

# Network creation

## 1. Creation of a Network with Edge, Node

```
library(igraph)
```

```
##  
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:stats':  
##  
##      decompose, spectrum
```

```
## The following object is masked from 'package:base':  
##  
##      union
```

```
g4 <- graph( c('Susann', 'Jeanette', 'Harrison', 'Myron', 'Julie', 'Colten', 'Brandyn', 'Leland', 'Catherine',  
'Tracy', 'Bee', 'Maureen', 'Annika', 'Hans', 'Spenser', 'Angelo', 'Blanche', 'Stanford', 'Hope', 'Catherine',  
'Almira', 'Thomas', 'Henry', 'Ralph', 'Louvenia', 'German', 'Lura', 'Wilma', 'Lauretta', 'Maudie', 'Martha',  
'Henry', 'Lloyd', 'Mayra', 'Noelle', 'Fabian', 'Ira', 'Zenobia', 'Noelle', 'Natalie', 'Brooke', 'German',  
'Lauretta', 'Zenobia', 'Hallie', 'Braxton', 'Lorraine', 'Alicia', 'Allie', 'Jaylon', 'Myrna', 'Darrel', 'Lura',  
'Hermon', 'Wyatt', 'Raoul', 'Althea', 'Laurel', 'Leola', 'Darrel', 'Giles', 'Merritt', 'Angelo', 'Kendrick',  
'Travis', 'Henry', 'Owen', 'Almira', 'Michelle', 'Lou', 'Stephan', 'Leola', 'Wyatt', 'Allie', 'Eli', 'Brandyn',  
'Mayra', 'Chin', 'Clarence', 'Marlee', 'Glenn', 'Reid', 'Glenn', 'Jerrold', 'Dale', 'Helena', 'Alvie', 'Elden',  
'Chaim', 'Merritt', 'Augustine', 'Curtiss', 'Alvie', 'Allie', 'Pollie', 'Catherine', 'Angelita', 'Glenn',  
'Allie', 'Braden', 'Manford', 'Raoul', 'Dwight', 'Pollie', 'Zona', 'Reggie', 'Dominic', 'Amy', 'Santos',  
'Faron', 'Leslie', 'Etha', 'Maureen', 'Juanita', 'Gust', 'Noelle', 'Darrel', 'Darin', 'Faron', 'Zona',  
'Myron', 'Hans', 'German', 'Elden', 'Mayra', 'Merritt', 'Myron', 'Gerald', 'Andrea', 'German', 'Angelita',  
'Giles', 'Reggie', 'Wyatt', 'Alvie', 'Darrel', 'Jarrett', 'Newell', 'Brandyn', 'Eloisa', 'Santos', 'Lou',  
'Quintin', 'Zechariah', 'Leola', 'Anthony', 'Eliga', 'Gust', 'Obie', 'Obie', 'Brandyn', 'Brooke', 'Dominic',  
'Jacoby', 'Maureen', 'Hardie', 'Noelle', 'Braxton', 'Noelle', 'Leola', 'Marlee', 'Helena', 'Ira', 'Kermit',  
'Wilda', 'Eli', 'Chance', 'Hardie', 'Andrea', 'Johnnie', 'Lauretta', 'Tracy', 'Kathryn', 'Spenser', 'Lou',  
'Dana', 'Dominic', 'Rachelle', 'Glenn', 'Darrel', 'Deidra', 'Hermon', 'Rosalind', 'Hans', 'Curtis',  
'Josue', 'Wyatt', 'Agatha', 'Wyatt', 'Chance', 'Glenn', 'Kendrick', 'Brooke', 'Hollie', 'Beverly', 'Katarina',  
'Josue', 'Leslie', 'Colten', 'Mayra', 'Darin', 'Hermon', 'Myron', 'Alicia', 'Leila', 'Kermit', 'Lamar',  
'Dana', 'Johnnie', 'Althea', 'Judson', 'Colten', 'Hope', 'Gust', 'Clarence', 'Leland', 'Matthew', 'Lorraine',  
'Althea', 'Colten', 'Jewel', 'Leila', 'Eli', 'Zenobia', 'German', 'Jaylon', 'Henry', 'Michelle', 'Johnnie',  
'Judson', 'Johnnie', 'Leslie', 'Wyatt', 'Lou', 'Maureen', 'Jacoby', 'Noelle', 'Johnnie', 'Alvie', 'Leila',  
'Myron', 'Wilda', 'Brandyn', 'Kendrick', 'Gerald', 'Tyson', 'Jacoby', 'Ari', 'Theo', 'Harrison', 'Carmen',  
'Leonard', 'Braden', 'Desi', 'Zona', 'Maureen', 'Ralph', 'Thomas', 'Myron', 'Austin', 'Leola', 'Lloyd',  
'Quintin', 'Lorraine', 'Glenn', 'Merritt', 'Janet', 'Myron', 'Alicia', 'Maureen', 'Leslie', 'Carla', 'Vicky',  
'Harley', 'Leslie', 'Hannah', 'Gust', 'Andrea', 'Giles', 'Wilma', 'Henry', 'Hermon', 'Stefani', 'Henry',  
'Harley', 'Noelle', 'Kermit', 'Laurel', 'Hermon', 'Sebastian', 'Andrea', 'Eliga', 'Sigmund', 'Darrel', 'Noelle',  
'Urban', 'Almira', 'Noelle', 'Dwight', 'Beverly', 'Wyatt', 'Juanita', 'Reid', 'Kermit', 'Myrna', 'Pollie',  
'Hope', 'Leola', 'Leslie', 'Jacoby', 'Pollie', 'Tiffany', 'Gust', 'Leland', 'Eliga', 'Lamar', 'Ira', 'Dale',  
'Noelle', 'Jarrett', 'Zenobia', 'Orpha', 'Glenn', 'Amy', 'Hermon', 'Myrna', 'Brandyn', 'Nell', 'Leslie',  
'Edd', 'Lura', 'Kendrick', 'Obie', 'Augustine', 'Zona', 'Glenn', 'Dominic', 'Jennifer', 'Rachelle', 'Faron',  
'Darrel', 'Pollie', 'Almira', 'Glenn', 'Wilma', 'Angus'))
```

```
## Warning in matrix(edges, ncol = 2, byrow = TRUE): data length [347] is not a  
## sub-multiple or multiple of the number of rows [174]
```

```
plot(g4, edge.arrow.size=.5, vertex.color="gold", vertex.size=5,  
  
      vertex.frame.color="gray", vertex.label.color="black",  
  
      vertex.label.cex=0.8, vertex.label.dist=2, edge.curved=0.2)
```



