Exc3B - Roads in Europe

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This dataset shows each pair of cities that have a direct road between them Source: http://konect.uni-koblenz.de/networks/ (http://konect.uni-koblenz.de/networks/)

```
library(igraph)
require(igraph)
```

Load The Data set:

```
eue.data = read.csv('eur.csv',header = F)
eur_data =  graph.data.frame(eue.data,directed = F)
```

Remove self loops:

```
eur_data = simplify(eur_data)
```

Centrality Degree

Betweeness

```
bet = betweenness(eur_data)
bet = sort(bet,decreasing = T)
```

```
names(bet[1])
```

```
## [1] "St."
```

Closeness

```
close = closeness(eur_data)
close = sort(close, decreasing = T)
```

```
names(close[1])
```

```
## [1] "Le"
```

Eigenvector

```
eigen = evcent(eur_data)
eigen = sort(eigen$vector, decreasing = T)
```

```
names(eigen[1])
```

```
## [1] "of"
```

Community Detection

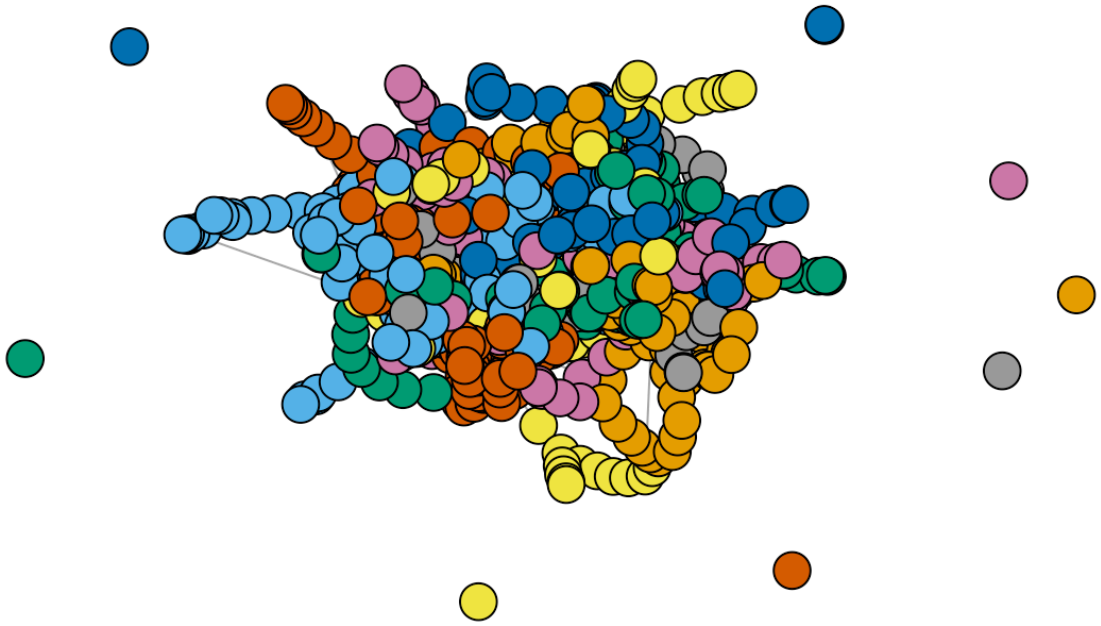
We started the algorithms:

1. Girvan-Newman
2. Multi-Level

Girvan-Newman

```
girvan = edge.betweenness.community(eur_data)
```

```
membership_girvan = membership(girvan)
plot(eur_data, vertex.size=7, vertex.label=NA,vertex.color=membership_girvan, asp=F
ALSE)
```



Community recived and their size

```
max(levels(as.factor(membership_girvan)))
```

```
## [1] "9"
```

```
summary(as.factor(membership_girvan))
```

```
##  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
##  1 44  1 43  3 88 23 40 63 35 37  1  1  1  1  1 20 39 51 32 50 39 81 13 14
## 26 27 28 29 30 31 32 33 34 35 36
## 56 11 18 44 66 35 12 31 50 20 12
```

