

WGCNA Demo

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Installing the package and setting up the options.

```
install.packages("BiocManager", repos='http://cran.us.r-project.org')
```

```
## Installing package into '/Users/mei/Library/R/3.6/library'
## (as 'lib' is unspecified)
```

```
##
##   There is a binary version available but the source version is
##   later:
##           binary source needs_compilation
## BiocManager 1.30.7 1.30.8                FALSE
```

```
## installing the source package 'BiocManager'
```

```
BiocManager::install("WGCNA")
```

```
## Bioconductor version 3.9 (BiocManager 1.30.8), R 3.6.0 (2019-04-26)
```

```
## Installing package(s) 'WGCNA'
```

```
## Package which is only available in source form, and may need
##   compilation of C/C++/Fortran: 'WGCNA'
```

```
## installing the source package 'WGCNA'
```

```
## Warning in install.packages(...): installation of package 'WGCNA' had non-
## zero exit status
```

```
## Old packages: 'classInt', 'data.table', 'digest', 'JuliaCall', 'purrr',
##   'styler'
```

```
install.packages("ggdendro", repos='http://cran.us.r-project.org')
```

```
## Installing package into '/Users/mei/Library/R/3.6/library'
## (as 'lib' is unspecified)
```

```
##
## The downloaded binary packages are in
##   /var/folders/hm/c3_fjypn62v5xh5b5ygv267m0000gn/T//RtmpHtA4uw/downloaded_packages
```

```
## Setting options
```

```
options(stringsAsFactors = FALSE)
library(WGCNA)
```

```
## Loading required package: dynamicTreeCut
```

```
## Loading required package: fastcluster
```

```
##
```

```
## Attaching package: 'fastcluster'
```

```
## The following object is masked from 'package:stats':
```

```
##
```

```
##   hclust
```

```
##
##
## Attaching package: 'WGCNA'

## The following object is masked from 'package:stats':
##
## cor
```

```
library(ggdendro)
library(ggplot2)
```

Importing data files from female and male liver tissues from mice, and exploring them.

```
mydataf <- read.csv("./FemaleLiver-Data/LiverFemale3600.csv", header = TRUE)
colnames(mydataf)
```

```
##      [1] "substanceBXH"  "gene_symbol"   "LocusLinkID"   "ProteomeID"
##      [5] "cytogeneticLoc" "CHROMOSOME"    "StartPosition"  "EndPosition"
##      [9] "F2_2"          "F2_3"          "F2_14"         "F2_15"
##     [13] "F2_19"         "F2_20"         "F2_23"         "F2_24"
##     [17] "F2_26"         "F2_37"         "F2_42"         "F2_43"
##     [21] "F2_45"         "F2_46"         "F2_47"         "F2_48"
##     [25] "F2_51"         "F2_52"         "F2_54"         "F2_63"
##     [29] "F2_65"         "F2_66"         "F2_68"         "F2_69"
##     [33] "F2_70"         "F2_71"         "F2_72"         "F2_78"
##     [37] "F2_79"         "F2_80"         "F2_81"         "F2_83"
##     [41] "F2_86"         "F2_87"         "F2_88"         "F2_89"
##     [45] "F2_107"        "F2_108"        "F2_109"        "F2_110"
##     [49] "F2_111"        "F2_112"        "F2_117"        "F2_119"
##     [53] "F2_125"        "F2_126"        "F2_127"        "F2_141"
##     [57] "F2_142"        "F2_143"        "F2_144"        "F2_145"
##     [61] "F2_154"        "F2_155"        "F2_156"        "F2_157"
##     [65] "F2_162"        "F2_163"        "F2_164"        "F2_165"
##     [69] "F2_166"        "F2_167"        "F2_169"        "F2_180"
##     [73] "F2_181"        "F2_182"        "F2_187"        "F2_188"
##     [77] "F2_189"        "F2_190"        "F2_191"        "F2_192"
##     [81] "F2_194"        "F2_195"        "F2_200"        "F2_201"
##     [85] "F2_212"        "F2_213"        "F2_214"        "F2_215"
##     [89] "F2_221"        "F2_222"        "F2_223"        "F2_224"
##     [93] "F2_225"        "F2_226"        "F2_227"        "F2_228"
##     [97] "F2_241"        "F2_242"        "F2_243"        "F2_244"
##    [101] "F2_245"        "F2_247"        "F2_248"        "F2_261"
##    [105] "F2_263"        "F2_264"        "F2_270"        "F2_271"
##    [109] "F2_272"        "F2_278"        "F2_287"        "F2_288"
##    [113] "F2_289"        "F2_290"        "F2_291"        "F2_296"
##    [117] "F2_298"        "F2_299"        "F2_300"        "F2_302"
##    [121] "F2_303"        "F2_304"        "F2_305"        "F2_306"
##    [125] "F2_307"        "F2_308"        "F2_309"        "F2_310"
##    [129] "F2_311"        "F2_312"        "F2_320"        "F2_321"
##    [133] "F2_323"        "F2_324"        "F2_325"        "F2_326"
##    [137] "F2_327"        "F2_328"        "F2_329"        "F2_330"
##    [141] "F2_332"        "F2_355"        "F2_357"
```

```
head(mydataf)
```

```
##      substanceBXH  gene_symbol LocusLinkID ProteomeID cytogeneticLoc
```

## 1	MMT00000044	1700007N18Rik	69339	286025	0			
## 2	MMT00000046	Mast2	17776	157466	0			
## 3	MMT00000051	Ankrd32	105377	321939	0			
## 4	MMT00000076	0	383154	0	0			
## 5	MMT00000080	Ldb2	16826	157383	0			
## 6	MMT00000102	Rdhs	216453	0	10_70.0_cM			
##	CHROMOSOME	StartPosition	EndPosition	F2_2	F2_3	F2_14	F2_15	
## 1	16	50911260	50912491	-0.01810	0.0642	6.44e-05	-0.05800	
## 2	4	115215318	115372404	-0.07730	-0.0297	1.12e-01	-0.05890	
## 3	13	74940309	74982847	-0.02260	0.0617	-1.29e-01	0.08710	
## 4	16	49345114	49477048	-0.00924	-0.1450	2.87e-02	-0.04390	
## 5	5	43546124	43613704	-0.04870	0.0582	-4.83e-02	-0.03710	
## 6	10	1337265	1347607	0.17600	-0.1890	-6.50e-02	-0.00846	
##	F2_19	F2_20	F2_23	F2_24	F2_26	F2_37	F2_42	
## 1	0.04830	-0.15197410	-0.00129	-0.23600	-0.0307	-0.02610	0.073705890	
## 2	0.04430	-0.09380000	0.09340	0.02690	-0.1330	0.07570	-0.009193803	
## 3	-0.11500	-0.06502607	0.00249	-0.10200	0.1420	-0.10200	0.064289290	
## 4	0.00425	-0.23610000	-0.06900	0.01440	0.0363	-0.01820	0.477874600	
## 5	0.02510	0.08504274	0.04450	0.00167	-0.0680	0.00567	