Result: A Teacher-student network is created

## 2. Adding the various vertex and edge attributes

V(g4) \$name

```
## [1] "Susann" "Jeanette" "Harrison" "Myron" "Julie" "Colten"
## [7] "Brandyn" "Leland" "Catherine" "Tracy" "Bee" "Maureen"
## [13] "Annika" "Hans" "Spenser" "Angelo" "Blanche" "Stanford"
## [19] "Hope" "Almira" "Thomas" "Henry" "Ralph" "Louvenia"
## [25] "German" "Lura" "Wilma" "Lauretta" "Maudie" "Martha"
## [31] "Loyd" "Mayra" "Noelle" "Fabian" "Ira" "Zenobia"
## [37] "Natalie" "Brooke" "Hallie" "Braxton" "Lorraine" "Alicia"
## [43] "Allie" "Jaylon" "Myrna" "Darrel" "Hermon" "Wyatt"
## [49] "Raoul" "Althea" "Laurel" "Leola" "Giles" "Merritt"
## [55] "Kendrick" "Travis" "Owen" "Michelle" "Lou" "Stephan"
## [61] "Eli" "Chin" "Clarence" "Marlee" "Glenn" "Reid"
## [67] "Jerrold" "Dale" "Helena" "Alvie" "Elden" "Chaim"
## [73] "Augustine" "Curtiss" "Pollie" "Angelita" "Braden" "Manford"
## [79] "Dwight" "Zona" "Reggie" "Dominic" "Amy" "Santos"
## [85] "Faron" "Leslie" "Etha" "Juanita" "Gust" "Darin"
## [91] "Gerald" "Andrea" "Jarrett" "Newell" "Eloisa" "Quintin"
## [97] "Zechariah" "Anthony" "Eliga" "Obie" "Jacoby" "Hardie"
## [103] "Kermit" "Wilda" "Chance" "Johnnie" "Kathryn" "Dana"
## [109] "Rachelle" "Deidra" "Orpha" "Rosalind" "Curtis" "Josue"
## [115] "Agatha" "Hollie" "Beverly" "Katarina" "Leila" "Lamar"
## [121] "Judson" "Matthew" "Jewel" "Johnie" "Tyson" "Ari"
## [127] "Theo" "Carmen" "Leonard" "Desi" "Austin" "Janet"
## [133] "Carla" "Vicky" "Harley" "Hannah" "Stefani" "Sebastian"
## [139] "Sigmund" "Urban" "Tiffany" "Nell" "Edd" "Jennifer"
## [145] "Angus"
```

