecedents are present in the shopping basket, there must be at least a 80% probability that the consequent is in the basket; * `minlen = 2` means that there must be at least 2 items in the total itemset (this avoids either the antecedent or the consequent being empty.)

What is the correct value of the parameters to choose? The real point is to obtain association rules that are useful. An association rule is truly useful if * When the antecedents hold, the consequent is very likely to hold * That is, the confidence is high * The antecedents strongly increase the likelihood of the consequent; * That is the lift is reasonably large * It explains a previously unknown relationship. * This is beyond what the calculations can tell you. * A rule will not be useful if it applies to hardly any baskets. However, if the dataset (and your business) is sufficiently large, you may be interested in rules whose itemsets have relatively low support, as we will see with the lastfm example below.

The precise values to be attached to all these conditions depend on the size of the dataset, and what resources you have to investigate rules that are suggested. Once the list of conditions is obtained, someone has to work through them and decide what to do about them.

1.0.2   Exercise 2: Application of Association Analysis to online radio recommendations.

Now that we have some idea how the process works, let's look at a real and very large dataset where we might hope to get association rules that have interesting interpretations. This large dataset will involve some extra care with inputting the data, but the main analysis is essentially the same.

Load the file `lastfm.csv` as a dataframe and print out the first rows

```
In [110]: lastfm.df <- read.table("lastfm.csv",header = TRUE,sep = ",")
          lastfm.df <- lastfm.df %>%
                     filter(country=="China")
          lastfm.df
```

user	artist	sex	country
232	the fray	f	China
232	keane	f	China
232	franz ferdinand	f	China
1347	mono	f	China
1347	sigur rós	f	China
1347	nick drake	f	China
1347	blur	f	China
1347	jason mraz	f	China
1347	kings of convenience	f	China
1347	rufus wainwright	f	China
1347	mogwai	f	China
1519	linkin park	f	China
1519	jem	f	China
1519	foo fighters	f	China
1519	kt tunstall	f	China
1519	dido	f	China
1519	avril lavigne	f	China
1519	sarah mclachlan	f	China
1519	natasha bedingfield	f	China
1519	amy macdonald	f	China
1519	katie melua	f	China
1519	maria mena	f	China
1519	the corrs	f	China
1519	sheryl crow	f	China
1519	colbie caillat	f	China
1519	nelly furtado	f	China
1519	danny elfman	f	China
1519	aimee mann	f	China
1519	shakira	f	China
1519	paolo nutini	f	China
18800	the strokes	f	China
18800	mgmt	f	China
19223	silverstein	f	China
19223	escape the fate	f	China
19223	a day to remember	f	China
19223	saosin	f	China
19223	senses fail	f	China
19223	bring me the horizon	f	China
19223	new found glory	f	China
19223	story of the year	f	China
19223	chiodos	f	China
19223	bullet for my valentine	f	China
19223	underoath	f	China
19223	the all-american rejects	f	China
19223	emery	f	China
19223	simple plan	f	China
19445	tom waits	m	China
19445	joni mitchell	m	China
19445	bonnie prince billy	m	China
19445	cat stevens	m	China
19445	nick cave and the bad seeds	m	China

In supermarket terminology, think of user as shoppers and artists as the items bought.

The user is represented by a number which will be automatically classified as numeric. Turn this variable into a factor: (I hope you all remember workshop 1 :)

```
In [111]: lastfm.df$user <- factor(lastfm.df$user)
```

We are aiming to create a list for each user, of the artists they have listened to. This effectively turns the data into transaction form, just as the market basket analysis completed earlier. We will call this list playlist. We get the playlist by using the command split

```
In [112]: playlist <- split(x = lastfm.df[,'artist'], f = lastfm.df$user)
```

split divides the data in the vector x into the groups defined by f(f stands for factor) * x is the "artist" column of the data frame lastfm . * For each f (that is, for each user), split picks out those artists that the user has purchased. * Look at the original dataframe above to think about this.

To understand what this does, first ask in the console window for a printout of the first 5 elements of playlist:

```
In [113]: playlist[1:5]
```

$'232' 1. the rasmus 2. keane 3. franz ferdinand

Levels: 1. '2pac' 2. '30 seconds to mars' 3. '311' 4. '36 crazyfists' 5. '3 doors down' 6. '44' 7. '50 cent' 8. '65daysofstatic' 9. 'abba' 10. 'above & beyond' 11. 'ac/dc' 12. 'adam green' 13. 'a day to remember' 14. 'adele' 15. 'adema' 16. 'aerosmith' 17. 'aesop rock' 18. 'afi' 19. 'a fine frenzy' 20. 'after forever' 21. 'against me!' 22. 'agalloch' 23. 'a-ha' 24. 'aimee mann' 25. 'air' 26. 'akira yamaoka' 27. 'akon' 28. 'akurat' 29. 'alanis morissette' 30. 'alesana' 31. 'alexisonfire' 32. 'al green' 33. 'alice cooper' 34. 'alice in chains' 35. 'alicia keys' 36. 'alkaline trio' 37. 'all shall perish' 38. 'all that remains' 39. 'all time low' 40. 'alter bridge' 41. 'amon amarth' 42. 'amon tobin' 43. 'amorphis' 44. 'amy macdonald' 45. 'amy winehouse' 46. 'anathema' 47. 'anberlin' 48. 'andrew bird' 49. 'andrew lloyd webber' 50. '...and you will know us by the trail of dead' 51. 'angels & airwaves' 52. 'angra' 53. 'ani difranco' 54. 'animal collective' 55. 'anna ternheim' 56. 'anthrax' 57. 'anti-flag' 58. 'antonio vivaldi' 59. 'antony and the johnsons' 60. 'a perfect circle' 61. 'aphex twin' 62. 'apocalyptica' 63. 'apoptygma berzerk' 64. 'apparat' 65. 'arcade fire' 66. 'arch enemy' 67. 'architecture in helsinki' 68. 'archive' 69. 'arctic monkeys' 70. 'aretha franklin' 71. 'armin van buuren' 72. 'ashlee simpson' 73. 'asian dub foundation' 74. 'as i lay dying' 75. 'atb' 76. 'atmosphere' 77. 'atreyu' 78. 'a tribe called quest' 79. 'at the drive-in' 80. 'at the gates' 81. 'audioslave' 82. 'autechre' 83. 'avantasia' 84. 'avenged sevenfold' 85. 'avril lavigne' 86. 'ayreon' 87. 'babyshambles' 88. 'backstreet boys' 89. 'bad brains' 90. 'badly drawn boy' 91. 'bad religion' 92. 'band of horses' 93. 'barenaked ladies' 94. 'basement jaxx' 95. 'basshunter' 96. 'bat for lashes' 97. 'bathory' 98. 'battles' 99. 'bauhaus' 100. 'beastie boys' 101. 'beatsteaks' 102. 'beck' 103. 'bee gees' 104. 'behemoth' 105. 'beirut' 106. 'belle and sebastian' 107. 'ben folds' 108. 'ben folds five' 109. 'ben harper' 110. 'benny benassi' 111. 'beyoncé' 112. 'biffy clyro' 113. 'billie holiday' 114. 'billy joel' 115. 'billy talent' 116. 'björk' 117. 'black eyed peas' 118. 'blackfield' 119. 'black flag' 120. 'black label society' 121. 'black rebel motorcycle club' 122. 'black sabbath' 123. 'blank & jones' 124. 'blind guardian' 125. 'blink-182' 126. 'bloc party' 127. 'blonde redhead' 128. 'blondie' 129. 'bloodbath' 130. 'bloodhound gang' 131. 'blur' 132. 'boards of canada' 133. 'bob dylan' 134. 'bob marley' 135. 'bob marley & the wailers' 136. 'böhse onkelz' 137. 'bon iver'

138. ′bon jovi′ 139. ′bonnie prince billy′ 140. ′bonobo′ 141. ′booka shade′ 142. ′bowling for soup′ 143. ′boys like girls′ 144. ′boys noize′ 145. ′brand new′ 146. ′breaking benjamin′ 147. ′brian eno′ 148. ′bright eyes′ 149. ′bring me the horizon′ 150. ′britney spears′ 151. ′broken social scene′ 152. ′bruce springsteen′ 153. ′bryan adams′ 154. ′buckethead′ 155. ′buena vista social club′ 156. ′built to spill′ 157. ′bullet for my valentine′ 158. ′burial′ 159. ′burzum′ 160. ′bush′ 161. ′busta rhymes′ 162. ′buzzcocks′ 163. ′caetano veloso′ 164. ′cake′ 165. ′calexico′ 166. ′caliban′ 167. ′calvin harris′ 168. ′camel′ 169. ′camera obscura′ 170. ′cannibal corpse′ 171. ′cansei de ser sexy′ 172. ′captain beefheart & his magic band′ 173. ′carcass′ 174. ′carla bruni′ 175. ′cascada′ 176. ′cat power′ 177. ′cat stevens′ 178. ′céline dion′ 179. ′chamillionaire′ 180. ′charlie parker′ 181. ′chet baker′ 182. ′chevelle′ 183. ′chicane′ 184. ′chico buarque′ 185. ′children of bodom′ 186. ′chimaira′ 187. ′chiodos′ 188. ′chris brown′ 189. ′chris cornell′ 190. ′christina aguilera′ 191. ′chromeo′ 192. ′circa survive′ 193. ′city and colour′ 194. ′clap your hands say yeah′ 195. ′clint mansell′ 196. ′clueso′ 197. ′cobra starship′ 198. ′cocorosie′ 199. ′cocteau twins′ 200. ′coheed and cambria′ 201. ′colbie caillat′ 202. ′coldplay′ 203. ′cold war kids′ 204. ′coma′ 205. ′combichrist′ 206. ′comeback kid′ 207. ′common′ 208. ′converge′ 209. ′corinne bailey rae′ 210. ′counting crows′ 211. ′cradle of filth′ 212. ′craig david′ 213. ′cream′ 214. ′creed′ 215. ′creedence clearwater revival′ 216. ′crystal castles′ 217. ′cunninlynguists′ 218. ′cursive′ 219. ′cut copy′ 220. ′cute is what we aim for′ 221. ′cypress hill′ 222. ′daft punk′ 223. ′damian marley′ 224. ′damien rice′ 225. ′danny elfman′ 226. ′darkthrone′ 227. ′dash berlin′ 228. ′dashboard confessional′ 229. ′dave matthews band′ 230. ′david bowie′ 231. ′david gray′ 232. ′david guetta′ 233. ′dead can dance′ 234. ′dead kennedys′ 235. ′death′ 236. ′death cab for cutie′ 237. ′death from above 1979′ 238. ′deathstars′ 239. ′deep purple′ 240. ′deerhoof′ 241. ′deerhunter′ 242. ′def leppard′ 243. ′deftones′ 244. ′deichkind′ 245. ′de la soul′ 246. ′delerium′ 247. ′depeche mode′ 248. ′de-phazz′ 249. ′descendents′ 250. ′dethklok′ 251. ′deus′ 252. ′devendra banhart′ 253. ′devildriver′ 254. ′devo′ 255. ′diana krall′ 256. ′dido′ 257. ′die apokalyptischen reiter′ 258. ′die Ärzte′ 259. ′die toten hosen′ 260. ′digitalism′ 261. ′dimmu borgir′ 262. ′dinosaur jr.′ 263. ′dio′ 264. ′dir en grey′ 265. ′dire straits′ 266. ′dirty pretty things′ 267. ′disturbed′ 268. ′dizzee rascal′ 269. ′django reinhardt′ 270. ′dj krush′ 271. ′dj shadow′ 272. ′dmx′ 273. ′dope′ 274. ′doves′ 275. ′down′ 276. ′dragonforce′ 277. ′dr. dre′ 278. ′dream theater′ 279. ′dredg′ 280. ′dropkick murphys′ 281. ′drowning pool′ 282. ′duffy′ 283. ′duran duran′ 284. ′eagles′ 285. ′eagles of death metal′ 286. ′echo & the bunnymen′ 287. ′eddie vedder′ 288. ′edguy′ 289. ′Édith piaf′ 290. ′editors′ 291. ′eels′ 292. ′einstürzende neubauten′ 293. ′elbow′ 294. ′electric light orchestra′ 295. ′electric six′ 296. ′ella fitzgerald′ 297. ′elliott smith′ 298. ′elton john′ 299. ′eluveitie′ 300. ′elvis costello′ 301. ′elvis presley′ 302. ′emery′ 303. ′emilíana torrini′ 304. ′emilie autumn′ 305. ′emilie simon′ 306. ′eminem′ 307. ′enigma′ 308. ′ennio morricone′ 309. ′enrique iglesias′ 310. ′ensiferum′ 311. ′enter shikari′ 312. ′enya′ 313. ′epica′ 314. ′equilibrium′ 315. ′era′ 316. ′eric clapton′ 317. ′erykah badu′ 318. ′escape the fate′ 319. ′evanescence′ 320. ′explosions in the sky′ 321. ′faithless′ 322. ′faith no more′ 323. ′fall out boy′ 324. ′farin urlaub′ 325. ′fatboy slim′ 326. ′fear factory′ 327. ′feeder′ 328. ′feist′ 329. ′fergie′ 330. ′ferry corsten′ 331. ′final fantasy′ 332. ′finch′ 333. ′finntroll′ 334. ′fiona apple′ 335. ′fischerspooner′ 336. ′fleet foxes′ 337. ′fleetwood mac′ 338. ′flight of the conchords′ 339. ′flogging molly′ 340. ′flo rida′ 341. ′flying lotus′ 342. ′flyleaf′ 343. ′foals′ 344. ′foo fighters′ 345. ′fort minor′ 346. ′four tet′ 347. ′frank sinatra′ 348. ′frank zappa′ 349. ′franz ferdinand′ 350. ′frédéric chopin′ 351. ′from autumn to ashes′ 352. ′from first to last′ 353. ′frou frou′ 354. ′fugazi′ 355. ′funeral for a friend′ 356. ′gamma ray′ 357. ′gang starr′ 358. ′garbage′ 359. ′gavin degraw′ 360. ′genesis′ 361. ′gentleman′ 362. ′george michael′ 363. ′ghostface′ 364. ′girls aloud′ 365. ′girl talk′ 366. ′gnarls barkley′ 367. ′god is an astronaut′ 368. ′godsmack′ 369. ′godspeed you! black emperor′ 370. ′gogol