Modularity

```
girvan$modularity
```

```
##    [1] -0.0011689354 -0.0004500285  0.0002688784  0.0009872677
##    [5]  0.0017061746  0.0024250815  0.0031439884  0.0038628953
##    [9]  0.0045818022  0.0053001915  0.0060185808  0.0067369701
##   [13]  0.0074558770  0.0081747839  0.0088931732  0.0096115625
##   [17]  0.0103299519  0.0110486000  0.0117675069  0.0124864137
##   [21]  0.0132050618  0.0139239687  0.0146426168  0.0153610062
##   [25]  0.0160799130  0.0167988199  0.0175177268  0.0182366337
##   [29]  0.0189552818  0.0196736711  0.0203923192  0.0211112261
##   [33]  0.0218298742  0.0225477460  0.0232666529  0.0239847834
##   [37]  0.0247036903  0.0254225972  0.0261412453  0.0268598934
##   [41]  0.0275788003  0.0282974484  0.0290163553  0.0297352621
##   [45]  0.0304539103  0.0311725584  0.0318912065  0.0326101133
##   [49]  0.0333287615  0.0340471508  0.0347660577  0.0354849645
##   [53]  0.0362023187  0.0369212256  0.0376398737  0.0383577455
##   [57]  0.0390766523  0.0397947829  0.0405136898  0.0412323379
##   [61]  0.0419509860  0.0426698929  0.0433885410  0.0441069303
##   [65]  0.0448258372  0.0455437089  0.0462623570  0.0469812639
##   [69]  0.0477001708  0.0484180425  0.0491364319  0.0498553388
##   [73]  0.0505732105  0.0512918586  0.0520097303  0.0527281197
##   [77]  0.0534470266  0.0541656747  0.0548845815  0.0556032296
##   [81]  0.0563221365  0.0570405259  0.0577578800  0.0584757518
##   [85]  0.0591941411  0.0599130480  0.0606316961  0.0613500854
##   [89]  0.0620684747  0.0627873816  0.0635060297  0.0642249366
##   [93]  0.0649433259  0.0656617152  0.0663806221  0.0670992702
##   [97]  0.0678176595  0.0685363076  0.0692549557  0.0699736039
##  [101]  0.0706925107  0.0714114176  0.0721300657  0.0728484550
##  [105]  0.0735673619  0.0742844573  0.0750033642  0.0757220123
##  [109]  0.0764406604  0.0771587910  0.0778766627  0.0785950520
##  [113]  0.0793137001  0.0800323482  0.0807512551  0.0814696444
##  [117]  0.0821885513  0.0829064231  0.0836248124  0.0843426841
##  [121]  0.0850610734  0.0857794628  0.0864973345  0.0872144299
##  [125]  0.0879328192  0.0886512085  0.0893695978  0.0900879872
##  [129]  0.0908058589  0.0915229543  0.0922403085  0.0929586978
##  [133]  0.0936770871  0.0943954764  0.0951136070  0.0958309611
##  [137]  0.0965488329  0.0972667046  0.0979850939  0.0987021893
##  [141]  0.0994195435  0.1001366389  0.1008537343  0.1015716060
##  [145]  0.1022899953  0.1030078671  0.1037247037  0.1044430930
##  [149]  0.1051604472  0.1058783189  0.1065956731  0.1073135448
##  [153]  0.1080319342  0.1087503235  0.1094676777  0.1101839967
##  [157]  0.1109023860  0.1116207753  0.1123391646  0.1130570364
##  [161]  0.1137749081  0.1144935562  0.1152122043  0.1159292997
##  [165]  0.1166463951  0.1173637493  0.1180811035  0.1187974225
##  [169]  0.1195158118  0.1202342011  0.1209525904  0.1216709798
##  [173]  0.1223893691  0.1231077584  0.1238261477  0.1245445370
##  [177]  0.1252624088  0.1259807981  0.1266991874  0.1274175767
##  [181]  0.1281359660  0.1288530614  0.1295714508  0.1302893225
##  [185]  0.1310077118  0.1317261011  0.1324439729  0.1331618446
##  [189]  0.1338786812  0.1345957766  0.1353136484  0.1360320377
##  [193]  0.1367499094  0.1374682987  0.1381869468  0.1388993841
##  [197]  0.1396172558  0.1403356452  0.1410519642  0.1417698359
```

```