[illegible]

```
## Warning in vattr[[name]][index] <- value: number of items to replace is not a
## multiple of replacement length
```

```
E(g4)$type <- "knows"

g4 <- set.edge.attribute(g4, "weight", value=runif(ecount(g4)))
get.edge.attribute(g4, "weight")
```

```
## [1] 0.38948975 0.83353694 0.15291035 0.02269613 0.91650950 0.57793172
## [7] 0.93178703 0.55614529 0.07183287 0.51227535 0.78462118 0.20748722
## [13] 0.45152537 0.72115012 0.71734152 0.87660967 0.42445400 0.50949113
## [19] 0.40572838 0.34933640 0.81387226 0.23038174 0.48189530 0.29569019
## [25] 0.93316874 0.43533067 0.78400581 0.29329710 0.76474341 0.80559230
## [31] 0.63942494 0.52270424 0.99244093 0.51664937 0.86153313 0.78123174
## [37] 0.91420806 0.63211526 0.04372872 0.04436701 0.55829665 0.86691525
## [43] 0.10988123 0.89025140 0.60087666 0.31327186 0.77560662 0.06312711
## [49] 0.57588690 0.55885273 0.46042095 0.85736246 0.41715612 0.52545003
## [55] 0.73006006 0.62463844 0.70390608 0.75449531 0.94716455 0.36884449
## [61] 0.62090223 0.49660159 0.97277274 0.44433450 0.55059879 0.36626377
## [67] 0.36573945 0.59481714 0.59619066 0.51244030 0.93745327 0.20043412
## [73] 0.89948391 0.47426242 0.50902570 0.85433873 0.15146555 0.29241650
## [79] 0.02013940 0.80413580 0.70887294 0.18839992 0.74361489 0.73095671
## [85] 0.49840358 0.34093473 0.76711973 0.96108983 0.26330920 0.61627607
## [91] 0.67179389 0.19930472 0.07051537 0.29047971 0.49878816 0.09204059
## [97] 0.57508671 0.52929534 0.48021283 0.91399714 0.58482197 0.20540896
## [103] 0.70460519 0.79557655 0.84159914 0.99522479 0.84246610 0.98588161
## [109] 0.53319921 0.91865400 0.42721803 0.38666356 0.95913936 0.49718479
## [115] 0.38528108 0.94074190 0.65861517 0.05282828 0.24150149 0.89054104
## [121] 0.81467397 0.68694855 0.71958666 0.92944272 0.10975394 0.17536680
## [127] 0.38586845 0.26850014 0.56761807 0.99795460 0.59960923 0.62747229
## [133] 0.31328819 0.61638108 0.32106556 0.35684482 0.66617756 0.49489385
## [139] 0.45043909 0.17733676 0.10232097 0.12278865 0.19800685 0.95167096
## [145] 0.68358142 0.18596665 0.90988132 0.52074571 0.42697966 0.12402522
## [151] 0.27672806 0.34563615 0.03505096 0.55138140 0.60763502 0.24420606
## [157] 0.67572375 0.04626122 0.37935359 0.85811262 0.67314453 0.79282023
## [163] 0.73435453 0.94167209 0.06664354 0.37118206 0.75854597 0.27222236
## [169] 0.57114905 0.27125399 0.41401062 0.78109278 0.34846172 0.49756515
```

```
edge_attr(g4)
```

```
## $type
## [1] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [10] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [19] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [28] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [37] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [46] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [55] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [64] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [73] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [82] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [91] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [100] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [109] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [118] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [127] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [136] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [145] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [154] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [163] "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows" "knows"
## [172] "knows" "knows" "knows"
##
## $weight
## [1] 0.38948975 0.83353694 0.15291035 0.02269613 0.91650950 0.57793172
## [7] 0.93178703 0.55614529 0.07183287 0.51227535 0.78462118 0.20748722
## [13] 0.45152537 0.72115012 0.71734152 0.87660967 0.42445400 0.50949113
## [19] 0.40572838 0.34933640 0.81387226 0.23038174 0.48189530 0.29569019
## [25] 0.93316874 0.43533067 0.78400581 0.29329710 0.76474341 0.80559230
## [31] 0.63942494 0.52270424 0.99244093 0.51664937 0.86153313 0.78123174
## [37] 0.91420806 0.63211526 0.04372872 0.04436701 0.55829665 0.86691525
## [43] 0.10988123 0.89025140 0.60087666 0.31327186 0.77560662 0.06312711
## [49] 0.57588690 0.55885273 0.46042095 0.85736246 0.41715612 0.52545003
## [55] 0.73006006 0.62463844 0.70390608 0.75449531 0.94716455 0.36884449
## [61] 0.62090223 0.49660159 0.97277274 0.44433450 0.55059879 0.36626377
## [67] 0.36573945 0.59481714 0.59619066 