-0.075348680	
## 6	-0.00574	-0.01807182	-0.12500	-0.06820	0.1250	0.00998	-0.037366600	
##	F2_43	F2_45	F2_46	F2_47	F2_48	F2_51	F2_52	F2_54
## 1	-0.0466	-0.00673	-0.0193	0.09040	0.0290	0.0356	-0.0388	-0.0360
## 2	-0.0075	0.01700	0.0722	-0.08390	0.0273	-0.0784	-0.0178	0.1120
## 3	0.0169	-0.01590	-0.1430	-0.00492	-0.0735	0.0657	-0.0197	-0.1290
## 4	0.1440	0.11100	0.0113	0.11900	0.0225	0.0932	0.1430	0.2640
## 5	-0.0673	-0.04720	0.0701	-0.08790	-0.0180	-0.1290	-0.0469	-0.0352
## 6	-0.0402	-0.02190	0.0269	0.13300	0.0732	0.1070	-0.0362	-0.0696
##	F2_63	F2_65	F2_66	F2_68	F2_69	F2_70	F2_71	F2_72
## 1	-0.05600	0.009840	-0.0261	0.00856	-0.01180	-0.03350	-0.08310	-0.0471
## 2	0.12300	0.051700	0.0731	0.08670	0.05710	0.00693	-0.00606	-0.0390
## 3	-0.14300	-0.061600	0.0419	-0.29000	-0.10800	-0.09950	-0.00315	0.0975
## 4	-0.09280	-0.000635	-0.0126	0.06910	0.02260	-0.08630	-0.22900	0.0178
## 5	-0.00166	0.058700	-0.0206	-0.13000	0.00392	0.05450	-0.11200	0.1070
## 6	-0.19400	-0.117000	-0.0400	0.06890	0.04320	-0.00338	-0.05270	-0.0416
##	F2_78	F2_79	F2_80	F2_81	F2_83	F2_86	F2_87	F2_88
## 1	-0.02820	0.047264410	0.0296	0.0114	0.0498	-0.0249	-0.00264	-0.02050
## 2	0.01870	0.008471275	-0.0687	-0.0114	-0.0262	-0.0215	-0.09580	-0.01930
## 3	0.01030	-0.134271000	0.1010	0.0521	-0.0607	-0.0285	0.02560	-0.01350
## 4	0.00166	0.064096960	0.0103	-0.0258	-0.0837	0.1880	0.03310	-0.00652
## 5	0.01190	0.008985630	-0.1030	-0.1400	-0.0282	-0.1090	0.02070	-0.01370
## 6	-0.03040	0.025920240	0.0697	0.1150	0.0953	0.0127	0.05490	0.00311
##	F2_89	F2_107	F2_108	F2_109	F2_110	F2_111	F2_112	F2_117
## 1	0.0826	-0.0421	0.0663	0.03620	0.0808	-0.0404	0.0877	0.07240
## 2	-0.1140	0.0815	0.0285	0.00299	-0.0407	-0.0657	0.0643	-0.00022
## 3	0.0796	0.0553	-0.0380	0.12900	-0.0361	0.0441	-0.1640	-0.01420
## 4	0.1550	0.0458	0.0752	0.12200	-0.0104	0.0914	-0.0355	0.06520
## 5	-0.0288	-0.1220	0.1270	-0.09390	0.1200	-0.0850	0.1400	0.00867
## 6	0.0955	-0.1520	-0.0670	-0.00599	-0.0438	0.0634	0.1380	-0.04010
##	F2_119	F2_125	F2_126	F2_127	F2_141	F2_142	F2_143	F2_144
## 1	-0.0210	0.04540	-0.03220	-0.00654	0.03490	-0.0315	-0.02170	0.00370
## 2	-0.0877	0.00167	0.00321	-0.01260	-0.04530	-0.0579	0.05920	0.00239
## 3	-0.0279	0.00677	0.07360	0.01750	0.10900	-0.0216	-0.01250	0.05460
## 4	0.1280	0.05940	0.01630	0.00292	0.00714	-0.0565	0.10200	0.03480
## 5	0.1440	0.08710	-0.03360	0.17300	0.08270	0.0594	-0.00317	-0.06750

```

## 6 0.1310 -0.12600 0.00484 -0.00256 -0.06800 0.0941 -0.04220 0.12000
## F2_145 F2_154 F2_155 F2_156 F2_157 F2_162 F2_163 F2_164
## 1 0.0322 -0.02150730 -0.000958 -0.0850 0.00462 0.03990 0.0716 -0.0923
## 2 -0.0383 0.02457782 -0.030300 -0.1260 -0.06670 -0.00637 -0.0161 -0.2340
## 3 0.0403 -0.01674888 0.059900 0.0311 -0.05190 0.01890 0.0207 0.0929
## 4 0.0245 0.06776892 0.016500 -0.0382 0.02120 0.06690 0.0512 -0.2450
## 5 0.0495 0.13520570 0.016500 0.0832 0.04350 0.19300 0.0586 -0.0768
## 6 0.1080 -0.05128296 -0.005590 0.0136 0.09910 0.06770 -0.0520 0.1550
## F2_165 F2_166 F2_167 F2_169 F2_180 F2_181 F2_182 F2_187
## 1 0.10900 0.0102 0.0337 0.00911 0.03210 0.03144772 0.0543 0.01120
## 2 -0.09610 -0.1290 -0.0109 -0.11300 -0.00677 -0.16704700 -0.0239 0.00304
## 3 0.00917 0.0874 -0.1260 -0.00949 -0.09900 0.02700180 -0.0570 -0.05160
## 4 1.23000 -0.0402 -0.0635 0.06880 0.03790 -0.02058180 0.0227 0.04180
## 5 0.04600 0.0484 0.2810 0.07210 -0.00630 0.37074790 0.0618 0.10800
## 6 0.07890 0.0336 0.0648 0.14400 0.02770 0.09297908 0.0601 0.02960
## F2_188 F2_189 F2_190 F2_191 F2_192 F2_194 F2_195 F2_200
## 1 0.01060 0.1130 -0.03960 -0.0504 0.0877 -0.0563 -0.00557 -0.0484
## 2 -0.03580 -0.1330 -0.01830 -0.0623 -0.0648 -0.0652 0.05020 -0.0912
## 3 -0.04970 0.1660 0.05000 0.0498 0.0431 -0.0224 -0.10700 0.0715
## 4 0.01010 0.2170 0.00206 -0.0155 0.6550 0.2820 -0.01310 -0.0387
## 5 0.12100 0.0237 0.02960 0.1130 0.0839 0.1050 0.15500 0.0823
## 6 0.00198 0.0251 0.00059 -0.0282 0.0429 0.0697 0.04930 0.0414
## F2_201 F2_212 F2_213 F2_214 F2_215 F2_221 F2_222 F2_223
## 1 -0.0273 -0.10816380 -0.0183 -0.0132 -0.00432 -0.6630 0.01440 0.0310
## 2 -0.0180 0.05682362 -0.0238 0.0721 0.03910 0.1070 0.00923 -0.0397
## 3 0.0432 -0.13217820 0.0205 -0.0411 0.07670 -0.0783 -0.06860 -0.0254
## 4 -0.0667 -0.32395020 -0.0245 0.0865 0.06470 -2.0000 0.00874 0.0847
## 5 0.1140 0.03542023 -0.2020 0.0822 0.04260 0.1030 -0.10100 0.1630
## 6 -0.0708 -0.10881230 0.0359 -0.0678 -0.11000 -0.1420 0.08430 -0.0610
## F2_224 F2_225 F2_226 F2_227 F2_228 F2_241 F2_242 F2_243
## 1 0.00818 -0.00892 -0.08710 0.0129 0.0937 0.0313 0.0821 0.00621
## 2 -0.06400 0.06300 -0.00152 0.0555 0.0947 -0.0387 0.0592 -0.00636
## 3 -0.05680 -0.13300 -0.07560 -0.0557 -0.0890 -0.1460 -0.0739 -0.01120
## 4 -0.09720 0.00746 -0.55200 0.0415 0.0733 0.0815 0.1100 0.21400
## 5 0.07410 -0.01640 0.08700 -0.0557 -0.1910 0.0219 0.0913 0.01120
## 6 0.08760 -0.03960 0.10200 0.0190 -0.1190 0.0687 -0.0525 -0.00716
## F2_244 F2_245 F2_247 F2_248 F2_261 F2_263 F2_264
## 1 0.0307 -0.13700 0.075300 -0.096881950 -0.01670 -0.0928 -0.00957
## 2 0.0614 0.02850 -0.000633 0.001598228 -0.00267 -0.0198 0.16300
## 3 -0.0528 0.05050 0.027700 -0.067933370 -0.02220 -0.0684 -0.04930
## 4 0.0135 -0.13500 -0.003100 0.072318780 0.01030 -0.3150 0.08420
## 5 0.1190 0.00383 0.041700 -0.038618510 0.11800 0.0123 0.03700
## 6 -0.1460 -0.14500 0.029400 0.035281240 -0.05660 0.0917 -0.08080
## F2_270 F2_271 F2_272 F2_278 F2_287 F2_288 F2_289 F2_290
## 1 0.0287 -0.01300 -0.0292 -0.03810 -0.0488 0.17361240 -0.097900 0.0383
## 2 -0.1310 -0.04260 -0.0514 0.07260 -0.0481 -0.16211430 -0.123000 -0.1370
## 3 0.0328 0.00537 -0.0259 -0.14400 0.0170 0.25924220 -0.041400 -0.0229
## 4 0.0351 NA 0.0730 0.00914 0.0556 0.18311140 0.051700 0.1780
## 5 -0.0142 0.00563 -0.0504 -0.05970 -0.0871 0.20897910 -0.000188 -0.0328
## 6 0.0362 0.00790 -0.0246 -0.07330 0.0125 -0.04778892 0.082500 0.1360
## F2_291 F2_296 F2_298 F2_299 F2_300 F2_302 F2_303 F2_304
## 1 0.01850 -0.08937784 0.0230 -0.06250 -0.000142 0.0344 0.0358 -0.0139
## 2 -0.05720 -0.07416870 -0.0688 -0.06540 -0.102000 -0.0780 -0.0820 -0.1830
## 3 -0.00664 -0.05915232 -0.0134 0.09740 0.015500 -0.0934 0.1780 0.0842

```