##  [201]  0.1424861550  0.1432045443  0.1439208633  0.1446395114
##  [205]  0.1453573832  0.1460744785  0.1467918327  0.1475081518
##  [209]  0.1482260235  0.1489444128  0.1496622846  0.1503791212
##  [213]  0.1510954402  0.1518143471  0.1525322188  0.1532506081
##  [217]  0.1539684799  0.1546868692  0.1554055173  0.1561218363
##  [221]  0.1568402257  0.1575557683  0.1582731225  0.1589904767
##  [225]  0.1597083484  0.1604264790  0.1611443507  0.1618624812
##  [229]  0.1625777651  0.1632964132  0.1640119559  0.1647282749
##  [233]  0.1654430413  0.1661598779  0.1668772320  0.1675927747
##  [237]  0.1683106464  0.1690285182  0.1697469075  0.1704642617
##  [241]  0.1711816159  0.1718984525  0.1726163242  0.1733347135
##  [245]  0.1740520677  0.1747683867  0.1754870348  0.1762049066
##  [249]  0.1769235547  0.1776414264  0.1783577455  0.1790745821
##  [253]  0.1797929714  0.1805113607  0.1812281973  0.1819450339
##  [257]  0.1826634232  0.1833812950  0.1840996843  0.1848160033
##  [261]  0.1855343926  0.1862532995  0.1869703949  0.1876885254
##  [265]  0.1884048445  0.1891170229  0.1898302365  0.1905481083
##  [269]  0.1912664976  0.1919843693  0.1927027587  0.1934206304
##  [273]  0.1941390197  0.1948571503  0.1955750220  0.1962928937
##  [277]  0.1970092128  0.1977276021  0.1984459914  0.1991633456
##  [281]  0.1998817349  0.2006001242  0.2013185135  0.2020371616
##  [285]  0.2027555510  0.2034739403  0.2041907769  0.2049089074
##  [289]  0.2056262616  0.2063405103  0.2070560530  0.2077739247
##  [293]  0.2084917965  0.2092101858  0.2099280576  0.2106464469
##  [297]  0.2113648362  0.2120827079  0.2127990270  0.2135163811
##  [301]  0.2142342529  0.2156684437  0.2163868330  0.2171047047
##  [305]  0.2178230940  0.2185394131  0.2192572848  0.2199746390
##  [309]  0.2206930283  0.2214109001  0.2221246312  0.2228425030
##  [313]  0.2235598572  0.2242777289  0.2249961182  0.2257139900
##  [317]  0.2264313441  0.2271492159  0.2278676052  0.2285859945
##  [321]  0.2293038663  0.2300201853  0.2307385746  0.2314569639
##  [325]  0.2321738005  0.2328906371  0.2336085089  0.2343248279
##  [329]  0.2350432172  0.2357616065  0.2364799959  0.2371978676
##  [333]  0.2379131515  0.2386310232  0.2393465659  0.2400636613
##  [337]  0.2407807567  0.2414986284  0.2422165002  0.2429338544
##  [341]  0.2436522437  0.2443706330  0.2450890223  0.2458074116
##  [345]  0.2465245070  0.2472397909  0.2479498991  0.2486662181
##  [349]  0.2493825371  0.2501009265  0.2508182806  0.2515361524
##  [353]  0.2522535065  0.2529718959  0.2536882149  0.2544024636
##  [357]  0.2551211117  0.2558384659  0.2565560789  0.2572739506
##  [361]  0.2579910460  0.2587084002  0.2594267895  0.2601451788
##  [365]  0.2608630506  0.2615809223  0.2622987941  0.2630166658
##  [369]  0.2637350551  0.2644529269  0.2651707986  0.2658886704
##  [373]  0.2666008488  0.2673192381  0.2680347808  0.2687526526
##  [377]  0.2694710419  0.2701889136  0.2709075617  0.2716254335
##  [381]  0.2723417525  0.2730596242  0.2737780136  0.2744958853
##  [385]  0.2752080638  0.2759267119  0.2766440660  0.2773588324
##  [389]  0.2780767041  0.2787930231  0.2795108949  0.2802277315
##  [393]  0.2809461208  0.2816634750  0.2823764298  0.2830948191
##  [397]  0.2838121733  0.2845308214  0.2852481756  0.2859613892
##  [401]  0.2866797785  0.2873976502  0.2881160395  0.2888341701
```

```