0.51244030 0.93745327 0.20043412
## [73] 0.89948391 0.47426242 0.50902570 0.85433873 0.15146555 0.29241650
## [79] 0.02013940 0.80413580 0.70887294 0.18839992 0.74361489 0.73095671
## [85] 0.49840358 0.34093473 0.76711973 0.96108983 0.26330920 0.61627607
## [91] 0.67179389 0.19930472 0.07051537 0.29047971 0.49878816 0.09204059
## [97] 0.57508671 0.52929534 0.48021283 0.91399714 0.58482197 0.20540896
## [103] 0.70460519 0.79557655 0.84159914 0.99522479 0.84246610 0.98588161
## [109] 0.53319921 0.91865400 0.42721803 0.38666356 0.95913936 0.49718479
## [115] 0.38528108 0.94074190 0.65861517 0.05282828 0.24150149 0.89054104
## [121] 0.81467397 0.68694855 0.71958666 0.92944272 0.10975394 0.17536680
## [127] 0.38586845 0.26850014 0.56761807 0.99795460 0.59960923 0.62747229
## [133] 0.31328819 0.61638108 0.32106556 0.35684482 0.66617756 0.49489385
## [139] 0.45043909 0.17733676 0.10232097 0.12278865 0.19800685 0.95167096
## [145] 0.68358142 0.18596665 0.90988132 0.52074571 0.42697966 0.12402522
## [151] 0.27672806 0.34563615 0.03505096 0.55138140 0.60763502 0.24420606
## [157] 0.67572375 0.04626122 0.37935359 0.85811262 0.67314453 0.79282023
## [163] 0.73435453 0.94167209 0.06664354 0.37118206 0.75854597 0.27222236
## [169] 0.57114905 0.27125399 0.41401062 0.78109278 0.34846172 0.49756515
```

```
vertex_attr(g4)
```

```
## $name
## [1] "Susann" "Jeanette" "Harrison" "Myron" "Julie" "Colten"
## [7] "Brandyn" "Leland" "Catherine" "Tracy" "Bee" "Maureen"
## [13] "Annika" "Hans" "Spenser" "Angelo" "Blanche" "Stanford"
## [19] "Hope" "Almira" "Thomas" "Henry" "Ralph" "Louvenia"
## [25] "German" "Lura" "Wilma" "Lauretta" "Maudie" "Martha"
## [31] "Loyd" "Mayra" "Noelle" "Fabian" "Ira" "Zenobia"
## [37] "Natalie" "Brooke" "Hallie" "Braxton" "Lorraine" "Alicia"
## [43] "Allie" "Jaylon" "Myrna" "Darrel" "Hermon" "Wyatt"
## [49] "Raoul" "Althea" "Laurel" "Leola" "Giles" "Merritt"
## [55] "Kendrick" "Travis" "Owen" "Michelle" "Lou" "Stephan"
## [61] "Eli" "Chin" "Clarence" "Marlee" "Glenn" "Reid"
## [67] "Jerrold" "Dale" "Helena" "Alvie" "Elden" "Chaim"
## [73] "Augustine" "Curtiss" "Pollie" "Angelita" "Braden" "Manford"
## [79] "Dwight" "Zona" "Reggie" "Dominic" "Amy" "Santos"
## [85] "Faron" "Leslie" "Etha" "Juanita" "Gust" "Darin"
## [91] "Gerald" "Andrea" "Jarrett" "Newell" "Eloisa" "Quintin"
## [97] "Zechariah" "Anthony" "Eliga" "Obie" "Jacoby" "Hardie"
## [103] "Kermit" "Wilda" "Chance" "Johnnie" "Kathryn" "Dana"
## [109] "Rachelle" "Deidra" "Orpha" "Rosalind" "Curtis" "Josue"
## [115] "Agatha" "Hollie" "Beverly" "Katarina" "Leila" "Lamar"
## [121] "Judson" "Matthew" "Jewel" "Johnnie" "Tyson" "Ari"
## [127] "Theo" "Carmen" "Leonard" "Desi" "Austin" "Janet"
## [133] "Carla" "Vicky" "Harley" "Hannah" "Stefani" "Sebastian"
## [139] "Sigmund" "Urban" "Tiffany" "Nell" "Edd" "Jennifer"
## [145] "Angus"
##
## $part
## [1] "teacher" "teacher" "student" "teacher" "teacher" "teacher" "teacher"
## [8] "teacher" "teacher" "student" "teacher" "student" "teacher" "student"
## [15] "student" "teacher" "teacher" "teacher" "student" "teacher" "student"
## [22] "teacher" "student" "student" "student" "student" "teacher" "student"
## [29] "teacher" "student" "student" "student" "teacher" "student" "teacher"
## [36] "student" "teacher" "teacher" "student" "student" "student" "student"
## [43] "teacher" "teacher" "teacher" "student" "teacher" "teacher" "teacher"
## [50] "student" "teacher" "teacher" "teacher" "student" "student" "teacher"
## [57] "teacher" "student" "teacher" "student" "teacher" "student" "student"
## [64] "student" "teacher" "student" "teacher" "student" "student" "teacher"
## [71] "teacher" "student" "student" "student" "teacher" "teacher" "teacher"
## [78] "student" "student" "student" "student" "student" "teacher" "teacher"
## [85] "student" "student" "student" "student" "student" "student" "student"
## [92] "student" "student" "student" "student" "student" "student" "student"
## [99] "student" "student" "student" "student" "student" "student" "student"
## [106] "student" "student" "student" "student" "student" "teacher" "student"
## [113] "teacher" "student" "student" "teacher" "teacher" "teacher" "student"
## [120] "teacher" "student" "student" "student" "student" "teacher" "student"
## [127] "student" "teacher" "student" "student" "teacher" "teacher" "teacher"
## [134] "student" "teacher" "teacher" "student" "student" "teacher" "student"
## [141] "student" "teacher" "student" "student" "teacher"
```