```
## 4 0.05250 -0.21653720 -0.2210 -0.00266 0.545000 0.0127 0.0273 -0.0928
## 5 -0.16600 -0.07897525 0.1410 -0.12900 0.090600 -0.1330 -0.2120 -0.0797
## 6 0.04620 0.03811979 -0.0346 0.04690 -0.034800 0.0110 0.0323 0.1660
## F2_305 F2_306 F2_307 F2_308 F2_309 F2_310 F2_311 F2_312
## 1 0.0134 -0.03145069 0.02780 -0.01190 -0.0744 0.00197 -0.0151 -0.0721
## 2 -0.0270 -0.09822316 -0.07890 -0.05480 -0.1320 -0.11000 -0.1130 -0.0805
## 3 0.0870 0.15520470 0.03410 -0.06830 0.0555 -0.04060 0.0835 0.0514
## 4 0.0469 0.10038160 -2.00000 0.05240 0.1260 0.07280 0.0600 -0.0455
## 5 -0.0191 -0.11958500 0.00294 -0.10600 -0.0518 -0.13200 0.0494 0.0221
## 6 -0.0866 0.05385017 0.09570 -0.00949 0.1120 0.20800 0.0872 -0.0555
## F2_320 F2_321 F2_323 F2_324 F2_325 F2_326 F2_327 F2_328
## 1 -0.0118 0.0200 0.0222 0.047700 -0.0488 0.0168 -0.0309 0.02740
## 2 -0.1200 0.0101 -0.1610 -0.049200 -0.0350 -0.0738 -0.1730 -0.07380
## 3 0.0713 -0.1130 0.0466 0.000612 0.1210 0.0996 0.1090 0.02730
## 4 -0.0464 0.0667 -0.1850 -0.270000 0.0803 0.0424 0.1610 0.05120
## 5 0.0272 -0.0938 0.1020 0.113000 -0.0859 -0.1340 0.0639 0.00731
## 6 0.0748 -0.1420 0.0590 -0.080000 -0.1200 0.1230 0.1870 0.05410
## F2_329 F2_330 F2_332 F2_355 F2_357
## 1 -0.0310 0.0660 -0.0199 -0.0146 0.065000
## 2 -0.2010 -0.0820 -0.0939 0.0192 -0.049900
## 3 0.1200 -0.0629 -0.0395 0.1090 0.000253
## 4 0.2410 0.3890 0.0251 -0.0348 0.114000
## 5 0.1240 -0.0212 0.0870 0.0512 0.024300
## 6 0.0699 0.0708 0.1450 -0.0399 0.037500
```

```
mydatam <- read.csv("./LiverMale3600.csv")
head(mydatam)
```

```
## substanceBXH gene_symbol LocusLinkID ProteomeID cytogeneticLoc
## 1 MMT000000044 1700007N18Rik 69339 286025 0
## 2 MMT000000046 Mast2 17776 157466 0
## 3 MMT000000051 Ankrd32 105377 321939 0
## 4 MMT000000076 0 383154 0 0
## 5 MMT000000080 Ldb2 16826 157383 0
## 6 MMT000000102 Rdhs 216453 0 10_70.0_cM
## CHROMOSOME StartPosition EndPosition F2_4 F2_5 F2_6 F2_7
## 1 16 50911260 50912491 -0.0444 -0.0179 -0.0431 0.03580
## 2 4 115215318 115372404 0.1250 0.0507 0.1290 0.13900
## 3 13 74940309 74982847 -0.1510 -0.0689 -0.0925 0.00353
## 4 16 49345114 49477048 -0.1650 -0.0285 2.0000 0.04570
## 5 5 43546124 43613704 -0.0724 -0.0603 -0.0569 0.02610
## 6 10 1337265 1347607 -0.1430 -0.0663 -0.1570 -0.23700
## F2_8 F2_9 F2_10 F2_13 F2_16 F2_17 F2_18 F2_22
## 1 0.0263 0.15400 0.000109 0.0254 -0.0294 0.1160 0.0431 -0.0267
## 2 0.2370 -0.00483 0.007490 0.0227 0.0355 0.0836 0.1230 0.1180
## 3 -0.1610 -0.00932 -0.191000 0.0809 0.0692 -0.1350 -0.0471 -0.0785