bordello' 371. 'gojira' 372. 'goldfinger' 373. 'goldfrapp' 374. 'good charlotte' 375. 'goo goo dolls' 376. 'gorillaz' 377. 'gotan project' 378. 'grateful dead' 379. 'green day' 380. 'grizzly bear' 381. 'groove armada' 382. 'groove coverage' 383. 'guano apes' 384. 'guided by voices' 385. 'guns n roses' 386. 'gwen stefani' 387. 'gym class heroes' 388. 'haggard' 389. 'håkan hellström' 390. 'hammerfall' 391. 'hans zimmer' 392. 'happysad' 393. 'hard-fi' 394. 'hatebreed' 395. 'heaven shall burn' 396. 'hellogoodbye' 397. 'helloween' 398. 'herbie hancock' 399. 'hercules and love affair' 400. 'hey' 401. 'high contrast' 402. 'hilary duff' 403. 'him' 404. 'hoobastank' 405. 'hooverphonic' 406. 'hot chip' 407. 'hot hot heat' 408. 'howard shore' 409. 'hypocrisy' 410. 'iamx' 411. 'ice cube' 412. 'iced earth' 413. 'iggy pop' 414. 'ignite' 415. 'ill niño' 416. 'immortal' 417. 'immortal technique' 418. 'imogen heap' 419. 'incubus' 420. 'in extremo' 421. 'infected mushroom' 422. 'in flames' 423. 'interpol' 424. 'inxs' 425. 'iron maiden' 426. 'iron & wine' 427. 'isis' 428. 'jack johnson' 429. 'james blunt' 430. 'james brown' 431. 'james morrison' 432. 'jamie cullum' 433. 'jamiroquai' 434. 'janet jackson' 435. 'janis joplin' 436. 'jason mraz' 437. 'jay-z' 438. 'jazzanova' 439. 'j dilla' 440. 'jedi mind tricks' 441. 'jeff buckley' 442. 'jefferson airplane' 443. 'jem' 444. 'jennifer lopez' 445. 'jens lekman' 446. 'jet' 447. 'jethro tull' 448. 'jimi hendrix' 449. 'jimmy eat world' 450. 'joanna newsom' 451. 'joe satriani' 452. 'johann sebastian bach' 453. 'john coltrane' 454. 'john frusciante' 455. 'john legend' 456. 'john lennon' 457. 'john mayer' 458. 'johnny cash' 459. 'john williams' 460. 'jonas brothers' 461. 'joni mitchell' 462. 'jordin sparks' 463. 'josé gonzález' 464. 'joshua radin' 465. 'joss stone' 466. 'journey' 467. 'joy division' 468. 'judas priest' 469. 'junior boys' 470. 'jurassic 5' 471. 'justice' 472. 'justin timberlake' 473. 'kaiser chiefs' 474. 'kamelot' 475. 'kanye west' 476. 'kasabian' 477. 'katatonia' 478. 'kate bush' 479. 'kate nash' 480. 'katie melua' 481. 'katy perry' 482. 'keane' 483. 'kelly clarkson' 484. 'kent' 485. 'killswitch engage' 486. 'kimya dawson' 487. 'king crimson' 488. 'kings of convenience' 489. 'kings of leon' 490. 'kiss' 491. 'klaxons' 492. 'kmfdm' 493. 'koop' 494. 'korpiklaani' 495. 'kosheen' 496. 'kon' 497. 'kraftwerk' 498. 'kreator' 499. 'kt tunstall' 500. 'kult' 501. 'kylie minogue' 502. 'kyuss' 503. 'lacrimosa' 504. 'lacuna coil' 505. 'lady gaga' 506. 'ladytron' 507. 'lagwagon' 508. 'lamb' 509. 'lamb of god' 510. 'late of the pier' 511. 'lcd soundsystem' 512. 'led zeppelin' 513. 'lenny kravitz' 514. 'leona lewis' 515. 'leonard cohen' 516. 'less than jake' 517. 'le tigre' 518. 'lifehouse' 519. 'lil wayne' 520. 'lily allen' 521. 'limp bizkit' 522. 'linkin park' 523. 'live' 524. 'lordi' 525. 'loreena mckennitt' 526. 'los hermanos' 527. 'lostprophets' 528. 'louis armstrong' 529. 'lou reed' 530. 'low' 531. 'ludacris' 532. 'ludwig van beethoven' 533. 'lupe fiasco' 534. 'lykke li' 535. 'lynyrd skynyrd' 536. 'm83' 537. 'machine head' 538. 'madlib' 539. 'madness' 540. 'madonna' 541. 'madvillain' 542. 'mae' 543. 'mando diao' 544. 'manic street preachers' 545. 'manowar' 546. 'manu chao' 547. 'mariah carey' 548. 'maria mena' 549. 'marillion' 550. 'marilyn manson' 551. 'mark ronson' 552. 'maroon 5' 553. 'marvin gaye' 554. 'mary j. blige' 555. 'massive attack' 556. 'mastodon' 557. 'matchbox twenty' 558. 'matisyahu' 559. 'maxïmo park' 560. 'max richter' 561. 'me first and the gimme gimmes' 562. 'megadeth' 563. 'melvins' 564. 'meshuggah' 565. 'metallica' 566. 'metric' 567. 'metro station' 568. 'mew' 569. 'mf doom' 570. 'mgmt' 571. 'm.i.a.' 572. 'michael bublé' 573. 'michael jackson' 574. 'mika' 575. 'mike oldfield' 576. 'miles davis' 577. 'miley cyrus' 578. 'millencolin' 579. 'mindless self indulgence' 580. 'ministry' 581. 'minor threat' 582. 'minus the bear' 583. 'mirah' 584. 'misfits' 585. 'missy elliott' 586. 'mobb deep' 587. 'moby' 588. 'modest mouse' 589. 'mogwai' 590. 'moloko' 591. 'mono' 592. 'moonspell' 593. 'morbid angel' 594. 'morcheeba' 595. 'morphine' 596. 'morrissey' 597. 'mos def' 598. 'motion city soundtrack' 599. 'mötley crüe' 600. 'motörhead' 601. 'mr. scruff' 602. 'mudvayne' 603. 'múm' 604. 'muse' 605. 'm. ward' 606. 'my bloody valentine' 607. 'my chemical romance' 608. 'my dying bride' 609. 'mylo' 610. 'my morning jacket' 611. 'myslovitz' 612. 'nada surf' 613. 'na-

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$'1347' 1. mono 2. sigur rós 3. nick drake 4. blur 5. jason mraz 6. kings of convenience 7. rufus wainwright 8. mogwai

Levels: 1. '2pac' 2. '30 seconds to mars' 3. '311' 4. '36 crazyfists' 5. '3 doors down' 6. '44' 7. '50 cent' 8. '65daysofstatic' 9. 'abba' 10. 'above & beyond' 11. 'ac/dc' 12. 'adam green' 13. 'a day to remember' 14. 'adele' 15. 'adema' 16. 'aerosmith' 17. 'aesop rock' 18. 'afi' 19. 'a fine frenzy' 20. 'after forever' 21. 'against me!' 22. 'agalloch' 23. 'a-ha' 24. 'aimee mann' 25. 'air' 26. 'akira yamaoka' 27. 'akon' 28. 'akurat' 29. 'alanis morissette' 30. 'alesana' 31. 'alexisonfire' 32. 'al green' 33. 'alice cooper' 34. 'alice in chains' 35. 'alicia keys' 36. 'alkaline trio' 37. 'all shall perish' 38. 'all that remains' 39. 'all time low' 40. 'alter bridge' 41. 'amon amarth' 42. 'amon tobin' 43. 'amorphis' 44. 'amy macdonald' 45. 'amy winehouse' 46. 'anathema' 47. 'anberlin' 48. 'andrew bird' 49. 'andrew lloyd webber' 50. '...and you will know us by the trail of dead' 51. 'angels & airwaves' 52. 'angra' 53. 'ani difranco' 54. 'animal collective' 55. 'anna ternheim' 56. 'anthrax' 57. 'anti-flag' 58. 'antonio vivaldi' 59. 'antony and the johnsons' 60. 'a perfect circle' 61. 'aphex twin' 62. 'apocalyptica' 63. 'apoptygma berzerk' 64. 'ap-

parat' 65. 'arcade fire' 66. 'arch enemy' 67. 'architecture in helsinki' 68. 'archive' 69. 'arctic monkeys' 70. 'aretha franklin' 71. 'armin van buuren' 72. 'ashlee simpson' 73. 'asian dub foundation' 74. 'as i lay dying' 75. 'atb' 76. 'atmosphere' 77. 'atreyu' 78. 'a tribe called quest' 79. 'at the drive-in' 80. 'at the gates' 81. 'audioslave' 82. 'autechre' 83. 'avantasia' 84. 'avenged sevenfold' 85. 'avril lavigne' 86. 'ayreon' 87. 'babyshambles' 88. 'backstreet boys' 89. 'bad brains' 90. 'badly drawn boy' 91. 'bad religion' 92. 'band of horses' 93. 'bare-naked ladies' 94. 'basement jaxx' 95. 'basshunter' 96. 'bat for lashes' 97. 'bathory' 98. 'battles' 99. 'bauhaus' 100. 'beastie boys' 101. 'beatsteaks' 102. 'beck' 103. 'bee gees' 104. 'behemoth' 105. 'beirut' 106. 'belle and sebastian' 107. 'ben folds' 108. 'ben folds five' 109. 'ben harper' 110. 'benny benassi' 111. 'beyoncé' 112. 'biffy clyro' 113. 'billie holiday' 114. 'billy joel' 115. 'billy talent' 116. 'björk' 117. 'black eyed peas' 118. 'blackfield' 119. 'black flag' 120. 'black label society' 121. 'black rebel motorcycle club' 122. 'black sabbath' 123. 'blank & jones' 124. 'blind guardian' 125. 'blink-182' 126. 'bloc party' 127. 'blonde redhead' 128. 'blondie' 129. 'bloodbath' 130. 'bloodhound gang' 131. 'blur' 132. 'boards of canada' 133. 'bob dylan' 134. 'bob marley' 135. 'bob marley & the wailers' 136. 'böhse onkelz' 137. 'bon iver' 138. 'bon jovi' 139. 'bonnie prince billy' 140. 'bonobo' 141. 'booka shade' 142. 'bowling for soup' 143. 'boys like girls' 144. 'boys noize' 145. 'brand new' 146. 'breaking benjamin' 147. 'brian eno' 148. 'bright eyes' 149. 'bring me the horizon' 150. 'britney spears' 151. 'broken social scene' 152. 'bruce springsteen' 153. 'bryan adams' 154. 'buckethead' 155. 'buena vista social club' 156. 'built to spill' 157. 'bullet for my valentine' 158. 'burial' 159. 'burzum' 160. 'bush' 161. 'busta rhymes' 162. 'buzzcocks' 163. 'caetano veloso' 164. 'cake' 165. 'calexico' 166. 'caliban' 167. 'calvin harris' 168. 'camel' 169. 'camera obscura' 170. 'cannibal corpse' 171. 'cansei de ser sexy' 172. 'captain beefheart & his magic band' 173. 'carcass' 174. 'carla bruni' 175. 'cascada' 176. 'cat power' 177. 'cat stevens' 178. 'céline dion' 179. 'chamillionaire' 180. 'charlie parker' 181. 'chet baker' 182. 'chevelle' 183. 'chicane' 184. 'chico buarque' 185. 'children of bodom' 186. 'chimaira' 187. 'chiodos' 188. 'chris brown' 189. 'chris cornell' 190. 'christina aguilera' 191. 'chromeo' 192. 'circa survive' 193. 'city and colour' 194. 'clap your hands say yeah' 195. 'clint mansell' 196. 'clueso' 197. 'cobra starship' 198. 'cocorosie' 199. 'cocteau twins' 200. 'coheed and cambria' 201. 'colbie caillat' 202. 'coldplay' 203. 'cold war kids' 204. 'coma' 205. 'combichrist' 206. 'comeback kid' 207. 'common' 208. 'converge' 209. 'corinne bailey rae' 210. 'counting crows' 211. 'cradle of filth' 212. 'craig david' 213. 'cream' 214. 'creed' 215. 'creedence clearwater revival' 216. 'crystal castles' 217. 'cunninlynguists' 218. 'cursive' 219. 'cut copy' 220. 'cute is what we aim for' 221. 'cypress hill' 222. 'daft punk' 223. 'damian marley' 224. 'damien rice' 225. 'danny elfman' 226. 'darkthrone' 227. 'dark tranquillity' 228. 'dashboard confessional' 229. 'dave matthews band' 230. 'david bowie' 231. 'david gray' 232. 'david guetta' 233. 'dead can dance' 234. 'dead kennedys' 235. 'death' 236. 'death cab for cutie' 237. 'death from above 1979' 238. 'deathstars' 239. 'deep purple' 240. 'deerhoof' 241. 'deerhunter' 242. 'def leppard' 243. 'deftones' 244. 'deichkind' 245. 'de la soul' 246. 'delerium' 247. 'depeche mode' 248. 'de-phazz' 249. 'descendents' 250. 'dethklok' 251. 'deus' 252. 'devendra banhart' 253. 'devildriver' 254. 'devo' 255. 'diana krall' 256. 'dido' 257. 'die apokalyptischen reiter' 258. 'die Ärzte' 259. 'die toten hosen' 260. 'digitalism' 261. 'dimmu borgir' 262. 'dinosaur jr.' 263. 'dio' 264. 'dir en grey' 265. 'dire straits' 266. 'dirty pretty things' 267. 'disturbed' 268. 'dizzee rascal' 269. 'django reinhardt' 270. 'dj krush' 271. 'dj shadow' 272. 'dmx' 273. 'dope' 274. 'doves' 275. 'down' 276. 'dragonforce' 277. 'dr. dre' 278. 'dream theater' 279. 'dredg' 280. 'dropkick murphys' 281. 'drowning pool' 282. 'duffy' 283. 'duran duran' 284. 'eagles' 285. 'eagles of death metal' 286. 'echo & the bunnymen' 287. 'eddie vedder' 288. 'edguy' 289. 'Édith piaf' 290. 'editors' 291. 'eels' 292. 'einstürzende neubauten' 293. 'elbow' 294. 'electric light orchestra' 295. 'elec-