Result: The edge and vertex attributes are checked

### 3. Colouring the vertex according to vertex attributes i.e. student and teacher

```
plot(g4, edge.arrow.size=.2, vertex.label.color="black", vertex.label.dist=0.1, vertex.size=6, vertex.label.cex=0.8,
     vertex.color=c( "yellow", "skyblue")[1+(V(g4)$part=="student")])
```



Result: The student vertex is coloured blue and the teacher vertex is coloured yellow

#### 4. Changing shapes of the vertices according to attributes:

```
plot(g4, edge.arrow.size=.5, vertex.label.color="black", vertex.label.dist=1.5, vertex.size=5,
     vertex.color=c( "yellow", "skyblue" )[1+(V(g4)$part=="student")],
     vertex.shape=c( "circle", "square" )[1+(V(g4)$part=="student")])
)
```



Result: The vertices with students are changed to square and the vertices with teachers are changed to circle

#### 5. Exploring the various layouts available in the igraph package

```
layouts <- grep("^layout_", ls("package:igraph"), value=TRUE)[-1]
layouts <- layouts[!grepl("bipartite|merge|norm|sugiyama|tree", layouts)]
par(mfrow=c(3,5), mar=c(1,1,1,1))
for (layout in layouts) {
  print(layout)
  l <- do.call(layout, list(g4))
  plot(g4, edge.arrow.mode=0, layout=l, main=layout, vertex.color=c("yellow", "skyblue")[1+(V(g4)$part=="student")], vertex.label=NA) }
```

```
## [1] "layout_as_star"
```

```
## [1] "layout_components"
```

```
## [1] "layout_in_circle"
```

```
## [1] "layout_nicely"
```

```
## [1] "layout_on_grid"
```

```
## [1] "layout_on_sphere"
```

```
## [1] "layout_randomly"
```

```
## [1] "layout_with_dh"
```

```
## [1] "layout_with_drl"
```

```
## [1] "layout_with_fr"
```

```
## [1] "layout_with_gem"
```