##  [405]  0.2895463485  0.2902626676  0.2909769163  0.2916950468
##  [409]  0.2924118834  0.2931305315  0.2938489209  0.2945631696
##  [413]  0.2952800062  0.2959947725  0.2967126443  0.2974289633
##  [417]  0.2988587547  0.2995768853  0.3002947570  0.3010051240
##  [421]  0.3017193727  0.3024377620  0.3031468350  0.3038649656
##  [425]  0.3045820610  0.3053001915  0.3060185808  0.3067354174
##  [429]  0.3074532892  0.3081711609  0.3088900678  0.3096058693
##  [433]  0.3103237410  0.3110416128  0.3117517209  0.3124701102
##  [437]  0.3131874644  0.3139043010  0.3146224316  0.3153387506
##  [441]  0.3160568811  0.3167752704  0.3174936597  0.3182115315
##  [445]  0.3189294032  0.3196472750  0.3203643704  0.3210817245
##  [449]  0.3217995963  0.3225169505  0.3232348222  0.3239521764
##  [453]  0.3246700481  0.3253879199  0.3261052741  0.3268215931
##  [457]  0.3275394648  0.3282557839  0.3289739144  0.3296917861
##  [461]  0.3304091403  0.3311262357  0.3318435899  0.3325614616
##  [465]  0.3332788158  0.3339966875  0.3347135241  0.3354308783
##  [469]  0.3361482325  0.3368655867  0.3375834584  0.3382997774
##  [473]  0.3390166140  0.3397329331  0.3404476994  0.3411647948
##  [477]  0.3418826665  0.3426005383  0.3433160809  0.3440277418
##  [481]  0.3447440609  0.3454596035  0.3461759226  0.3468891362
##  [485]  0.3476064903  0.3483217742  0.3490375757  0.3497549299
##  [489]  0.3504717665  0.3511891206  0.3519062160  0.3526217587
##  [493]  0.3533391129  0.3540575022  0.3547707158  0.3554870348
##  [497]  0.3562033539  0.3569191553  0.3576359919  0.3583476528
##  [501]  0.3590644894  0.3597808084  0.3604981626  0.3612134465
##  [505]  0.3619297655  0.3626476373  0.3633608509  0.3640725118
##  [509]  0.3647893484  0.3655056674  0.3662230216  0.3669403758
##  [513]  0.3676561772  0.3683714611  0.3690870038  0.3698009937
##  [517]  0.3705173128  0.3712341494  0.3719478805  0.3726647171
##  [521]  0.3733815537  0.3740983904  0.3748139330  0.3755312872
##  [525]  0.3762452772  0.3769621138  0.3783724962  0.3790893329
##  [529]  0.3798046167  0.3805219709  0.3812388075  0.3819566793
##  [533]  0.3826722219  0.3833877646  0.3841030485  0.3848188500
##  [537]  0.3855341338  0.3862514880  0.3869670307  0.3876773977
##  [541]  0.3883921640  0.3891053776  0.3898227317  0.3905400859
##  [545]  0.3912564049  0.3919719476  0.3926841261  0.3934009627
##  [549]  0.3941183169  0.3948323068  0.3955491434  0.3962654625
##  [553]  0.3969810051  0.3976937012  0.3984089850  0.3991258216
##  [557]  0.3998405880  0.4005522488  0.4012685679  0.4019848869
##  [561]  0.4027006884  0.4034175250  0.4041328089  0.4048457637
##  [565]  0.4055620827  0.4069885099  0.4077027587  0.4084195953
##  [569]  0.4091328089  0.4098486103  0.4105607888  0.4112755551
##  [573]  0.4119895451  0.4127019823  0.4134172662  0.4141325501
##  [577]  0.4148465400  0.4155569070  0.4162732260  0.4169887687
##  [581]  0.4177061229  0.4184203716  0.4191346204  0.4198447285
##  [585]  0.4205548367  0.4212716733  0.4219869572  0.4226973242
##  [589]  0.4234146783  0.4241302210  0.4248465400  0.4262654625
##  [593]  0.4269828166  0.4276929248  0.4284076911  0.4291180581
##  [597]  0.4298336007  0.4305509549  0.4312672740  0.4319835930
##  [601]  0.4326991357  0.4334154547  0.4341286683  0.4355390508
##  [605]  0.4362553698  0.4369727240  0.4383882822  0.4398108276
```

```