tric six' 296. 'ella fitzgerald' 297. 'elliott smith' 298. 'elton john' 299. 'eluveitie' 300. 'elvis costello' 301. 'elvis presley' 302. 'emery' 303. 'emilíana torrini' 304. 'emilie autumn' 305. 'emilie simon' 306. 'eminem' 307. 'enigma' 308. 'ennio morricone' 309. 'enrique iglesias' 310. 'ensiferum' 311. 'enter shikari' 312. 'enya' 313. 'epica' 314. 'equilibrium' 315. 'era' 316. 'eric clapton' 317. 'erykah badu' 318. 'escape the fate' 319. 'evanescence' 320. 'explosions in the sky' 321. 'faithless' 322. 'faith no more' 323. 'fall out boy' 324. 'farin urlaub' 325. 'fatboy slim' 326. 'fear factory' 327. 'feeder' 328. 'feist' 329. 'fergie' 330. 'ferry corsten' 331. 'final fantasy' 332. 'finch' 333. 'finntroll' 334. 'fiona apple' 335. 'fischerspooner' 336. 'fleet foxes' 337. 'fleetwood mac' 338. 'flight of the conchords' 339. 'flogging molly' 340. 'flo rida' 341. 'flying lotus' 342. 'flyleaf' 343. 'foals' 344. 'foo fighters' 345. 'fort minor' 346. 'four tet' 347. 'frank sinatra' 348. 'frank zappa' 349. 'franz ferdinand' 350. 'frédéric chopin' 351. 'from autumn to ashes' 352. 'from first to last' 353. 'frou frou' 354. 'fugazi' 355. 'funeral for a friend' 356. 'gamma ray' 357. 'gang starr' 358. 'garbage' 359. 'gavin degraw' 360. 'genesis' 361. 'gentleman' 362. 'george michael' 363. 'ghostface' 364. 'girls aloud' 365. 'girl talk' 366. 'gnarls barkley' 367. 'god is an astronaut' 368. 'godsmack' 369. 'godspeed you! black emperor' 370. 'gogol bordello' 371. 'gojira' 372. 'goldfinger' 373. 'goldfrapp' 374. 'good charlotte' 375. 'goo goo dolls' 376. 'gorillaz' 377. 'gotan project' 378. 'grateful dead' 379. 'green day' 380. 'grizzly bear' 381. 'groove armada' 382. 'groove coverage' 383. 'guano apes' 384. 'guided by voices' 385. 'guns n roses' 386. 'gwen stefani' 387. 'gym class heroes' 388. 'haggard' 389. 'håkan hellström' 390. 'hammerfall' 391. 'hans zimmer' 392. 'hardfloor' 393. 'hari hari' 394. 'hatebreed' 395. 'heaven shall burn' 396. 'hellogoodbye' 397. 'helloween' 398. 'herbie hancock' 399. 'hercules and love affair' 400. 'hey' 401. 'high contrast' 402. 'hilary duff' 403. 'him' 404. 'hoobastank' 405. 'hooverphonic' 406. 'hot chip' 407. 'hot hot heat' 408. 'howard shore' 409. 'hypocrisy' 410. 'ianx' 411. 'ice cube' 412. 'iced earth' 413. 'iggy pop' 414. 'ignite' 415. 'ill niño' 416. 'immortal' 417. 'immortal technique' 418. 'imogen heap' 419. 'incubus' 420. 'in extremo' 421. 'infected mushroom' 422. 'in flames' 423. 'interpol' 424. 'inxs' 425. 'iron maiden' 426. 'iron & wine' 427. 'isis' 428. 'jack johnson' 429. 'james blunt' 430. 'james brown' 431. 'james morrison' 432. 'jamie cullum' 433. 'jamiroquai' 434. 'janet jackson' 435. 'janis joplin' 436. 'jason mraz' 437. 'jay-z' 438. 'jazzanova' 439. 'j dilla' 440. 'jedi mind tricks' 441. 'jeff buckley' 442. 'jefferson airplane' 443. 'jem' 444. 'jennifer lopez' 445. 'jens lekman' 446. 'jet' 447. 'jethro tull' 448. 'jimi hendrix' 449. 'jimmy eat world' 450. 'joanna newsom' 451. 'joe satriani' 452. 'johann sebastian bach' 453. 'john coltrane' 454. 'john frusciante' 455. 'john legend' 456. 'john lennon' 457. 'john mayer' 458. 'johnny cash' 459. 'john williams' 460. 'jonas brothers' 461. 'joni mitchell' 462. 'jordin sparks' 463. 'josé gonzález' 464. 'joshua radin' 465. 'joss stone' 466. 'journey' 467. 'joy division' 468. 'judas priest' 469. 'junior boys' 470. 'jurassic 5' 471. 'justice' 472. 'justin timberlake' 473. 'kaiser chiefs' 474. 'kamelot' 475. 'kanye west' 476. 'kasabian' 477. 'katatonia' 478. 'kate bush' 479. 'kate nash' 480. 'katie melua' 481. 'katy perry' 482. 'keane' 483. 'kelly clarkson' 484. 'kent' 485. 'killswitch engage' 486. 'kimya dawson' 487. 'king crimson' 488. 'kings of convenience' 489. 'kings of leon' 490. 'kiss' 491. 'klaxons' 492. 'kmfdm' 493. 'koop' 494. 'korpiklaani' 495. 'kosheen' 496. 'kon' 497. 'kraftwerk' 498. 'kreator' 499. 'kt tunstall' 500. 'kult' 501. 'kylie minogue' 502. 'kyuss' 503. 'lacrimosa' 504. 'lacuna coil' 505. 'lady gaga' 506. 'ladytron' 507. 'lagwagon' 508. 'lamb' 509. 'lamb of god' 510. 'late of the pier' 511. 'lcd soundsystem' 512. 'led zeppelin' 513. 'lenny kravitz' 514. 'leona lewis' 515. 'leonard cohen' 516. 'less than jake' 517. 'le tigre' 518. 'lifehouse' 519. 'lil wayne' 520. 'lily allen' 521. 'limp bizkit' 522. 'linkin park' 523. 'live' 524. 'lordi' 525. 'loreena mckennitt' 526. 'los hermanos' 527. 'lostprophets' 528. 'louis armstrong' 529. 'lou reed' 530. 'low' 531. 'ludacris' 532. 'ludwig van beethoven' 533. 'lupe fiasco' 534. 'lykke li' 535. 'lynyrd skynyrd' 536. 'm83' 537. 'machine head' 538. 'madlib'

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780. 'ska-p' 781. 'skid row' 782. 'skillet' 783. 'skinny puppy' 784. 'slayer' 785. 'slipknot' 786. 'slowdive' 787. 'sneaker pimps' 788. 'snoop dogg' 789. 'snow patrol' 790. 'social distortion' 791. 'sodom' 792. 'soilwork' 793. 'something corporate' 794. 'sonata arctica' 795. 'sonic syndicate' 796. 'sonic youth' 797. 'soulfly' 798. 'soundgarden' 799. 'soundtrack' 800. 'spice girls' 801. 'spoon' 802. 'squarepusher' 803. 'staind' 804. 'stars' 805. 'static-x' 806. 'steely dan' 807. 'stereolab' 808. 'stereophonics' 809. 'stevie wonder' 810. 'st. germain' 811. 'sting' 812. 'stone sour' 813. 'stone temple pilots' 814. 'story of the year' 815. 'strapping young lad' 816. 'stratovarius' 817. 'streetlight manifesto' 818. 'sublime' 819. 'subway to sally' 820. 'sufjan stevens' 821. 'sugababes' 822. 'sugarcult' 823. 'sum 41' 824. 'supergrass' 825. 'supertramp' 826. 'switchfoot' 827. 'symphony x' 828. 'system of a down' 829. 'taking back sunday' 830. 'talib kweli' 831. 'talking heads' 832. 'tarja turunen' 833. 't.a.t.u.' 834. 'taylor swift' 835. 'tegan and sara' 836. 'télépopmusik' 837. 'tenacious d' 838. 'testament' 839. 'the 69 eyes' 840. 'the academy is...' 841. 'the album leaf' 842. 'the all-american rejects' 843. 'the arcade fire' 844. 'the ataris' 845. 'theatre of tragedy' 846. 'the beach boys' 847. 'the beatles' 848. 'the birthday massacre' 849. 'the black dahlia murder' 850. 'the black keys' 851. 'the blood brothers' 852. 'the books' 853. 'the bouncing souls' 854. 'the bravery' 855. 'the breeders' 856. 'the brian jonestown massacre' 857. 'the byrds' 858. 'the cardigans' 859. 'the chemical brothers' 860. 'the cinematic orchestra' 861. 'the clash' 862. 'the corrs' 863. 'the cranberries' 864. 'the cribs' 865. 'the crystal method' 866. 'the cure' 867. 'the dandy warhols' 868. 'the decemberists' 869. 'the dillinger escape plan' 870. 'the distillers' 871. 'the doors' 872. 'the dresden dolls' 873. 'the faint' 874. 'the fall' 875. 'the fall of troy' 876. 'the flaming lips' 877. 'the flashbulb' 878. 'the fratellis' 879. 'the fray' 880. 'the future sound of london' 881. 'the game' 882. 'the gathering' 883. 'the get up kids' 884. 'the gossip' 885. 'the go! team' 886. 'the haunted' 887. 'the hellacopters' 888. 'the herbaliser' 889. 'the hives' 890. 'the hush sound' 891. 'the jam' 892. 'the jesus and mary chain' 893. 'the jimi hendrix experience' 894. 'the killers' 895. 'the kills' 896. 'the kinks' 897. 'the knife' 898. 'the kooks' 899. 'the last shadow puppets' 900. 'the libertines' 901. 'the magnetic fields' 902. 'the mars volta' 903. 'the mountain goats' 904. 'the national' 905. 'the new pornographers' 906. 'the notwist' 907. 'the offspring' 908. 'the pigeon detectives' 909. 'the pipettes' 910. 'the pogues' 911. 'the police' 912. 'the postal service' 913. 'the presets' 914. 'the prodigy' 915. 'the pussycat dolls' 916. 'the raconteurs' 917. 'the radio dept.' 918. 'the rapture' 919. 'the rasmus' 920. 'the raveonettes' 921. 'therion' 922. 'the rolling stones' 923. 'the roots' 924. 'the shins' 925. 'the sisters of mercy' 926. 'the smashing pumpkins' 927. 'the smiths' 928. 'the sounds' 929. 'the specials' 930. 'the stone roses' 931. 'the streets' 932. 'the strokes' 933. 'the subways' 934. 'the ting tings' 935. 'the used' 936. 'the velvet underground' 937. 'the veronicas' 938. 'the verve' 939. 'the vines' 940. 'the weakerthans' 941. 'the whitest boy alive' 942. 'the white stripes' 943. 'the who' 944. 'the wombats' 945. 'they might be giants' 946. 'the zombies' 947. 'thievery corporation' 948. 'thin lizzy' 949. 'third eye blind' 950. 'thomas newman' 951. 'thom yorke' 952. 'three days grace' 953. 'thrice' 954. 'thursday' 955. 't.i.' 956. 'tiamat' 957. 'tiësto' 958. 'timbaland' 959. 'tokyo police club' 960. 'tom petty and the heartbreakers' 961. 'tom waits' 962. 'tool' 963. 'tori amos' 964. 'tortoise' 965. 'tosca' 966. 'toto' 967. 'tracy chapman' 968. 'travis' 969. 'trentemøller' 970. 't. rex' 971. 'tricky' 972. 'tristania' 973. 'trivium' 974. 'turbonegro' 975. 'turisas' 976. 'tv on the radio' 977. 'type o negative' 978. 'u2' 979. 'ulver' 980. 'underoath' 981. 'underworld' 982. 'unkle' 983. '[unknown]' 984. 'usher' 985. 'vader' 986. 'vampire weekend' 987. 'vangelis' 988. 'van halen' 989. 'van morrison' 990. 'various artists' 991. 'velvet revolver' 992. 'venetian snares' 993. 'vnv nation' 994. 'volbeat' 995. 'weezer' 996. 'wilco' 997. 'within temptation' 998. 'wolfgang amadeus mozart' 999. 'wu-tang clan' 1000. 'yann tiersen' 1001. 'yeah yeah yeahs' 1002. 'yellowcard' 1003. 'yo la tengo' 1004. 'zero 7'