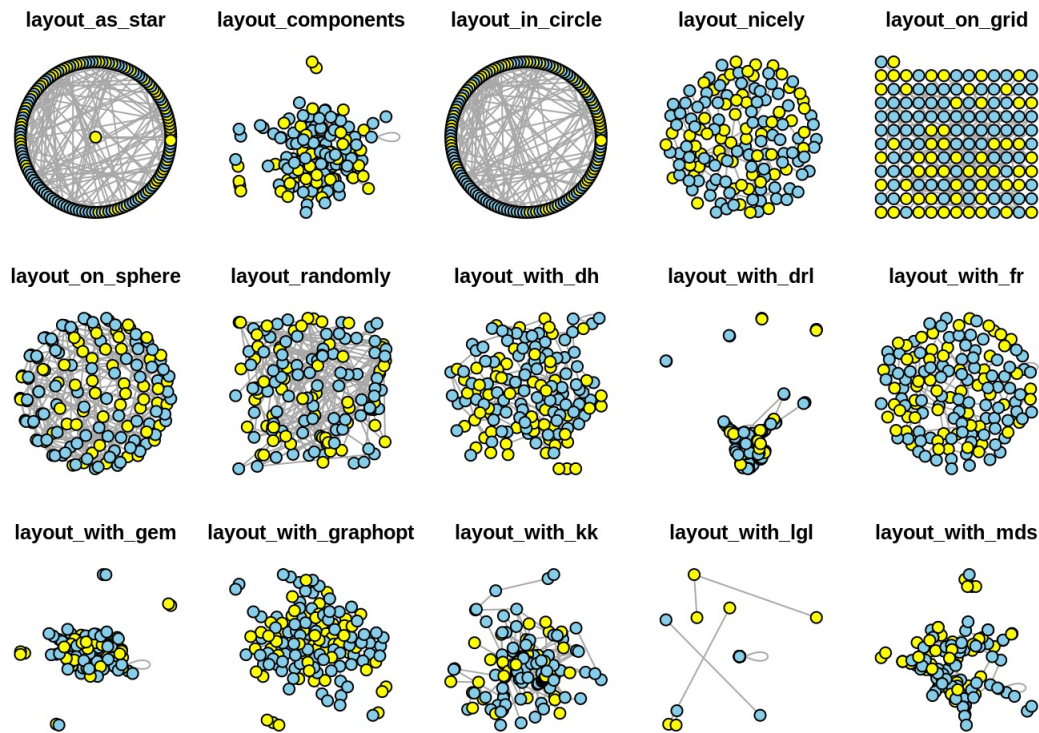
```
## [1] "layout_with_graphopt"
```

```
## [1] "layout_with_kk"
```

```
## [1] "layout_with_lgl"
```

```
## [1] "layout_with_mds"
```