##  [609]  0.4405250763  0.4412367372  0.4426453082  0.4433616272
##  [613]  0.4440763936  0.4447937477  0.4455118783  0.4462300088
##  [617]  0.4469447751  0.4476621293  0.4483768956  0.4490945086
##  [621]  0.4498092749  0.4512077532  0.4519264013  0.4526445319
##  [625]  0.4540616428  0.4547795145  0.4554963511  0.4562118938
##  [629]  0.4569276953  0.4576445319  0.4583608509  0.4590771699
##  [633]  0.4597929714  0.4605061850  0.4612204337  0.4619305419
##  [637]  0.4626375446  0.4633523110  0.4640688888  0.4647862429
##  [641]  0.4655015268  0.4662157756  0.4669300243  0.4676463434
##  [645]  0.4683626624  0.4690774287  0.4697929714  0.4705077377
##  [649]  0.4712240567  0.4719372703  0.4726502251  0.4733644739
##  [653]  0.4740787226  0.4747934889  0.4755098080  0.4762250919
##  [657]  0.4769390818  0.4776533306  0.4783675793  0.4790828632
##  [661]  0.4797960768  0.4805046323  0.4812193986  0.4819295068
##  [665]  0.4826442731  0.4833598157  0.4840730293  0.4847862429
##  [669]  0.4854994565  0.4862137053  0.4869258838  0.4876411676
##  [673]  0.4883528285  0.4890670773  0.4897813260  0.4904955748
##  [677]  0.4912108587  0.4919264013  0.4926411676  0.4933554164
##  [681]  0.4940686300  0.4947789969  0.4954875524  0.4961883443
##  [685]  0.4969000052  0.4976142539  0.4983295378  0.4990411987
##  [689]  0.4997515657  0.5004671083  0.5011803219  0.5018956058
##  [693]  0.5026108897  0.5033178924  0.5040308473  0.5047394027
##  [697]  0.5054523575  0.5061653124  0.5068774908  0.5075891517
##  [701]  0.5082977072  0.5090109208  0.5097262046  0.5104391595
##  [705]  0.5111503028  0.5118619637  0.5125759536  0.5132889084
##  [709]  0.5139855598  0.5146998085  0.5154101755  0.5161218363
##  [713]  0.5168373790  0.5175459345  0.5182612184  0.5189723617
##  [717]  0.5203623001  0.5210744785  0.5217680244  0.5231841002
##  [721]  0.5239004192  0.5253113193  0.5260048652  0.5274188707
##  [725]  0.5288344289  0.5295471249  0.5302593033  0.5309740697
##  [729]  0.5316852130  0.5323968739  0.5331085348  0.5338189017
##  [733]  0.5345305626  0.5352448113  0.5359549195  0.5366614047
##  [737]  0.5373730656  0.5380862792  0.5387984576  0.5395049428
##  [741]  0.5402181564  0.5409324052  0.5416453600  0.5423565033
##  [745]  0.5430697169  0.5437782723  0.5444899332  0.5451930542
##  [749]  0.5459021272  0.5466060245  0.5473163915  0.5480189949
##  [753]  0.5487311733  0.5494306713  0.5501384504  0.5508397598
##  [757]  0.5515446923  0.5522571295  0.5529682729  0.5536822628
##  [761]  0.5543913359  0.5550991150  0.5558112934  0.5565214016
##  [765]  0.5572281455  0.5579346307  0.5593336266  0.5600406294
##  [769]  0.5607497024  0.5614608457  0.5621725066  0.5628857202
##  [773]  0.5635883236  0.5642963615  0.5650064696  0.5657176130
##  [777]  0.5664246157  0.5671298069  0.5678388800  0.5685513172
##  [781]  0.5692598727  0.5699715336  0.5706862999  0.5713940790
##  [785]  0.5728044615  0.5735145696  0.5742262305  0.5749340096
##  [789]  0.5756441178  0.5763552611  0.5770622639  0.5777630557
##  [793]  0.5784555665  0.5791573935  0.5798638787  0.5805615651
##  [797]  0.5812696030  0.5819781585  0.5826805031  0.5833895761
##  [801]  0.5847645049  0.5861246830  0.5868259924  0.5875309249
##  [805]  0.5882358574  0.5889387195  0.5896410641  0.5903465142
##  [809]  0.5910519642  0.5917620724  0.5924724393  0.5931753015
```