$'1519' 1. linkin park 2. jem 3. foo fighters 4. kt tunstall 5. dido 6. avril lavigne 7. sarah mclachlan 8. natasha bedingfield 9. amy macdonald 10. katie melua 11. maria mena 12. the corrs 13. sheryl crow 14. colbie caillat 15. nelly furtado 16. danny elfman 17. aimee mann 18. shakira 19. paolo nutini

Levels: 1. '2pac' 2. '30 seconds to mars' 3. '311' 4. '36 crazyfists' 5. '3 doors down' 6. '44' 7. '50 cent' 8. '65daysofstatic' 9. 'abba' 10. 'above & beyond' 11. 'ac/dc' 12. 'adam green' 13. 'a day to remember' 14. 'adele' 15. 'adema' 16. 'aerosmith' 17. 'aesop rock' 18. 'afi' 19. 'a fine frenzy' 20. 'after forever' 21. 'against me!' 22. 'agalloch' 23. 'a-ha' 24. 'aimee mann' 25. 'air' 26. 'akira yamaoka' 27. 'akon' 28. 'akurat' 29. 'alanis morissette' 30. 'alesana' 31. 'alexisonfire' 32. 'al green' 33. 'alice cooper' 34. 'alice in chains' 35. 'alicia keys' 36. 'alkaline trio' 37. 'all shall perish' 38. 'all that remains' 39. 'all time low' 40. 'alter bridge' 41. 'amon amarth' 42. 'amon tobin' 43. 'amorphis' 44. 'amy macdonald' 45. 'amy winehouse' 46. 'anathema' 47. 'anberlin' 48. 'andrew bird' 49. 'andrew lloyd webber' 50. '...and you will know us by the trail of dead' 51. 'angels & airwaves' 52. 'angra' 53. 'ani difranco' 54. 'animal collective' 55. 'anna ternheim' 56. 'anthrax' 57. 'anti-flag' 58. 'antonio vivaldi' 59. 'antony and the johnsons' 60. 'a perfect circle' 61. 'aphex twin' 62. 'apocalyptica' 63. 'apoptygma berzerk' 64. 'apparat' 65. 'arcade fire' 66. 'arch enemy' 67. 'architecture in helsinki' 68. 'archive' 69. 'arctic monkeys' 70. 'aretha franklin' 71. 'armin van buuren' 72. 'ashlee simpson' 73. 'asian dub foundation' 74. 'as i lay dying' 75. 'atb' 76. 'atmosphere' 77. 'atreyu' 78. 'a tribe called quest' 79. 'at the drive-in' 80. 'at the gates' 81. 'audioslave' 82. 'autechre' 83. 'avantasia' 84. 'avenged sevenfold' 85. 'avril lavigne' 86. 'ayreon' 87. 'babyshambles' 88. 'backstreet boys' 89. 'bad brains' 90. 'badly drawn boy' 91. 'bad religion' 92. 'band of horses' 93. 'barenaked ladies' 94. 'basement jaxx' 95. 'basshunter' 96. 'bat for lashes' 97. 'bathory' 98. 'battles' 99. 'bauhaus' 100. 'beastie boys' 101. 'beatsteaks' 102. 'beck' 103. 'bee gees' 104. 'behemoth' 105. 'beirut' 106. 'belle and sebastian' 107. 'ben folds' 108. 'ben folds five' 109. 'ben harper' 110. 'benny benassi' 111. 'beyoncé' 112. 'biffy clyro' 113. 'billie holiday' 114. 'billy joel' 115. 'billy talent' 116. 'björk' 117. 'black eyed peas' 118. 'blackfield' 119. 'black flag' 120. 'black label society' 121. 'black rebel motorcycle club' 122. 'black sabbath' 123. 'blank & jones' 124. 'blind guardian' 125. 'blink-182' 126. 'bloc party' 127. 'blonde redhead' 128. 'blondie' 129. 'bloodbath' 130. 'bloodhound gang' 131. 'blur' 132. 'boards of canada' 133. 'bob dylan' 134. 'bob marley' 135. 'bob marley & the wailers' 136. 'böhse onkelz' 137. 'bon iver' 138. 'bon jovi' 139. 'bonnie prince billy' 140. 'bonobo' 141. 'booka shade' 142. 'bowling for soup' 143. 'boys like girls' 144. 'boys noize' 145. 'brand new' 146. 'breaking benjamin' 147. 'brian eno' 148. 'bright eyes' 149. 'bring me the horizon' 150. 'britney spears' 151. 'broken social scene' 152. 'bruce springsteen' 153. 'bryan adams' 154. 'buckethead' 155. 'buena vista social club' 156. 'built to spill' 157. 'bullet for my valentine' 158. 'burial' 159. 'burzum' 160. 'bush' 161. 'busta rhymes' 162. 'buzzcocks' 163. 'caetano veloso' 164. 'cake' 165. 'calexico' 166. 'caliban' 167. 'calvin harris' 168. 'camel' 169. 'camera obscura' 170. 'cannibal corpse' 171. 'cansei de ser sexy' 172. 'captain beefheart & his magic band' 173. 'carcass' 174. 'carla bruni' 175. 'cascada' 176. 'cat power' 177. 'cat stevens' 178. 'céline dion' 179. 'chamillionaire' 180. 'charlie parker' 181. 'chet baker' 182. 'chevelle' 183. 'chicane' 184. 'chico buarque' 185. 'children of bodom' 186. 'chimaira' 187. 'chiodos' 188. 'chris brown' 189. 'chris cornell' 190. 'christina aguilera' 191. 'chromeo' 192. 'circa survive' 193. 'city and colour' 194. 'clap your hands say yeah' 195. 'clint mansell' 196. 'clueso' 197. 'cobra starship' 198. 'cocorosie' 199. 'cocteau twins' 200. 'coheed and cambria' 201. 'colbie caillat' 202. 'coldplay' 203. 'cold war kids' 204. 'coma' 205. 'combichrist' 206. 'comeback kid' 207. 'common' 208. 'converge' 209. 'corinne bailey rae' 210. 'counting crows' 211. 'cradle of filth' 212. 'craig david'

213. 'cream' 214. 'creed' 215. 'creedence clearwater revival' 216. 'crystal castles' 217. 'cunninlynguists' 218. 'cursive' 219. 'cut copy' 220. 'cute is what we aim for' 221. 'cypress hill' 222. 'daft punk' 223. 'damian marley' 224. 'damien rice' 225. 'danny elfman' 226. 'darkthrone' 227. 'dark tranquillity' 228. 'dashboard confessional' 229. 'dave matthews band' 230. 'david bowie' 231. 'david gray' 232. 'david guetta' 233. 'dead can dance' 234. 'dead kennedys' 235. 'death' 236. 'death cab for cutie' 237. 'death from above 1979' 238. 'deathstars' 239. 'deep purple' 240. 'deerhoof' 241. 'deerhunter' 242. 'def leppard' 243. 'deftones' 244. 'deichkind' 245. 'de la soul' 246. 'delerium' 247. 'depeche mode' 248. 'de-phazz' 249. 'descendents' 250. 'dethklok' 251. 'deus' 252. 'devendra banhart' 253. 'devildriver' 254. 'devo' 255. 'diana krall' 256. 'dido' 257. 'die apokalyptischen reiter' 258. 'die Ärzte' 259. 'die toten hosen' 260. 'digitalism' 261. 'dimmu borgir' 262. 'dinosaur jr.' 263. 'dio' 264. 'dir en grey' 265. 'dire straits' 266. 'dirty pretty things' 267. 'disturbed' 268. 'dizzee rascal' 269. 'django reinhardt' 270. 'dj krush' 271. 'dj shadow' 272. 'dmx' 273. 'dope' 274. 'doves' 275. 'down' 276. 'dragonforce' 277. 'dr. dre' 278. 'dream theater' 279. 'dredg' 280. 'dropkick murphys' 281. 'drowning pool' 282. 'duffy' 283. 'duran duran' 284. 'eagles' 285. 'eagles of death metal' 286. 'echo & the bunnymen' 287. 'eddie vedder' 288. 'edguy' 289. 'Édith piaf' 290. 'editors' 291. 'eels' 292. 'einstürzende neubauten' 293. 'elbow' 294. 'electric light orchestra' 295. 'electric six' 296. 'ella fitzgerald' 297. 'elliott smith' 298. 'elton john' 299. 'eluveitie' 300. 'elvis costello' 301. 'elvis presley' 302. 'emery' 303. 'emilíana torrini' 304. 'emilie autumn' 305. 'emilie simon' 306. 'eminem' 307. 'enigma' 308. 'enrico morricone' 309. 'enrique iglesias' 310. 'ensiferum' 311. 'enter shikari' 312. 'enya' 313. 'epica' 314. 'equilibrium' 315. 'era' 316. 'eric clapton' 317. 'erykah badu' 318. 'escape the fate' 319. 'evanescence' 320. 'explosions in the sky' 321. 'faithless' 322. 'faith no more' 323. 'fall out boy' 324. 'farin urlaub' 325. 'fatboy slim' 326. 'fear factory' 327. 'feeder' 328. 'feist' 329. 'fergie' 330. 'ferry corsten' 331. 'final fantasy' 332. 'finch' 333. 'finntroll' 334. 'fiona apple' 335. 'fischerspooner' 336. 'fleet foxes' 337. 'fleetwood mac' 338. 'flight of the conchords' 339. 'flogging molly' 340. 'flo rida' 341. 'flying lotus' 342. 'flyleaf' 343. 'foals' 344. 'foo fighters' 345. 'fort minor' 346. 'four tet' 347. 'frank sinatra' 348. 'frank zappa' 349. 'franz ferdinand' 350. 'frederic chopin' 351. 'from autumn to ashes' 352. 'from first to last' 353. 'frou frou' 354. 'fugazi' 355. 'funeral for a friend' 356. 'gamma ray' 357. 'gang starr' 358. 'garbage' 359. 'gavin degraw' 360. 'genesis' 361. 'gentleman' 362. 'george michael' 363. 'ghostface' 364. 'girls aloud' 365. 'girl talk' 366. 'gnarls barkley' 367. 'god is an astronaut' 368. 'godsmack' 369. 'godspeed you! black emperor' 370. 'gogol bordello' 371. 'gojira' 372. 'goldfinger' 373. 'goldfrapp' 374. 'good charlotte' 375. 'goo goo dolls' 376. 'gorillaz' 377. 'gotan project' 378. 'grateful dead' 379. 'green day' 380. 'grizzly bear' 381. 'groove armada' 382. 'groove coverage' 383. 'guano apes' 384. 'guided by voices' 385. 'guns n roses' 386. 'gwen stefani' 387. 'gym class heroes' 388. 'haggard' 389. 'håkan hellström' 390. 'hammerfall' 391. 'hans zimmer' 392. 'happysad' 393. 'hard-fi' 394. 'hatebreed' 395. 'heaven shall burn' 396. 'hellogoodbye' 397. 'helloween' 398. 'herbie hancock' 399. 'hercules and love affair' 400. 'hey' 401. 'high contrast' 402. 'hilary duff' 403. 'him' 404. 'hoobastank' 405. 'hooverphonic' 406. 'hot chip' 407. 'hot hot heat' 408. 'howard shore' 409. 'hypocrisy' 410. 'iamx' 411. 'ice cube' 412. 'iced earth' 413. 'iggy pop' 414. 'ignite' 415. 'ill niño' 416. 'immortal' 417. 'immortal technique' 418. 'imogen heap' 419. 'incubus' 420. 'in extremo' 421. 'infected mushroom' 422. 'in flames' 423. 'interpol' 424. 'inxs' 425. 'iron maiden' 426. 'iron & wine' 427. 'isis' 428. 'jack johnson' 429. 'james blunt' 430. 'james brown' 431. 'james morrison' 432. 'jamie cullum' 433. 'jamiroquai' 434. 'janet jackson' 435. 'janis joplin' 436. 'jason mraz' 437. 'jay-z' 438. 'jazzanova' 439. 'j dilla' 440. 'jedi mind tricks' 441. 'jeff buckley' 442. 'jefferson airplane' 443. 'jem' 444. 'jennifer lopez' 445. 'jens lekman' 446. 'jet' 447. 'jethro tull' 448. 'jimi hendrix' 449. 'jimmy eat world' 450. 'joanna newsom'