## 4 -0.4550 0.33200 0.043500 0.0944 0.1640 0.0774 0.0169 -0.1030
## 5 -0.1130 -0.01210 -0.161000 0.0100 -0.1320 -0.1550 -0.1420 -0.0666
## 6 -0.2090 -0.09170 0.060800 -0.1330 -0.0683 -0.2010 -0.2530 -0.2020
## F2_27 F2_28 F2_29 F2_30 F2_33 F2_34 F2_35 F2_39
## 1 -0.2160 -0.12700 0.0377 -0.07320 -0.0137 0.0434 -0.0277 0.0667
## 2 0.1200 0.16300 0.1570 0.20600 -0.0102 0.1460 0.1890 0.1170
## 3 -0.0352 0.00584 -0.1070 -0.07020 -0.0273 0.0426 0.0314 0.0751
## 4 -0.2080 -0.25600 0.0204 -0.04560 -0.8740 -0.8230 0.2260 0.1750
## 5 -0.0351 -0.03760 -0.0966 0.00728 -0.0629 0.1210 -0.2050 0.0322
```

```

## 6 -0.1110 -0.12700 -0.0948 -0.19000 -0.1610 -0.1260 -0.1760 -0.1850
##      F2_40  F2_41  F2_49      F2_50  F2_55  F2_56  F2_57      F2_59
## 1  0.0283  0.0541  0.0533 -0.06555326 -0.00713  0.0453  0.0256  0.02944015
## 2  0.2400  0.1560  0.0114 -0.02107601  0.10900  0.1700  0.2540  0.08054645
## 3 -0.1070 -0.0586 -0.0698 -0.07634149 -0.03310 -0.0901 -0.0965 -0.11589100
## 4  0.0204  0.0801 -0.0481 -0.17293770  0.13600  0.0427  0.0187  0.35591750
## 5 -0.0158 -0.0989 -0.0752 -0.03223757 -0.06150  0.0164 -0.1050 -0.05905863
## 6 -0.2190 -0.2260  0.0867 -0.08595835 -0.06300 -0.1770 -0.1320 -0.05455500
##      F2_60  F2_73  F2_74  F2_75  F2_76  F2_84  F2_85  F2_91  F2_92
## 1 -0.0459  0.0338 -0.0458  0.0201  0.0300 -0.0352 -0.1050  0.0259  0.0939
## 2  0.1890  0.1640  0.0728  0.1230  0.1360  0.2380  0.1000  0.2040  0.1950
## 3 -0.0930 -0.0391  0.0406 -0.0223 -0.0397 -0.0299 -0.0903 -0.2060 -0.1140
## 4  0.0437 -0.2150 -0.0366  0.0152  0.0448  0.4910 -0.5400  0.0573 -0.0314
## 5 -0.1030  0.0122 -0.1220 -0.0603 -0.0907 -0.0313 -0.0243 -0.2260  0.0257
## 6 -0.2250 -0.1760 -0.0801 -0.1050 -0.1510 -0.1560 -0.1650 -0.0885 -0.2140
##      F2_93      F2_94  F2_104  F2_105  F2_114  F2_115  F2_116  F2_120
## 1  0.04060  0.05805066 -0.0118  0.0143 -0.08070 -0.0418 -0.0559  0.00961
## 2  0.06750 -0.09036969  0.2950 -0.0661 -0.02010  0.0179  0.0837  0.04040
## 3 -0.01200 -0.04731417 -0.1050  0.0588  0.00895  0.1190  0.0474 -0.08880
## 4  0.08910  0.03246458  0.0498  0.0764 -0.07570  0.0532 -0.1520  0.14000
## 5  0.00118 -0.01082061  0.0462  0.0566  0.00530  0.0935 -0.0622  0.05640
## 6 -0.08690 -0.01983479 -0.2880 -0.0425 -0.10000 -0.1520 -0.1490 -0.03080
##      F2_121  F2_122  F2_123  F2_124  F2_146  F2_147  F2_148  F2_149
## 1  0.02130 -0.000128  0.04350  0.01260  0.003750  0.00994 -0.0225  0.0593
## 2  0.15900  0.004370  0.02910  0.05050  0.049400  0.17200 -0.0412  0.0968
## 3 -0.13600  0.052000 -0.00612  0.04040  0.008640  0.02550 -0.0475  0.0802
## 4 -0.03820 -0.041300  0.09380 -0.11600 -0.048700  0.07400  0.0380  0.0568
## 5  0.00566 -0.000152  0.07480 -0.00657 -0.000285  0.13500  0.1200 -0.0286
## 6 -0.10200 -0.093200 -0.04530 -0.16100 -0.085200 -0.18200 -0.0417 -0.1450
##      F2_151  F2_152  F2_153  F2_158  F2_159  F2_160  F2_170  