Result: The various layout styles are explored

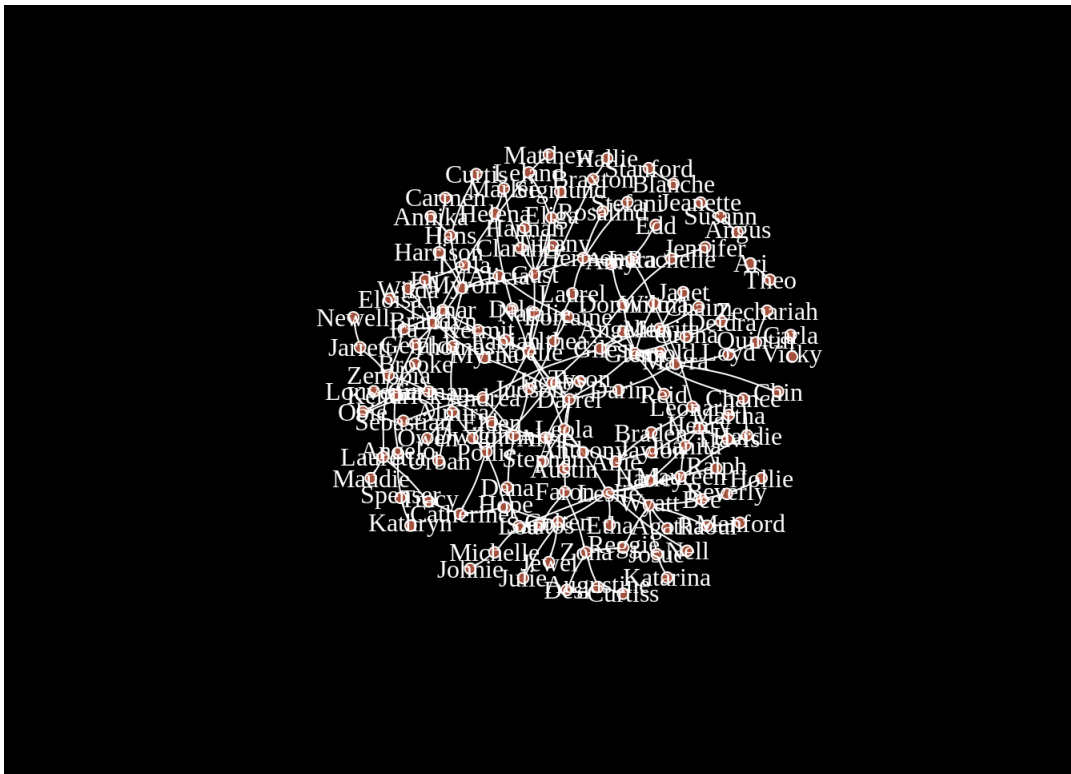
#### 6. The basic layout for various styles that can be used

```
par(bg="black")
plot(g4,

# === vertex
vertex.color = rgb(0.8,0.4,0.3,0.8),
vertex.frame.color = "white",
vertex.shape="circle", # One of "none", "circle", "square", "csquare", "rectangle", "crectangle", "vrectangle", "pie", "raster", or "sphere"
vertex.size=5,
vertex.size2=NA,

# === vertex label
vertex.label.color="white",
vertex.label.family="Times",
vertex.label.font=0.05,
vertex.label.cex=1,
vertex.label.dist=0,
vertex.label.degree=0 ,

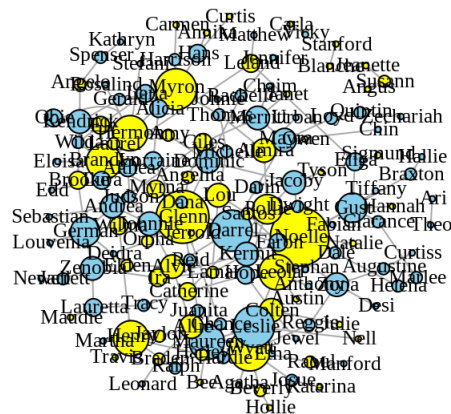
# === Edge
edge.color="white",
edge.width=1,
edge.arrow.size=0.1,
edge.arrow.width=0.1,
edge.lty="solid", # Line type, could be 0 or "blank", 1 or "solid", 2 or "dashed", 3 or "dotted", 4 or "dotdash", 5 or "longdash", 6 or "twodash"
edge.curved=0.1 ,
)
```



Result: The various vertex and edge styles were explored in igraph

#### 7. Changing the vertex size according to people known i.e. the degree of the vertex

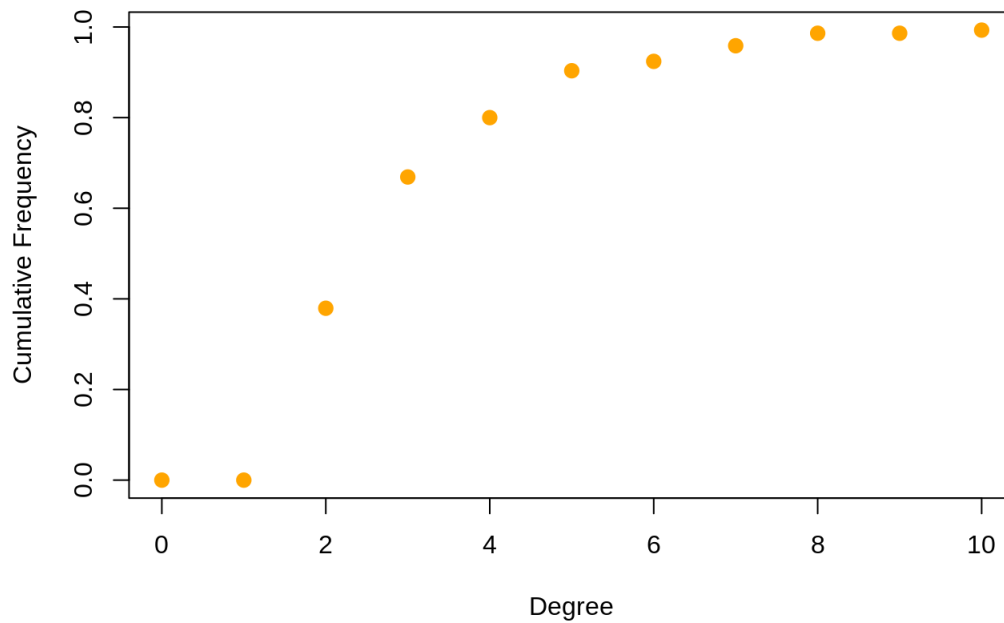
```
deg <- degree(g4, mode="all")
plot(g4, vertex.size=deg*3, edge.arrow.size=.05, vertex.label.color="black", vertex.label.dist=0.1, vertex.size=6, vertex.label.cex=0.8, vertex.color=c("yellow", "skyblue")[1+(V(g4)$part=="student")])
```