451. 'joe satriani' 452. 'johann sebastian bach' 453. 'john coltrane' 454. 'john frusciante' 455. 'john legend' 456. 'john lennon' 457. 'john mayer' 458. 'johnny cash' 459. 'john williams' 460. 'jonas brothers' 461. 'joni mitchell' 462. 'jordin sparks' 463. 'josé gonzález' 464. 'joshua radin' 465. 'joss stone' 466. 'journey' 467. 'joy division' 468. 'judas priest' 469. 'junior boys' 470. 'jurassic 5' 471. 'justice' 472. 'justin timberlake' 473. 'kaiser chiefs' 474. 'kamelot' 475. 'kanye west' 476. 'kasabian' 477. 'katatonia' 478. 'kate bush' 479. 'kate nash' 480. 'katie melua' 481. 'katy perry' 482. 'keane' 483. 'kelly clarkson' 484. 'kent' 485. 'killswitch engage' 486. 'kimya dawson' 487. 'king crimson' 488. 'kings of convenience' 489. 'kings of leon' 490. 'kiss' 491. 'klaxons' 492. 'kmfdm' 493. 'koop' 494. 'korpiklaani' 495. 'kosheen' 496. 'kon' 497. 'kraftwerk' 498. 'kreator' 499. 'kt tunstall' 500. 'kult' 501. 'kylie minogue' 502. 'kyuss' 503. 'lacrimosa' 504. 'lacuna coil' 505. 'lady gaga' 506. 'ladytron' 507. 'lagwagon' 508. 'lamb' 509. 'lamb of god' 510. 'late of the pier' 511. 'lcd soundsystem' 512. 'led zeppelin' 513. 'lenny kravitz' 514. 'leona lewis' 515. 'leonard cohen' 516. 'less than jake' 517. 'le tigre' 518. 'lifehouse' 519. 'lil wayne' 520. 'lily allen' 521. 'limp bizkit' 522. 'linkin park' 523. 'live' 524. 'lordi' 525. 'loreena mckennitt' 526. 'los hermanos' 527. 'lostprophets' 528. 'louis armstrong' 529. 'lou reed' 530. 'low' 531. 'ludacris' 532. 'ludwig van beethoven' 533. 'lupe fiasco' 534. 'lykke li' 535. 'lynyrd skynyrd' 536. 'm83' 537. 'machine head' 538. 'madlib' 539. 'madness' 540. 'madonna' 541. 'madvillain' 542. 'mae' 543. 'mando diao' 544. 'manic street preachers' 545. 'manowar' 546. 'manu chao' 547. 'mariah carey' 548. 'maria mena' 549. 'marillion' 550. 'marilyn manson' 551. 'mark ronson' 552. 'maroon 5' 553. 'marvin gaye' 554. 'mary j. blige' 555. 'massive attack' 556. 'mastodon' 557. 'matchbox twenty' 558. 'matisyahu' 559. 'maxïmo park' 560. 'max richter' 561. 'me first and the gimme gimmes' 562. 'megadeth' 563. 'melvins' 564. 'meshuggah' 565. 'metallica' 566. 'metric' 567. 'metro station' 568. 'mew' 569. 'mf doom' 570. 'mgmt' 571. 'm.i.a.' 572. 'michael bublé' 573. 'michael jackson' 574. 'mika' 575. 'mike oldfield' 576. 'miles davis' 577. 'miley cyrus' 578. 'millencolin' 579. 'mindless self indulgence' 580. 'ministry' 581. 'minor threat' 582. 'minus the bear' 583. 'miranda' 584. 'misfits' 585. 'missy elliott' 586. 'mobb deep' 587. 'moby' 588. 'modest mouse' 589. 'mogwai' 590. 'moloko' 591. 'mono' 592. 'moonspell' 593. 'morbid angel' 594. 'morcheeba' 595. 'morphine' 596. 'morrissey' 597. 'mos def' 598. 'motion city soundtrack' 599. 'mötley crüe' 600. 'motörhead' 601. 'mr. scruff' 602. 'mudvayne' 603. 'múm' 604. 'muse' 605. 'm. ward' 606. 'my bloody valentine' 607. 'my chemical romance' 608. 'my dying bride' 609. 'mylo' 610. 'my morning jacket' 611. 'myslovitz' 612. 'nada surf' 613. 'napalm death' 614. 'nas' 615. 'natasha bedingfield' 616. 'neil young' 617. 'neko case' 618. 'nelly' 619. 'nelly furtado' 620. 'n*e*r*d' 621. 'neutral milk hotel' 622. 'new found glory' 623. 'new order' 624. 'ne-yo' 625. 'nick cave and the bad seeds' 626. 'nick drake' 627. 'nickelback' 628. 'nightmares on wax' 629. 'nightwish' 630. 'nile' 631. 'nina simone' 632. 'nine inch nails' 633. 'nirvana' 634. 'no doubt' 635. 'nofx' 636. 'norah jones' 637. 'norther' 638. 'notorious b.i.g.' 639. 'nouvelle vague' 640. 'oasis' 641. 'of montreal' 642. 'ok go' 643. 'okkervil river' 644. 'onerepublic' 645. 'oomph!' 646. 'opeth' 647. 'orbital' 648. 'o.s.t.r.' 649. 'otis redding' 650. 'outkast' 651. 'ozzy osbourne' 652. 'pain' 653. 'pain of salvation' 654. 'panic at the disco' 655. 'panic! at the disco' 656. 'pantera' 657. 'paolo nutini' 658. 'papa roach' 659. 'paradise lost' 660. 'paramore' 661. 'parkway drive' 662. 'parov stelar' 663. 'patrick wolf' 664. 'paul mccartney' 665. 'paul oakenfold' 666. 'paul simon' 667. 'paul van dyk' 668. 'pavement' 669. 'peaches' 670. 'pearl jam' 671. 'pendulum' 672. 'pennywise' 673. 'peter bjorn and john' 674. 'peter fox' 675. 'peter gabriel' 676. 'pet shop boys' 677. 'phil collins' 678. 'philip glass' 679. 'phoenix' 680. 'pidama porno' 681. 'pinback' 682. 'pink' 683. 'pink floyd' 684. 'pink martini' 685. 'pixies' 686. 'pj harvey' 687. 'placebo' 688. 'plaid' 689. 'plain white ts' 690. 'p.o.d.' 691. 'poets of the fall' 692. 'porcupine tree' 693. 'por-

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$'2335' 1. kent 2. onerepublic 3. nada surf

Levels: 1. '3oc' 2. '30 seconds to mars' 3. '311' 4. '36 crazyfists' 5. '3 doors down' 6. '44' 7. '50 cent' 8. '65daysofstatic' 9. 'abba' 10. 'above & beyond' 11. 'ac/dc' 12. 'adam green' 13. 'a day to remember' 14. 'adele' 15. 'adema' 16. 'aerosmith' 17. 'aesop rock' 18. 'afi' 19. 'a fine frenzy' 20. 'after forever' 21. 'against me!' 22. 'agalloch' 23. 'a-ha' 24. 'aimee mann' 25. 'air' 26. 'akira yamaoka' 27. 'ason' 28. 'alkurat' 29. 'alanis morissette' 30. 'alesana' 31. 'alexisonfire' 32. 'al green' 33. 'alice cooper' 34. 'alice in chains' 35. 'alicia keys' 36. 'alkaline trio' 37. 'all shall perish' 38. 'all that remains' 39. 'all time low' 40. 'alter bridge' 41. 'amon amarth' 42. 'amon tobin' 43. 'amorphis' 44. 'amy macdonald' 45. 'amy winehouse' 46. 'anathema' 47. 'anberlin' 48. 'andrew bird' 49. 'andrew lloyd webber' 50. '...and you will know us by the trail of dead' 51. 'angels & airwaves' 52. 'angra' 53. 'ani difranco' 54. 'animal collective' 55. 'anna ternheim' 56. 'anthrax' 57. 'anti-flag' 58. 'antonio vivaldi' 59. 'antony and the johnsons' 60. 'a perfect circle' 61. 'aphex twin' 62. 'apocalyptica' 63. 'apoptygma berzerk' 64. 'apparat' 65. 'arcade fire' 66. 'arch enemy' 67. 'architecture in helsinki' 68. 'archive' 69. 'arctic monkeys' 70. 'aretha franklin' 71. 'armin van buuren' 72. 'ashlee simpson' 73. 'asian dub foundation' 74. 'as i lay dying' 75. 'atb' 76. 'atmosphere' 77. 'atreyu' 78. 'a tribe called quest' 79. 'at the drive-in' 80. 'at the gates' 81. 'audioslave' 82. 'autechre' 83. 'avantasia' 84. 'avenged sevenfold' 85. 'avril lavigne' 86. 'ayreon' 87. 'babyshambles' 88. 'backstreet boys' 89. 'bad brains' 90. 'badly drawn boy' 91. 'bad religion' 92. 'band of horses' 93. 'barenaked ladies' 94. 'basement jaxx' 95. 'basshunter' 96. 'bat for lashes' 97. 'bathory' 98. 'battles' 99. 'bauhaus' 100. 'beastie boys' 101. 'beatsteaks' 102. 'beck' 103. 'bee gees' 104. 'behemoth' 105. 'beirut' 106. 'belle and sebastian' 107. 'ben folds' 108. 'ben folds five' 109. 'ben harper' 110. 'benny benassi' 111. 'beyoncé' 112. 'biffy clyro' 113. 'billie holiday' 114. 'billy joel' 115. 'billy talent' 116. 'björk' 117. 'black eyed peas' 118. 'blackfield' 119. 'black flag' 120. 'black label society' 121. 'black rebel motorcycle club' 122. 'black sabbath' 123. 'blank & jones' 124. 'blind guardian' 125. 'blink-182' 126. 'bloc party' 127. 'blonde redhead' 128. 'blondie' 129. 'bloodbath' 130. 'bloodhound gang' 131. 'blur' 132. 'boards of canada' 133. 'bob dylan' 134. 'bob marley' 135. 'bob marley & the wailers' 136. 'böhse onkelz' 137. 'bon iver' 138. 'bon jovi' 139. 'bonnie prince billy' 140. 'bonobo' 141. 'booka shade' 142. 'bowling for soup' 143. 'boys like girls' 144. 'boys noize' 145. 'brand new' 146. 'breaking benjamin'

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Levels: 1. '2pac' 2. '30 seconds to mars' 3. '311' 4. '36 crazyfists' 5. '3 doors down' 6. '44' 7. '50 cent' 8. '65daysofstatic' 9. 'abba' 10. 'above & beyond' 11. 'ac/dc' 12. 'adam green' 13. 'a day to remember' 14. 'adele' 15. 'adema' 16. 'aerosmith' 17. 'aesop rock' 18. 'afi' 19. 'a fine frenzy' 20. 'after forever' 21. 'against me!' 22. 'agalloch' 23. 'a-ha' 24. 'aimee mann' 25. 'air' 26. 'akira yamaoka' 27. 'akon' 28. 'akurat' 29. 'alanis morissette' 30. 'alesana' 31. 'alexisonfire' 32. 'al green' 33. 'alice cooper' 34. 'alice in chains' 35. 'alicia keys' 36. 'alkaline trio' 37. 'all shall perish' 38. 'all that remains' 39. 'all time low' 40. 'alter bridge' 41. 'amon amarth' 42. 'amon tobin' 43. 'amorphis' 44. 'amy macdonald' 45. 'amy winehouse' 46. 'anathema' 47. 'anberlin' 48. 'andrew bird' 49. 'andrew lloyd webber' 50. '...and you will know us by the trail of dead' 51. 'angels & airwaves' 52. 'angra' 53. 'ani difranco' 54. 'animal collective' 55. 'anna ternheim' 56. 'anthrax' 57. 'anti-flag' 58. 'antonio vivaldi' 59. 'antony and the johnsons' 60. 'a perfect circle' 61. 'aphex twin' 62. 'apocalyptica' 63. 'apoptygma berzerk' 64. 'ap-