F2_171
## 1 -0.00857  0.0288  0.0761  0.000479 -0.0189  0.0438  0.0149  0.02290
## 2  0.04930 -0.0367 -0.1340  0.138000 -0.0126  0.0757  0.0853  0.14800
## 3  0.04530  0.0184  0.0162 -0.052900  0.0576 -0.0076 -0.0349 -0.03930
## 4 -0.00238 -0.0396  0.0121  0.026400  0.0114  0.0108  0.0861  0.01890
## 5  0.15700 -0.0247  0.1090  0.004630 -0.1240 -0.0387  0.0269  0.00419
## 6 -0.04530 -0.0119  0.0662 -0.063400  0.0423 -0.0895 -0.1090 -0.11600
##      F2_172  F2_173  F2_174  F2_176  F2_178  F2_179  F2_183  F2_184
## 1  0.0812 -0.0100  0.0492  0.03220  0.07230 -0.0196 -0.05150  0.00377
## 2 -0.0538  0.1300  0.1850  0.02230  0.00528  0.0265  0.03850  0.19300
## 3  0.0696  0.0564 -0.0620  0.02440  0.00459 -0.0327  0.00872 -0.04460
## 4  0.0772  0.0169  0.0694  0.00808  0.15500 -0.1810 -0.03080 -0.01700
## 5 -0.0258 -0.1100  0.0790  0.08090 -0.02610 -0.0216 -0.08210  0.03000
## 6  0.0621 -0.1820 -0.1480 -0.09400  0.00701 -0.0180  0.06090 -0.18000
##      F2_185      F2_186  F2_197  F2_198  F2_199  F2_207  F2_208  F2_209
## 1  0.03590  0.02331811  0.08710  0.00320 -0.0152  0.0919  0.0745 -0.07960
## 2  0.06140  0.05443614 -0.09730  0.02270  0.0731  0.1870  0.1540  0.14400
## 3 -0.07370 -0.16528400  0.00276  0.00964 -0.0403 -0.0760 -0.0429 -0.12000
## 4 -0.12100 -0.04767130 -0.06740  0.00838  0.0253  0.2100 -0.3510  0.09110
## 5  0.00615  0.05199314  0.04700  0.04130 -0.0335  0.1610  0.1570  0.00777
## 6  0.00157 -0.05937405 -0.04100 -0.04790 -0.1440 -0.2910 -0.2530 -0.11300
##      F2_210  F2_216  F2_217  F2_218  F2_219  F2_220      F2_230  F2_231
## 1  0.0848 -0.093800 -0.0898  0.0472  0.00513  0.0578  0.05616089  0.1470
## 2  0.0594  0.109000  0.0791  0.2110  0.08110  0.1580  0.19241050  0.1410
## 3 -0.0627 -0.029200  0.1090 -0.0459 -0.06390 -0.1700 -0.09710876 -0.0163

```

```

## 4  0.0349 -0.024900 -0.0165  0.7450  0.04310  0.0427  0.38320980  0.1750
## 5  0.0935  0.000275 -0.0371  0.0980  0.07460  0.2250 -0.11742250 -0.0112
## 6 -0.0358 -0.042800 -0.1930 -0.1750 -0.02980 -0.1190 -0.15757000 -0.0319
##      F2_232  F2_233  F2_234      F2_235  F2_236  F2_237  F2_238  F2_239
## 1  0.018600  0.0976  0.0160  0.05150205  0.0394  0.00542  0.000242 -0.01540
## 2  0.056600  0.2570  0.2590  0.14049010  0.0965  0.04190  0.009570  0.11900
## 3 -0.000807 -0.1110 -0.1750 -0.09649123  0.0154 -0.00482  0.014500 -0.00822
## 4 -0.040400  0.0284 -0.1630  0.02090355  0.0610  0.04090  0.004970  0.19500
## 5  0.007410  0.2130  0.0578  0.06377663 -0.0739 -0.03110  0.019900 -0.02510
## 6 -0.046300 -0.2130 -0.2990 -0.10599170 -0.0209 -0.14300  0.069700 -0.08810
##      F2_249  F2_250  F2_251      F2_252  F2_254      F2_256      F2_257
## 1 -0.02430 -0.1010  0.0626 -0.060100  0.11600  0.03889860  0.07270702
## 2  0.08050  0.1460  0.0296  0.243000  0.18900  0.13016450  0.03534575
## 3  0.00863 -0.0533 -0.0225  0.011700 -0.19800 -0.06286667 -0.13364770
## 4  0.04790 -0.2420  0.1500 -0.000738  0.21100  0.06825731  0.04275748
## 5  0.03110 -0.0222      NA  0.133000 -0.00411 -0.08267811  0.08027854
## 6 -0.13200 -0.1830 -0.1090 -0.237000 -0.19800 -0.15300000  0.00877483
##      F2_265  F2_266  F2_268      F2_274  F2_275  F2_276  F2_279  F2_280
## 1 -0.0290  0.0550 -0.0312 -0.02870776  0.05570 -0.0859  0.01570  0.1010
## 2  0.0221  0.1020  0.1030  0.07293987  0.00983  0.0640  0.05220  0.2420
## 3 -0.0235 -0.0451 -0.0247 -0.68900000  0.02710 -0.0721  0.00623 -0.1590
## 4  0.2240  0.1280  0.0340  0.12850620 -0.09060  0.3490 -0.04130  0.0187
## 5 -0.0183 -0.0851 -0.0846 -0.19800000 -0.02600 -0.1410  0.00820 -0.0193
## 6 -0.0432 -0.0188 -0.1010  0.03046819 -0.05890 -0.0467 -0.10800 -0.2750
##      F2_281  F2_282  F2_284      F2_285  F2_286      F2_292      F2_294
## 1 -0.02040 -0.00133  0.0414  0.020115580 -0.00453  0.1898726  0.04873549
## 2 -0.01090  0.04050  0.0824  0.013043140  0.12100  0.0674650 -0.02203408
## 3  0.00717  0.03830  0.0193  0.007803106 -0.06740  0.1602482 -0.03922225
## 4  0.01140  0.05380  1.9100 -0.088830460 -0.00285  0.1820795 -0.14910580
## 5 -0.12600 -0.06070 -0.0211  0.206402900 -0.01670  0.1148936 -0.02899761
## 6  0.00944 -0.04300 -0.1100 -0.099250960 -0.12500 -0.1783375 -0.08796206
##      F2_295  F2_313  F2_314  F2_315      F2_316  F2_317  F2_318  F2_343
## 1  0.01950  0.00240 -0.09950 -0.0872 -0.103662100  0.0242  0.00536  0.1340
## 2 -0.01470  0.19700  0.09810  0.0618  0.098719220  0.0104  0.09670 -0.0248
## 3  0.11700 -0.00744  0.00862  0.0130 -0.002592110  0.0946  0.01590 -0.0934
## 4  0.14100  0.04860 -0.03720  0.7800  0.280451100 -0.0560  0.02180  0.2100
## 5  0.00608  0.05360 -0.04540 -0.1290  0.001011547  0.0877 -0.07280 -0.0284
## 6 -0.02930 -0.17800 -0.09560 -0.0600 -0.067627370 -0.0127 -0.07340  0.0180
##      F2_353
## 1  0.15584910
## 2  0.11533460
## 3 -0.13519600
## 4  0.24050990
## 5 -0.13719800
## 6 -0.06457439

```

```

## LocusLinkID and ProteomeID are annotations from the said databases
## http://www.ncbi.nlm.nih.gov/LocusLink/

```

Moving on, we extract expression data from the master dataframe. Recall that the rows represent genes and the columns represent different samples (mice) in the original data.

```

exprdata = as.data.frame(t(mydataf[, -c(1:8)]))
names(exprdata) = mydataf$substanceBXH
rownames(exprdata) = names(mydataf)[-c(1:8)]

```

```

gsg = goodSamplesGenes(exprdata, verbose = 3)

## Flagging genes and samples with too many missing values...
## ..step 1
gsg$allOK

## [1] TRUE

sample_tree <- as.dendrogram(hclust(dist(exprdata), method = "average"))

dplot <- gg dendrogram(data= sample_tree, rotate = FALSE)+
  theme_dendro()+
  ggtitle("Sample clustering to detect outliers")+
  theme(plot.title = element_text(hjust = 0.5))+
  xlab("Samples")

print(dplot)

```

Sample clustering to detect outliers