Result: The vertex size was changed according to the degree of the vertex the larger circles showing more degree of the vertex so they know more people

#### 8. Plotting the degree distribution

```
deg.dist <- degree_distribution(g4, cumulative=T, mode="all")
plot(x=0:max(deg), y=1-deg.dist, pch=19, cex=1.2, col="orange",
     xlab="Degree", ylab="Cumulative Frequency")
```



Result: The graph for degree distribution vs Cumulative frequency is plotted for all the vertices

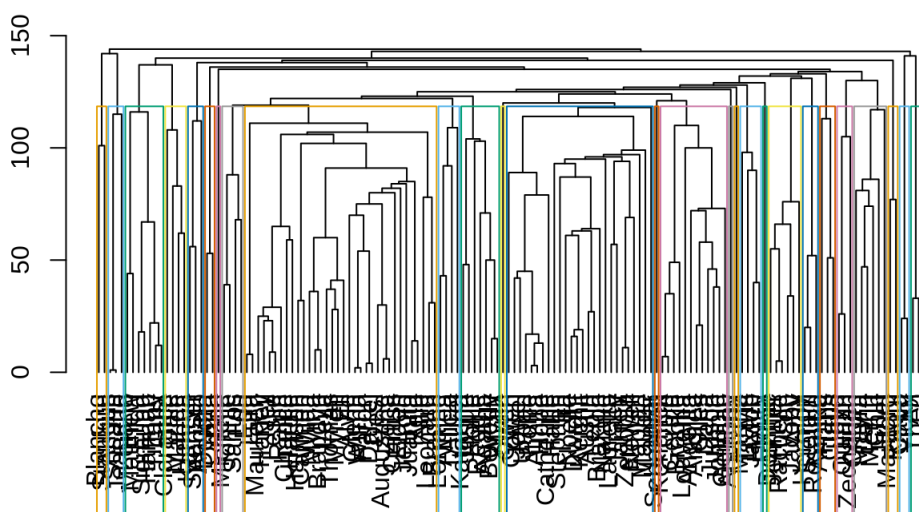
#### 9. Community detection based on edge betweenness

```
ceb <- cluster_edge_betweenness(g4)
```

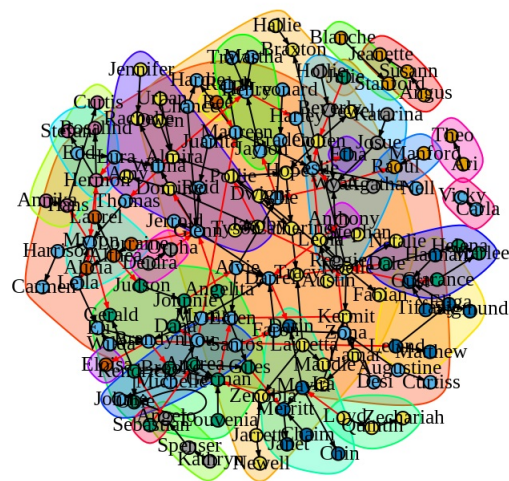
```
## Warning in cluster_edge_betweenness(g4): At community.c:459 :Membership vector
## will be selected based on the lowest modularity score.
```

```
## Warning in cluster_edge_betweenness(g4): At community.c:464 :Modularity
## calculation with weighted edge betweenness community detection might not make
## sense -- modularity treats edge weights as similarities while edge betweenness
## treats them as distances
```

```
dendPlot(ceb, mode="hclust")
```



```
plot(ceb, g4, edge.arrow.size=.2, vertex.label.color="black", vertex.label.dist=0.1,vertex.size=6,vertex.lab
el.cex=0.8)
```



Conculsion: A Teacher-student network was created alongwith the Network attributes and are then plotted using vaarious parameters like color, shape, size etc with respect to the family they belong to and the various communitites inside the graph are detected.