parat' 65. 'arcade fire' 66. 'arch enemy' 67. 'architecture in helsinki' 68. 'archive' 69. 'arctic monkeys' 70. 'aretha franklin' 71. 'armin van buuren' 72. 'ashlee simpson' 73. 'asian dub foundation' 74. 'as i lay dying' 75. 'atb' 76. 'atmosphere' 77. 'atreyu' 78. 'a tribe called quest' 79. 'at the drive-in' 80. 'at the gates' 81. 'audioslave' 82. 'autechre' 83. 'avantasia' 84. 'avenged sevenfold' 85. 'avril lavigne' 86. 'ayreon' 87. 'babyshambles' 88. 'backstreet boys' 89. 'bad brains' 90. 'badly drawn boy' 91. 'bad religion' 92. 'band of horses' 93. 'barenaked ladies' 94. 'basement jaxx' 95. 'basshunter' 96. 'bat for lashes' 97. 'bathory' 98. 'battles' 99. 'bauhaus' 100. 'beastie boys' 101. 'beatsteaks' 102. 'beck' 103. 'bee gees' 104. 'behemoth' 105. 'beirut' 106. 'belle and sebastian' 107. 'ben folds' 108. 'ben folds five' 109. 'ben harper' 110. 'benny benassi' 111. 'beyoncé' 112. 'biffy clyro' 113. 'billie holiday' 114. 'billy joel' 115. 'billy talent' 116. 'björk' 117. 'black eyed peas' 118. 'blackfield' 119. 'black flag' 120. 'black label society' 121. 'black rebel motorcycle club' 122. 'black sabbath' 123. 'blank & jones' 124. 'blind guardian' 125. 'blink-182' 126. 'bloc party' 127. 'blonde redhead' 128. 'blondie' 129. 'bloodbath' 130. 'bloodhound gang' 131. 'blur' 132. 'boards of canada' 133. 'bob dylan' 134. 'bob marley' 135. 'bob marley & the wailers' 136. 'böhse onkelz' 137. 'bon iver' 138. 'bon jovi' 139. 'bonnie prince billy' 140. 'bonobo' 141. 'booka shade' 142. 'bowling for soup' 143. 'boys like girls' 144. 'boys noize' 145. 'brand new' 146. 'breaking benjamin' 147. 'brian eno' 148. 'bright eyes' 149. 'bring me the horizon' 150. 'britney spears' 151. 'broken social scene' 152. 'bruce springsteen' 153. 'bryan adams' 154. 'buckethead' 155. 'buena vista social club' 156. 'built to spill' 157. 'bullet for my valentine' 158. 'burial' 159. 'burzum' 160. 'bush' 161. 'busta rhymes' 162. 'buzzcocks' 163. 'caetano veloso' 164. 'cake' 165. 'calexico' 166. 'caliban' 167. 'calvin harris' 168. 'camel' 169. 'camera obscura' 170. 'cannibal corpse' 171. 'cansei de ser sexy' 172. 'captain beefheart & his magic band' 173. 'carcass' 174. 'carla bruni' 175. 'cascada' 176. 'cat power' 177. 'cat stevens' 178. 'céline dion' 179. 'chamillionaire' 180. 'charlie parker' 181. 'chet baker' 182. 'chevelle' 183. 'chicane' 184. 'chico buarque' 185. 'children of bodom' 186. 'chimaira' 187. 'chiodos' 188. 'chris brown' 189. 'chris cornell' 190. 'christina aguilera' 191. 'chromeo' 192. 'circa survive' 193. 'city and colour' 194. 'clap your hands say yeah' 195. 'clint mansell' 196. 'clueso' 197. 'cobra starship' 198. 'cocorosie' 199. 'cocteau twins' 200. 'coheed and cambria' 201. 'colbie caillat' 202. 'coldplay' 203. 'cold war kids' 204. 'coma' 205. 'combichrist' 206. 'comeback kid' 207. 'common' 208. 'converge' 209. 'corinne bailey rae' 210. 'counting crows' 211. 'cradle of filth' 212. 'craig david' 213. 'cream' 214. 'creed' 215. 'creedence clearwater revival' 216. 'crystal castles' 217. 'cunninlynguists' 218. 'cursive' 219. 'cut copy' 220. 'cute is what we aim for' 221. 'cypress hill' 222. 'daft punk' 223. 'damian marley' 224. 'damien rice' 225. 'danny elfman' 226. 'darkthrone' 227. 'dark tranquillity' 228. 'dashboard confessional' 229. 'dave matthews band' 230. 'david bowie' 231. 'david gray' 232. 'david guetta' 233. 'dead can dance' 234. 'dead kennedys' 235. 'death' 236. 'death cab for cutie' 237. 'death from above 1979' 238. 'deathstars' 239. 'deep purple' 240. 'deerhoof' 241. 'deerhunter' 242. 'def leppard' 243. 'deftones' 244. 'deichkind' 245. 'de la soul' 246. 'delerium' 247. 'depeche mode' 248. 'de-phazz' 249. 'descendents' 250. 'dethklok' 251. 'deus' 252. 'devendra banhart' 253. 'devildriver' 254. 'devo' 255. 'diana krall' 256. 'dido' 257. 'die apokalyptischen reiter' 258. 'die Ärzte' 259. 'die toten hosen' 260. 'digitalism' 261. 'dimmu borgir' 262. 'dinosaur jr.' 263. 'dio' 264. 'dir en grey' 265. 'dire straits' 266. 'dirty pretty things' 267. 'disturbed' 268. 'dizzee rascal' 269. 'django reinhardt' 270. 'dj krush' 271. 'dj shadow' 272. 'dmx' 273. 'dope' 274. 'doves' 275. 'down' 276. 'dragonforce' 277. 'dr. dre' 278. 'dream theater' 279. 'dredg' 280. 'dropkick murphys' 281. 'drowning pool' 282. 'duffy' 283. 'duran duran' 284. 'eagles' 285. 'eagles of death metal' 286. 'echo & the bunnymen' 287. 'eddie vedder' 288. 'edguy' 289. 'Édith piaf' 290. 'editors' 291. 'eels' 292. 'einstürzende neubauten' 293. 'elbow' 294. 'electric light orchestra' 295. 'elec-

tric six' 296. 'ella fitzgerald' 297. 'elliott smith' 298. 'elton john' 299. 'eluveitie' 300. 'elvis costello' 301. 'elvis presley' 302. 'emery' 303. 'emilíana torrini' 304. 'emilie autumn' 305. 'emilie simon' 306. 'eminem' 307. 'enigma' 308. 'ennio morricone' 309. 'enrique iglesias' 310. 'ensiferum' 311. 'enter shikari' 312. 'enya' 313. 'epica' 314. 'equilibrium' 315. 'era' 316. 'eric clapton' 317. 'erykah badu' 318. 'escape the fate' 319. 'evanescence' 320. 'explosions in the sky' 321. 'faithless' 322. 'faith no more' 323. 'fall out boy' 324. 'farin urlaub' 325. 'fatboy slim' 326. 'fear factory' 327. 'feeder' 328. 'feist' 329. 'fergie' 330. 'ferry corsten' 331. 'final fantasy' 332. 'finch' 333. 'finntroll' 334. 'fiona apple' 335. 'fischerspooner' 336. 'fleet foxes' 337. 'fleetwood mac' 338. 'flight of the conchords' 339. 'flogging molly' 340. 'flo rida' 341. 'flying lotus' 342. 'flyleaf' 343. 'foals' 344. 'foo fighters' 345. 'fort minor' 346. 'four tet' 347. 'frank sinatra' 348. 'frank zappa' 349. 'franz ferdinand' 350. 'frédéric chopin' 351. 'from autumn to ashes' 352. 'from first to last' 353. 'frou frou' 354. 'fugazi' 355. 'funeral for a friend' 356. 'gamma ray' 357. 'gang starr' 358. 'garbage' 359. 'gavin degraw' 360. 'genesis' 361. 'gentleman' 362. 'george michael' 363. 'ghostface' 364. 'girls aloud' 365. 'girl talk' 366. 'gnarls barkley' 367. 'god is an astronaut' 368. 'godsmack' 369. 'godspeed you! black emperor' 370. 'gogol bordello' 371. 'gojira' 372. 'goldfinger' 373. 'goldfrapp' 374. 'good charlotte' 375. 'goo goo dolls' 376. 'gorillaz' 377. 'gotan project' 378. 'grateful dead' 379. 'green day' 380. 'grizzly bear' 381. 'groove armada' 382. 'groove coverage' 383. 'guano apes' 384. 'guided by voices' 385. 'guns n roses' 386. 'gwen stefani' 387. 'gym class heroes' 388. 'haggard' 389. 'håkan hellström' 390. 'hammerfall' 391. 'hans zimmer' 392. 'hardwell' 393. 'harris' 394. 'hatebreed' 395. 'heaven shall burn' 396. 'hellogoodbye' 397. 'helloween' 398. 'herbie hancock' 399. 'hercules and love affair' 400. 'hey' 401. 'high contrast' 402. 'hilary duff' 403. 'him' 404. 'hoobastank' 405. 'hooverphonic' 406. 'hot chip' 407. 'hot hot heat' 408. 'howard shore' 409. 'hypocrisy' 410. 'ianx' 411. 'ice cube' 412. 'iced earth' 413. 'iggy pop' 414. 'ignite' 415. 'ill niño' 416. 'immortal' 417. 'immortal technique' 418. 'imogen heap' 419. 'incubus' 420. 'in extremo' 421. 'infected mushroom' 422. 'in flames' 423. 'interpol' 424. 'inxs' 425. 'iron maiden' 426. 'iron & wine' 427. 'isis' 428. 'jack johnson' 429. 'james blunt' 430. 'james brown' 431. 'james morrison' 432. 'jamie cullum' 433. 'jamiroquai' 434. 'janet jackson' 435. 'janis joplin' 436. 'jason mraz' 437. 'jay-z' 438. 'jazzanova' 439. 'j dilla' 440. 'jedi mind tricks' 441. 'jeff buckley' 442. 'jefferson airplane' 443. 'jem' 444. 'jennifer lopez' 445. 'jens lekman' 446. 'jet' 447. 'jethro tull' 448. 'jimi hendrix' 449. 'jimmy eat world' 450. 'joanna newsom' 451. 'joe satriani' 452. 'johann sebastian bach' 453. 'john coltrane' 454. 'john frusciante' 455. 'john legend' 456. 'john lennon' 457. 'john mayer' 458. 'johnny cash' 459. 'john williams' 460. 'jonas brothers' 461. 'joni mitchell' 462. 'jordin sparks' 463. 'josé gonzález' 464. 'joshua radin' 465. 'joss stone' 466. 'journey' 467. 'joy division' 468. 'judas priest' 469. 'junior boys' 470. 'jurassic 5' 471. 'justice' 472. 'justin timberlake' 473. 'kaiser chiefs' 474. 'kamelot' 475. 'kanye west' 476. 'kasabian' 477. 'katatonia' 478. 'kate bush' 479. 'kate nash' 480. 'katie melua' 481. 'katy perry' 482. 'keane' 483. 'kelly clarkson' 484. 'kent' 485. 'killswitch engage' 486. 'kimya dawson' 487. 'king crimson' 488. 'kings of convenience' 489. 'kings of leon' 490. 'kiss' 491. 'klaxons' 492. 'kmfdm' 493. 'koop' 494. 'korpiklaani' 495. 'kosheen' 496. 'kon' 497. 'kraftwerk' 498. 'kreator' 499. 'kt tunstall' 500. 'kult' 501. 'kylie minogue' 502. 'kyuss' 503. 'lacrimosa' 504. 'lacuna coil' 505. 'lady gaga' 506. 'ladytron' 507. 'lagwagon' 508. 'lamb' 509. 'lamb of god' 510. 'late of the pier' 511. 'lcd soundsystem' 512. 'led zeppelin' 513. 'lenny kravitz' 514. 'leona lewis' 515. 'leonard cohen' 516. 'less than jake' 517. 'le tigre' 518. 'lifehouse' 519. 'lil wayne' 520. 'lily allen' 521. 'limp bizkit' 522. 'linkin park' 523. 'live' 524. 'lordi' 525. 'loreena mckennitt' 526. 'los hermanos' 527. 'lostprophets' 528. 'louis armstrong' 529. 'lou reed' 530. 'low' 531. 'ludacris' 532. 'ludwig van beethoven' 533. 'lupe fiasco' 534. 'lykke li' 535. 'lynyrd skynyrd' 536. 'm83' 537. 'machine head' 538. 'madlib'