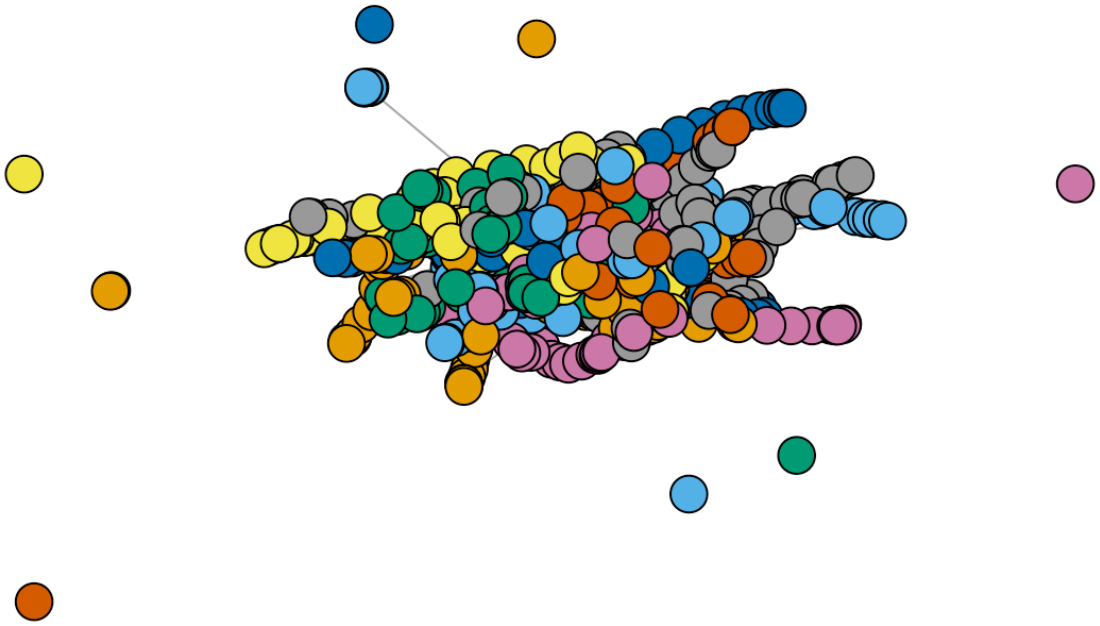
```
##  [813]  0.5938820454  0.5945874955  0.5952906164  0.5959934786
##  [817]  0.5966984111  0.5974023084  0.5981108638  0.5988199369
##  [821]  0.5995277160  0.6002362714  0.6009391336  0.6016482066
##  [825]  0.6023585736  0.6030624709  0.6037601573  0.6044650898
##  [829]  0.6051705398  0.6058759899  0.6072216759  0.6079279023
##  [833]  0.6086276590  0.6093302624  0.6107132136  0.6114163346
##  [837]  0.6121155737  0.6128215413  0.6135269914  0.6142334765
##  [841]  0.6149389266  0.6156402360  0.6163415455  0.6170299156
##  [845]  0.6177330366  0.6184379690  0.6191410900  0.6198480927
##  [849]  0.6205509549  0.6212517468  0.6219548678  0.6226344392
##  [853]  0.6233290202  0.6240298121  0.6247078309  0.6254086227
##  [857]  0.6261094146  0.6268122768  0.6275130687  0.6282097200
##  [861]  0.6295864603  0.6316218105  0.6329405828  0.6336320584
##  [865]  0.6343351793  0.6350328658  0.6357305522  0.6364230630
##  [869]  0.6371191967  0.6378106723  0.6385119818  0.6391951762
##  [873]  0.6405175716  0.6418839605  0.6425800942  0.6432829564
##  [877]  0.6439824543  0.6446811759  0.6453796387  0.6460721495
##  [881]  0.6467579318  0.6474592412  0.6481527871  0.6488473681
##  [885]  0.6502499871  0.6516272450  0.6523156151  0.6529915636
##  [889]  0.6536838155  0.6550481342  0.6557440091  0.6564150406
##  [893]  0.6583781895  0.6590691476  0.6597637286  0.6604546866
##  [897]  0.6618011490  0.6624721805  0.6631574453  0.6638419336
##  [901]  0.6645403965  0.6652313545  0.6659217949  0.6666039542
##  [905]  0.6672907717  0.6679729310  0.6693548471  0.6700416645
##  [909]  0.6707390922  0.6714233218  0.6721137622  0.6728062730
##  [913]  0.6734801511  0.6741568759  0.6748128979  0.6754575333
##  [917]  0.6761420216  0.6768329797  0.6775097045  0.6781980746
##  [921]  0.6788833394  0.6795771440  0.6802499871  0.6809158429
##  [925]  0.6815980022  0.6822718803  0.6829385125  0.6836082501
##  [929]  0.6842624605  0.6849430671  0.6856197919  0.6862988458
##  [933]  0.6869711713  0.6876450494  0.6883246209  0.6889948760
##  [937]  0.6896420993  0.6903242586  0.6909732933  0.6916365613
##  [941]  0.6922907717  0.6929361834  0.6936051447  0.6942521091
##  [945]  0.6949249521  0.6956040060  0.6962527819  0.6969062160
##  [949]  0.6975674137  0.6987919880  0.7000755654  0.7007432328
##  [953]  0.7013811397  0.7020493246  0.7027035350  0.7033608509
##  [957]  0.7040065214  0.7046555561  0.7053097666  0.7059686352