539. ʹmadnessʹ 540. ʹmadonnaʹ 541. ʹmadvillainʹ 542. ʹmaeʹ 543. ʹmando diaoʹ 544. ʹmanic street preachersʹ 545. ʹmanowarʹ 546. ʹmanu chaoʹ 547. ʹmariah careyʹ 548. ʹmaria menaʹ 549. ʹmarillionʹ 550. ʹmarilyn mansonʹ 551. ʹmark ronsonʹ 552. ʹmaroon 5ʹ 553. ʹmarvin gayeʹ 554. ʹmary j. bligeʹ 555. ʹmassive attackʹ 556. ʹmastodonʹ 557. ʹmatchbox twentyʹ 558. ʹmatisyahuʹ 559. ʹmaxïmo parkʹ 560. ʹmax richterʹ 561. ʹme first and the gimme gimmesʹ 562. ʹmegadethʹ 563. ʹmelvinsʹ 564. ʹmeshuggahʹ 565. ʹmetallicaʹ 566. ʹmetricʹ 567. ʹmetro station ʹ 568. ʹmewʹ 569. ʹmf doomʹ 570. ʹmgmtʹ 571. ʹm.i.a.ʹ 572. ʹmichael bubléʹ 573. ʹmichael jacksonʹ 574. ʹmikaʹ 575. ʹmike oldfieldʹ 576. ʹmiles davisʹ 577. ʹmiley cyrusʹ 578. ʹmillencolinʹ 579. ʹmindless self indulgenceʹ 580. ʹministryʹ 581. ʹminor threatʹ 582. ʹminus the bearʹ 583. ʹmirahʹ 584. ʹmisfitsʹ 585. ʹmissy elliottʹ 586. ʹmobb deepʹ 587. ʹmobyʹ 588. ʹmodest mouseʹ 589. ʹmogwaiʹ 590. ʹmolokoʹ 591. ʹmonoʹ 592. ʹmoonspellʹ 593. ʹmorbid angelʹ 594. ʹmorcheebaʹ 595. ʹmorphineʹ 596. ʹmorrisseyʹ 597. ʹmos defʹ 598. ʹmotion city soundtrackʹ 599. ʹmötley crüeʹ 600. ʹmotörheadʹ 601. ʹmr. scruffʹ 602. ʹmudvayneʹ 603. ʹmúmʹ 604. ʹmuseʹ 605. ʹm. wardʹ 606. ʹmy bloody valentineʹ 607. ʹmy chemical romanceʹ 608. ʹmy dying brideʹ 609. ʹmyloʹ 610. ʹmy morning jacketʹ 611. ʹmyslovitzʹ 612. ʹnada surfʹ 613. ʹnapalm deathʹ 614. ʹnasʹ 615. ʹnatasha bedingfieldʹ 616. ʹneil youngʹ 617. ʹneko caseʹ 618. ʹnellyʹ 619. ʹnelly furtadoʹ 620. ʹn*e*r*dʹ 621. ʹneutral milk hotelʹ 622. ʹnew found gloryʹ 623. ʹnew orderʹ 624. ʹne-yoʹ 625. ʹnick cave and the bad seedsʹ 626. ʹnick drakeʹ 627. ʹnickelbackʹ 628. ʹnightmares on waxʹ 629. ʹnightwishʹ 630. ʹnileʹ 631. ʹnina simoneʹ 632. ʹnine inch nailsʹ 633. ʹnirvanaʹ 634. ʹno doubtʹ 635. ʹnofxʹ 636. ʹnorah jonesʹ 637. ʹnortherʹ 638. ʹnotorious b.i.g.ʹ 639. ʹnouvelle vagueʹ 640. ʹoasisʹ 641. ʹof montrealʹ 642. ʹok goʹ 643. ʹokkervil riverʹ 644. ʹonerepublicʹ 645. ʹoomph!ʹ 646. ʹopethʹ 647. ʹorbitalʹ 648. ʹo.s.t.r.ʹ 649. ʹotis reddingʹ 650. ʹoutkastʹ 651. ʹozzy osbourneʹ 652. ʹpainʹ 653. ʹpain of salvationʹ 654. ʹpanic at the discoʹ 655. ʹpanic. at the discoʹ 656. ʹpanteraʹ 657. ʹpaolo nutiniʹ 658. ʹpapa roachʹ 659. ʹparadise lostʹ 660. ʹparamoreʹ 661. ʹparkway driveʹ 662. ʹparov stelarʹ 663. ʹpatrick wolfʹ 664. ʹpaul mccartneyʹ 665. ʹpaul oakenfoldʹ 666. ʹpaul simonʹ 667. ʹpaul van dykʹ 668. ʹpavementʹ 669. ʹpeachesʹ 670. ʹpearl jamʹ 671. ʹpendulumʹ 672. ʹpennywiseʹ 673. ʹpeter bjorn and johnʹ 674. ʹpeter foxʹ 675. ʹpeter gabrielʹ 676. ʹpet shop boysʹ 677. ʹphil collinsʹ 678. ʹphilip glassʹ 679. ʹphoenixʹ 680. ʹpidama pornoʹ 681. ʹpinbackʹ 682. ʹpinkʹ 683. ʹpink floydʹ 684. ʹpink martiniʹ 685. ʹpixiesʹ 686. ʹpj harveyʹ 687. ʹplaceboʹ 688. ʹplaidʹ 689. ʹplain white tsʹ 690. ʹp.o.d.ʹ 691. ʹpoets of the fallʹ 692. ʹporcupine treeʹ 693. ʹportisheadʹ 694. ʹprefuse 73ʹ 695. ʹprimal screamʹ 696. ʹprimusʹ 697. ʹprinceʹ 698. ʹpublic enemyʹ 699. ʹpulpʹ 700. ʹqueenʹ 701. ʹqueens of the stone ageʹ 702. ʹqueensrßcheʹ 703. ʹradioheadʹ 704. ʹrage against the machineʹ 705. ʹrainbowʹ 706. ʹrammsteinʹ 707. ʹramonesʹ 708. ʹrancidʹ 709. ʹratatatʹ 710. ʹray charlesʹ 711. ʹray lamontagneʹ 712. ʹrazorlightʹ 713. ʹred hot chili peppersʹ 714. ʹred.jumpsuit.apparatusʹ 715. ʹreel big fishʹ 716. ʹrefusedʹ 717. ʹregina spektorʹ 718. ʹrelient kʹ 719. ʹr.e.m.ʹ 720. ʹrhapsody of fireʹ 721. ʹrichard cheeseʹ 722. ʹrihannaʹ 723. ʹrilo kileyʹ 724. ʹrise againstʹ 725. ʹriversideʹ 726. ʹrjd2ʹ 727. ʹrobbie williamsʹ 728. ʹrobynʹ 729. ʹrob zombieʹ 730. ʹróisín murphyʹ 731. ʹroots manuvaʹ 732. ʹroxetteʹ 733. ʹröyksoppʹ 734. ʹrufus wainwrightʹ 735. ʹrushʹ 736. ʹryan adamsʹ 737. ʹsabatonʹ 738. ʹsadeʹ 739. ʹsage francisʹ 740. ʹsamaelʹ 741. ʹsantanaʹ 742. ʹsantogoldʹ 743. ʹsaosinʹ 744. ʹsara bareillesʹ 745. ʹsarah mclachlanʹ 746. ʹsatyriconʹ 747. ʹsaves the dayʹ 748. ʹsay anythingʹ 749. ʹscar symmetryʹ 750. ʹschandmaulʹ 751. ʹscissor sistersʹ 752. ʹscooterʹ 753. ʹscorpionsʹ 754. ʹsealʹ 755. ʹsean paulʹ 756. ʹseeedʹ 757. ʹseetherʹ 758. ʹsenses failʹ 759. ʹsentencedʹ 760. ʹseptemberʹ 761. ʹsepulturaʹ 762. ʹserge gainsbourgʹ 763. ʹserj tankianʹ 764. ʹsex pistolsʹ 765. ʹshakiraʹ 766. ʹsheryl crowʹ 767. ʹshe wants revengeʹ 768. ʹshiny toy gunsʹ 769. ʹshout out loudsʹ 770. ʹshpongleʹ 771. ʹsiaʹ 772. ʹsigur rósʹ 773. ʹsilverchairʹ 774. ʹsilversteinʹ 775. ʹsimian mobile discoʹ 776. ʹsimon & garfunkelʹ 777. ʹsimple planʹ 778. ʹsiouxsie and the bansheesʹ 779. ʹsireniaʹ

780. 'ska-p' 781. 'skid row' 782. 'skillet' 783. 'skinny puppy' 784. 'slayer' 785. 'slipknot' 786. 'slowdive' 787. 'sneaker pimps' 788. 'snoop dogg' 789. 'snow patrol' 790. 'social distortion' 791. 'sodom' 792. 'soilwork' 793. 'something corporate' 794. 'sonata arctica' 795. 'sonic syndicate' 796. 'sonic youth' 797. 'soulfly' 798. 'soundgarden' 799. 'soundtrack' 800. 'spice girls' 801. 'spoon' 802. 'squarepusher' 803. 'staind' 804. 'stars' 805. 'static-x' 806. 'steely dan' 807. 'stereolab' 808. 'stereophonics' 809. 'stevie wonder' 810. 'st. germain' 811. 'sting' 812. 'stone sour' 813. 'stone temple pilots' 814. 'story of the year' 815. 'strapping young lad' 816. 'stratovarius' 817. 'streetlight manifesto' 818. 'sublime' 819. 'subway to sally' 820. 'sufjan stevens' 821. 'sugababes' 822. 'sugarcult' 823. 'sum 41' 824. 'supergrass' 825. 'supertramp' 826. 'switchfoot' 827. 'symphony x' 828. 'system of a down' 829. 'taking back sunday' 830. 'talib kweli' 831. 'talking heads' 832. 'tarja turunen' 833. 't.a.t.u.' 834. 'taylor swift' 835. 'tegan and sara' 836. 'télépopmusik' 837. 'tenacious d' 838. 'testament' 839. 'the 69 eyes' 840. 'the academy is...' 841. 'the album leaf' 842. 'the all-american rejects' 843. 'the arcade fire' 844. 'the ataris' 845. 'theatre of tragedy' 846. 'the beach boys' 847. 'the beatles' 848. 'the birthday massacre' 849. 'the black dahlia murder' 850. 'the black keys' 851. 'the blood brothers' 852. 'the books' 853. 'the bouncing souls' 854. 'the bravery' 855. 'the breeders' 856. 'the brian jonestown massacre' 857. 'the byrds' 858. 'the cardigans' 859. 'the chemical brothers' 860. 'the cinematic orchestra' 861. 'the clash' 862. 'the corrs' 863. 'the cranberries' 864. 'the cribs' 865. 'the crystal method' 866. 'the cure' 867. 'the dandy warhols' 868. 'the decemberists' 869. 'the dillinger escape plan' 870. 'the distillers' 871. 'the doors' 872. 'the dresden dolls' 873. 'the faint' 874. 'the fall' 875. 'the fall of troy' 876. 'the flaming lips' 877. 'the flashbulb' 878. 'the fratellis' 879. 'the fray' 880. 'the future sound of london' 881. 'the game' 882. 'the gathering' 883. 'the get up kids' 884. 'the gossip' 885. 'the go! team' 886. 'the haunted' 887. 'the hellacopters' 888. 'the herbaliser' 889. 'the hives' 890. 'the hush sound' 891. 'the jam' 892. 'the jesus and mary chain' 893. 'the jimi hendrix experience' 894. 'the killers' 895. 'the kills' 896. 'the kinks' 897. 'the knife' 898. 'the kooks' 899. 'the last shadow puppets' 900. 'the libertines' 901. 'the magnetic fields' 902. 'the mars volta' 903. 'the mountain goats' 904. 'the national' 905. 'the new pornographers' 906. 'the notwist' 907. 'the offspring' 908. 'the pigeon detectives' 909. 'the pipettes' 910. 'the pogues' 911. 'the police' 912. 'the postal service' 913. 'the presets' 914. 'the prodigy' 915. 'the pussycat dolls' 916. 'the raconteurs' 917. 'the radio dept.' 918. 'the rapture' 919. 'the rasmus' 920. 'the raveonettes' 921. 'therion' 922. 'the rolling stones' 923. 'the roots' 924. 'the shins' 925. 'the sisters of mercy' 926. 'the smashing pumpkins' 927. 'the smiths' 928. 'the sounds' 929. 'the specials' 930. 'the stone roses' 931. 'the streets' 932. 'the strokes' 933. 'the subways' 934. 'the ting tings' 935. 'the used' 936. 'the velvet underground' 937. 'the veronicas' 938. 'the verve' 939. 'the vines' 940. 'the weakerthans' 941. 'the whitest boy alive' 942. 'the white stripes' 943. 'the who' 944. 'the wombats' 945. 'they might be giants' 946. 'the zombies' 947. 'thievery corporation' 948. 'thin lizzy' 949. 'third eye blind' 950. 'thomas newman' 951. 'thom yorke' 952. 'three days grace' 953. 'thrice' 954. 'thursday' 955. 't.i.' 956. 'tiamat' 957. 'tiësto' 958. 'timbaland' 959. 'tokyo police club' 960. 'tom petty and the heartbreakers' 961. 'tom waits' 962. 'tool' 963. 'tori amos' 964. 'tortoise' 965. 'tosca' 966. 'toto' 967. 'tracy chapman' 968. 'travis' 969. 'trentemøller' 970. 't. rex' 971. 'tricky' 972. 'tristania' 973. 'trivium' 974. 'turbonegro' 975. 'turisas' 976. 'tv on the radio' 977. 'type o negative' 978. 'u2' 979. 'ulver' 980. 'underoath' 981. 'underworld' 982. 'unkle' 983. '[unknown]' 984. 'usher' 985. 'vader' 986. 'vampire weekend' 987. 'vangelis' 988. 'van halen' 989. 'van morrison' 990. 'various artists' 991. 'velvet revolver' 992. 'venetian snares' 993. 'vnv nation' 994. 'volbeat' 995. 'weezer' 996. 'wilco' 997. 'within temptation' 998. 'wolfgang amadeus mozart' 999. 'wu-tang clan' 1000. 'yann tiersen' 1001. 'yeah yeah yeahs' 1002. 'yellowcard' 1003. 'yo la tengo' 1004. 'zero 7'

So playlist is a list of lists, one for each user. Above you see the lists of artists for users 1, 3, 4 and 5. Now there is a problem with this data: for a given user, the same artist may be listed more than once. So we apply the instruction unique to every user's list of artists. This is done with the command `lapply`:

```
In [114]: playlist<-lapply(playlist, unique)
```

From help: *lapply (x,FUN,...)* returns a list of the same length as x, each element of which is the result of applying FUN to the corresponding element of x.

So in our case, playlist provides a list of artists for each user, and for each of these lists, unique is applied. unique removes duplicates from the list of artists for each user.

Convert this list of list into a transaction object:

```
In [115]: playlist.tr<-as(playlist, "transactions")
          playlist.tr

transactions in sparse format with
 39 transactions (rows) and
 338 items (columns)
```

Let's look again at the most frequent items, this time specify supp = 0.1

```
In [116]: playlist.apriori <-apriori(playlist.tr,
                         parameter = list(supp  = 0.1,
                                          conf  = 0.8,
                                          minlen = 2 ))

Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen
        0.8    0.1    1 none FALSE            TRUE       5     0.1      2
 maxlen target    ext
     10  rules FALSE


Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE


Absolute minimum support count: 3


set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[338 item(s), 39 transaction(s)] done [0.00s].
sorting and recoding items ... [19 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 done [0.00s].
writing ... [3 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Now run the rule mining again, this time with the settings supp   = 0.01 and conf   = 0.5

```
In [78]: playlist.apriori <-apriori(playlist.tr,
                              parameter = list(supp   = 0.01,
                                               conf   = 0.5,
                                               minlen = 2 ))

Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen
        0.5    0.1    1 none FALSE            TRUE       5    0.01      2
 maxlen target    ext
     10  rules FALSE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 150

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[1004 item(s), 15000 transaction(s)] done [0.04s].
sorting and recoding items ... [65 item(s)] done [0.01s].
creating transaction tree ... done [0.02s].
checking subsets of size 1 2 3 4 done [0.04s].
writing ... [50 rule(s)] done [0.00s].
creating S4 object ... done [0.01s].
```

As we now have more rules, let's sort them by confidence. You can also look at it by the lift:

```
In [117]: rules_conf <- sort (playlist.apriori, by="confidence", decreasing=TRUE)

In [118]: inspect(rules_conf)

    lhs          rhs          support   confidence lift  count
[1] {dido}  => {linkin park} 0.1025641 1.0         6.500 4
[2] {oasis} => {radiohead}   0.1538462 1.0         4.875 6
[3] {keane} => {radiohead}   0.1025641 0.8         3.900 4
```

1.0.3   Exercie 3:

There will be couple of questions based on this exercise in the homework quiz.
Select out of lastfm those observations for which the country is China, then repeat the analysis.
You may have to change the limits on support etc. I strongly recommend, in the apriori command,
specifying support = 0.1. Don't make the limits too generous or you may run out of memory.

```
In [50]: lastfm.df %>%
          select(country=='China')


         Error in .f(.x[[i]], ...): object 'country' not found
     Traceback:


     1. lastfm.df %>% select(country == "China")

     2. withVisible(eval(quote(`_fseq`(`_lhs`)), env, env))

     3. eval(quote(`_fseq`(`_lhs`)), env, env)

     4. eval(quote(`_fseq`(`_lhs`)), env, env)

     5. `_fseq`(`_lhs`)

     6. freduce(value, `_function_list`)

     7. withVisible(function_list[[k]](value))

     8. function_list[[k]](value)

     9. select(., country == "China")

     10. select.data.frame(., country == "China")

     11. tidyselect::vars_select(names(.data), !(!(!quos(...))))

     12. vars_select_eval(.vars, quos)

     13. map_if(ind_list, is_helper, eval_tidy)

     14. map(.x[sel], .f, ...)

     15. .f(.x[[i]], ...)


In [45]:

Eclat

parameter specification:
 tidLists support minlen maxlen              target   ext
    FALSE     0.5      1      3 frequent itemsets FALSE

algorithmic control:
```

```
  sparse sort verbose
     7   -2    TRUE


Absolute minimum support count: 7500

eclat - zero frequent items
```

In [119]: itemFrequency(playlist.tr)

2pac 0.0256410256410256 **65daysofstatic** 0.0256410256410256 **abba** 0.0512820512820513 **above \& beyond**   0.0256410256410256 **adam green**   0.0256410256410256 **a day to remember** 0.0256410256410256 **after forever** 0.0256410256410256 **agalloch** 0.0256410256410256 **aimee mann** 0.0512820512820513 **air**   0.0512820512820513 **akira yamaoka**   0.0256410256410256 **akon** 0.0256410256410256 **al green**   0.0256410256410256 **alicia keys**   0.0256410256410256 **amorphis** 0.0256410256410256 **amy macdonald** 0.0256410256410256 **amy winehouse** 0.0512820512820513 **andrew lloyd webber**   0.0256410256410256 **...and you will know us by the trail of dead** 0.0256410256410256 **angels \& airwaves** 0.0256410256410256 **ani difranco** 0.0256410256410256 **animal collective**   0.0256410256410256 **anna ternheim**   0.0512820512820513 **antony and the johnsons** 0.0512820512820513 **apocalyptica** 0.0256410256410256 **arcade fire** 0.0256410256410256 **arch enemy**   0.0256410256410256 **arctic monkeys**   0.0512820512820513 **armin van buuren** 0.0256410256410256 **ashlee simpson** 0.0256410256410256 **atb** 0.0512820512820513 **a tribe called quest**   0.0256410256410256 **audioslave**   0.0256410256410256 **avril lavigne**   0.0769230769230769 **ayreon**   0.0256410256410256 **backstreet boys**   0.0769230769230769 **band of horses** 0.0256410256410256 **beck** 0.0769230769230769 **bee gees** 0.0769230769230769 **belle and sebastian** 0.0769230769230769 **benny benassi** 0.0256410256410256 **billie holiday** 0.0512820512820513 **billy joel**   0.0512820512820513 **björk**   0.0512820512820513 **black eyed peas**   0.0256410256410256 **blink-182**   0.0256410256410256 **bloc party**   0.0769230769230769 **blonde redhead** 0.0256410256410256 **blur**   0.0512820512820513 **bob dylan**   0.0512820512820513 **bon jovi** 0.0256410256410256 **bonnie prince billy** 0.0512820512820513 **booka shade** 0.0256410256410256 **brian eno**   0.0256410256410256 **bring me the horizon**   0.0256410256410256 **britney spears** 0.102564102564103 **bryan adams** 0.0256410256410256 **buckethead** 0.0256410256410256 **bullet for my valentine**   0.0256410256410256 **busta rhymes**   0.0256410256410256 **calexico** 0.0256410256410256 **calvin harris**   0.0256410256410256 **camera obscura**   0.0256410256410256 **captain beefheart \& his magic band**   0.0256410256410256 **cascada**   0.0256410256410256 **cat power**   0.0769230769230769 **cat stevens**   0.0256410256410256 **céline dion**   0.0256410256410256 **chamillionaire**   0.0256410256410256 **children of bodom**   0.0256410256410256 **chiodos** 0.0256410256410256 **chris brown**   0.0512820512820513 **christina aguilera** 0.0256410256410256 **chromeo** 0.0256410256410256 **colbie caillat**   0.0256410256410256 **coldplay** 0.282051282051282 **corinne bailey rae**   0.0256410256410256 **craig david**   0.0512820512820513 **crystal castles** 0.0256410256410256 **cypress hill** 0.0256410256410256 **daft punk** 0.0256410256410256 **damien rice** 0.102564102564103 **danny elfman**   0.0256410256410256 **dark tranquillity**   0.0256410256410256 **david bowie**   0.0769230769230769 **david guetta**   0.0256410256410256 **dead can dance** 0.0256410256410256 **death cab for cutie**   0.128205128205128 **death from above 1979** 0.0256410256410256 **def leppard**   0.0256410256410256 **de-phazz**   0.0256410256410256 **devendra banhart**   0.0512820512820513 **dido** 0.102564102564103 **dirty pretty things** 0.0256410256410256 **dizzee rascal**   0.0256410256410256 **dj krush**   0.0256410256410256 **dream theater** 0.0769230769230769 **duffy** 0.0512820512820513 **eagles** 0.0256410256410256 **eagles of death metal**

0.0256410256410256 **Édith piaf** 0.0256410256410256 **eels** 0.0256410256410256 **ella fitzgerald** 0.0256410256410256 **elton john** 0.0512820512820513 **eluveitie** 0.0256410256410256 **elvis presley** 0.0256410256410256 **emery** 0.0256410256410256 **eminem** 0.102564102564103 **enigma** 0.0256410256410256 **ennio morricone** 0.102564102564103 **ensiferum** 0.0256410256410256 **enya** 0.102564102564103 **equilibrium** 0.0256410256410256 **era** 0.0256410256410256 **escape the fate** 0.0256410256410256 **evanescence** 0.0512820512820513 **explosions in the sky** 0.0256410256410256 **fergie** 0.0256410256410256 **fiona apple** 0.0256410256410256 **fleet foxes** 0.0256410256410256 **fleetwood mac** 0.0512820512820513 **foo fighters** 0.0512820512820513 **franz ferdinand** 0.0512820512820513 **frou frou** 0.0256410256410256 **gang starr** 0.0256410256410256 **girls aloud** 0.0256410256410256 **gnarls barkley** 0.0256410256410256 **god is an astronaut** 0.0256410256410256 **goldfrapp** 0.0256410256410256 **gorillaz** 0.0256410256410256 **green day** 0.0769230769230769 **guns n roses** 0.0256410256410256 **haggard** 0.0256410256410256 **hans zimmer** 0.0256410256410256 **hard-fi** 0.0256410256410256 **hilary duff** 0.0256410256410256 **him** 0.0256410256410256 **hooverphonic** 0.0256410256410256 **hot hot heat** 0.0512820512820513 **imogen heap** 0.0256410256410256 **in flames** 0.0256410256410256 **iron maiden** 0.0256410256410256 **iron \& wine** 0.0256410256410256 **jack johnson** 0.0769230769230769 **james blunt** 0.128205128205128 **janet jackson** 0.0256410256410256 **jason mraz** 0.0769230769230769 **jay-z** 0.0256410256410256 **jeff buckley** 0.0256410256410256 **jem** 0.0769230769230769 **jet** 0.0256410256410256 **johann sebastian bach** 0.0256410256410256 **john mayer** 0.0256410256410256 **johnny cash** 0.0256410256410256 **john williams** 0.0256410256410256 **joni mitchell** 0.0256410256410256 **jordin sparks** 0.0256410256410256 **joss stone** 0.0256410256410256 **jurassic 5** 0.0256410256410256 **justice** 0.0256410256410256 **kamelot** 0.0256410256410256 **kanye west** 0.0256410256410256 **kasabian** 0.0256410256410256 **katatonia** 0.0256410256410256 **katie melua** 0.0256410256410256 **keane** 0.128205128205128 **kelly clarkson** 0.0512820512820513 **kent** 0.0512820512820513 **kimya dawson** 0.0256410256410256 **king crimson** 0.0512820512820513 **kings of convenience** 0.0512820512820513 **korpiklaani** 0.0256410256410256 **kon** 0.0256410256410256 **kraftwerk** 0.0256410256410256 **kt tunstall** 0.0256410256410256 **lady gaga** 0.0512820512820513 **led zeppelin** 0.0256410256410256 **leona lewis** 0.0769230769230769 **less than jake** 0.0256410256410256 **lil wayne** 0.0769230769230769 **lily allen** 0.0256410256410256 **linkin park** 0.153846153846154 **lou reed** 0.0256410256410256 **low** 0.0256410256410256 **ludwig van beethoven** 0.0256410256410256 **madonna** 0.0256410256410256 **mando diao** 0.0256410256410256 **mariah carey** 0.153846153846154 **maria mena** 0.0256410256410256 **marilyn manson** 0.0256410256410256 **maroon 5** 0.128205128205128 **marvin gaye** 0.0256410256410256 **mary j. blige** 0.0256410256410256 **megadeth** 0.0256410256410256 **metallica** 0.0512820512820513 **mgmt** 0.0512820512820513 **michael jackson** 0.0256410256410256 **mika** 0.0512820512820513 **mike oldfield** 0.0256410256410256 **mobb deep** 0.0256410256410256 **modest mouse** 0.0256410256410256 **mogwai** 0.0256410256410256 **mono** 0.0512820512820513 **mr. scruff** 0.0256410256410256 **muse** 0.0769230769230769 **my chemical romance** 0.0256410256410256 **mylo** 0.0256410256410256 **nada surf** 0.0769230769230769 **natasha bedingfield** 0.0769230769230769 **nelly furtado** 0.102564102564103 **n*e*r*d** 0.0256410256410256 **neutral milk hotel** 0.0256410256410256 **new found glory** 0.0256410256410256 **new order** 0.0256410256410256 **ne-yo** 0.0512820512820513 **nick cave and the bad seeds** 0.0256410256410256 **nick drake** 0.128205128205128 **nickelback** 0.0512820512820513 **nightwish** 0.0512820512820513 **nina simone** 0.0256410256410256 **nine inch nails** 0.0256410256410256 **nirvana** 0.0512820512820513 **norah jones** 0.0256410256410256 **notorious b.i.g.** 0.0512820512820513 **nouvelle vague** 0.0256410256410256 **oasis** 0.153846153846154 **of montreal** 0.0256410256410256 **ok go** 0.0256410256410256 **onerepublic** 0.0256410256410256 **opeth** 0.0256410256410256 **outkast** 0.0256410256410256 **ozzy osbourne** 0.0256410256410256 **pain of salvation** 0.0256410256410256 **paolo nutini** 0.0512820512820513 **patrick wolf** 0.0256410256410256 **paul mccartney**

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enemy   0.0256410256410256 **pulp**   0.0512820512820513 **queen**   0.0256410256410256 **radiohead**
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0.0256410256410256 **razorlight** 0.0769230769230769 **red.jumpsuit.apparatus** 0.0256410256410256
regina spektor   0.0256410256410256 **rhapsody of fire**   0.0256410256410256 **rihanna**
0.0512820512820513 **robbie williams**   0.0256410256410256 **robyn**   0.0256410256410256 **roxette**
0.0512820512820513 **rufus wainwright**   0.0256410256410256 **rush**   0.0256410256410256 **ryan**
adams 0.0256410256410256 **saosin** 0.0256410256410256 **sara bareilles** 0.0256410256410256 **sarah**
mclachlan 0.0512820512820513 **senses fail** 0.0256410256410256 **sentenced** 0.0256410256410256
serj tankian 0.0256410256410256 **shakira** 0.0256410256410256 **sheryl crow** 0.0256410256410256
sigur rós   0.0512820512820513 **silverstein**   0.0256410256410256 **simon \& garfunkel**
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0.0256410256410256 **snow patrol**   0.0769230769230769 **sonic youth**   0.0256410256410256
soundtrack 0.0256410256410256 **spoon** 0.0256410256410256 **sting** 0.0512820512820513 **story of**
the year 0.0512820512820513 **sum 41** 0.0256410256410256 **symphony x** 0.0256410256410256
system of a down   0.0256410256410256 **talking heads**   0.0256410256410256 **taylor swift**
0.0256410256410256 **tenacious d**   0.0256410256410256 **testament**   0.0256410256410256 **the**
all-american rejects 0.0512820512820513 **the arcade fire** 0.0256410256410256 **the beach boys**
0.0256410256410256 **the beatles**   0.0769230769230769 **the bravery**   0.0512820512820513 **the**
chemical brothers   0.0256410256410256 **the corrs**   0.0256410256410256 **the cranberries**
0.102564102564103 **the cribs**   0.0512820512820513 **the cure**   0.102564102564103 **the flaming lips**
0.0256410256410256 **the fratellis** 0.0256410256410256 **the fray**   0.0512820512820513 **the hives**
0.0256410256410256 **the killers**   0.0769230769230769 **the kinks**   0.0256410256410256 **the kooks**
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the radio dept.   0.0512820512820513 **the rapture**   0.0256410256410256 **the streets**
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velvet underground   0.0256410256410256 **the verve**   0.0512820512820513 **the vines**
0.0256410256410256 **the whitest boy alive**   0.0256410256410256 **the white stripes**
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0.0512820512820513 **within temptation**   0.0256410256410256 **wu-tang clan**   0.0256410256410256
yeah yeah yeahs   0.0256410256410256