##  [961]  0.7066264686  0.7079729310  0.7086354226  0.7092885979
##  [965]  0.7099376326  0.7105734693  0.7117638839  0.7123777237
##  [969]  0.7130143367  0.7136597485  0.7148739713  0.7161101910
##  [973]  0.7167411107  0.7173671135  0.7179436882  0.7195675690
##  [977]  0.7201710574  0.7218987112  0.7230720460  0.7243835723
##  [981]  0.7249904249  0.7256174629  0.7262354433  0.7267483567
##  [985]  0.7277032762  0.7282969308  0.7288696237  0.7294819109
##  [989]  0.7300654728  0.7306653382  0.7311945551  0.7317711299
##  [993]  0.7323425289  0.7329423943  0.7340300709  0.7352813001
##  [997]  0.7358648621  0.7364134879  0.7369781585  0.7387316909
## [1001]  0.7392854925  0.7398165209  0.7403056260  0.7408193158
## [1005]  0.7418109829  0.7423880752  0.7442414989  0.7447559650
## [1009]  0.7459132550  0.7464152994  0.7469126857  0.7493835723
## [1013]  0.7521598261  0.7525262668  0.7529765540  0.7543149940
```

```
## [1017]  0.7552818177  0.7562486414  0.7571285130  0.7575622380
## [1021]  0.7598840640  0.7602696548  0.7606539517  0.7609883029
## [1025]  0.7613653538  0.7615374463  0.7617134206  0.7619877336
## [1029]  0.7621719890  0.7626372859  0.7630378862  0.7637107293
## [1033]  0.7639182755  0.7645833549  0.7647241344  0.7648007350
## [1037]  0.7649190001  0.7650328658  0.7651368977  0.7651995238
## [1041]  0.7656852647  0.7666344910  0.7662980695  0.7661816159
## [1045]  0.7666342322  0.7659717406  0.7652352363  0.7651048082
## [1049]  0.7639061125  0.7634353812  0.7606619740  0.7593131825
## [1053]  0.7566236220  0.7490173904  0.7438163139  0.7425394648
## [1057]  0.7340285182  0.7317007401  0.7197484602  0.7096620258
## [1061]  0.6996925625  0.6893118886  0.6516401843  0.5654567569
## [1065]  0.5260022773  0.4901741628  0.4582361161  0.4362175871
## [1069]  0.0028735573
```

Multi-Level

```
multi = multilevel.community(eur_data)
```

```
membership_multi = membership(multi)
plot(eur_data, vertex.size=7, vertex.label=NA,vertex.color=membership_multi, asp=FA
LSE)
```



Community recived and their size

```
max(levels(as.factor(membership_multi)))
```

```
## [1] "9"
```

```
summary(as.factor(membership_multi))
```

```
##  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
##  1  1  1  1  1  1  1 30  3 39 66 29 34 35 50 49 67 53 46 40 49 40 23 28 25
## 26 27 28 29 30 31 32 33 34 35
## 33 27 27 32 60 33 56 24 47 25
```

Modularity

```
multi$modularity
```

```
## [1] 0.4500538 0.6388086 0.7355090 0.7595981 0.7596405
```