

Homework for Network Analysis Workshop

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Exercise 1. Nigeria Data

```
# setup the working directory
setwd("/Users/minheeseo/Dropbox/Classes/2018_Classes/Network/network2018_hw1/")
# clean the workspace
rm(list = ls())
# loading data and R packages
library(igraph)
library(network)
load("nigeria.rda")
# first, check the number of actors and time span
# length(unique(nigeria$sender))
# length(unique(nigeria$receiver))
# identical(unique(nigeria$sender), unique(nigeria$receiver))
# # check the order length(unique(nigeria$year))
# table(nigeria$conflict) # sparse data
nigeria$sender <- gsub("\n", " ", nigeria$sender)
nigeria$receiver <- gsub("\n", " ", nigeria$receiver)

# create list where the length of list is time span
network.mat <- vector("list", length(unique(nigeria$year)) +
  1)
names(network.mat) <- unique(nigeria$year)

time <- unique(nigeria$year)
for (t in 1:length(time)) {
  slice <- NULL
  empty.mat <- NULL
  country.senter <- country.receiver <- c()
  slice <- nigeria[nigeria$year == time[t], ]
  country.sender <- unique(slice$sender)
  empty.mat <- matrix(0, length(country.sender), length(unique(slice$receiver)))
  empty.mat <- as.data.frame(empty.mat)
  rownames(empty.mat) <- country.sender
  colnames(empty.mat) <- unique(slice$receiver)
  for (i in 1:length(country.sender)) {
    country.receiver <- unique(slice$receiver[slice$sender ==
      country.sender[i]])
    for (j in 1:length(country.receiver)) {
      empty.mat[rownames(empty.mat) == country.sender[i],
        colnames(empty.mat) == country.receiver[j]] <- slice$conflict[slice$sender ==
        country.sender[i] & slice$receiver == country.receiver[j]]
    }
  }
  network.mat[[t]] <- empty.mat
}
```

```

# network.mat list contains 17 matrix each one for each year
country.sender <- unique(nigeria$sender)
empty.mat <- matrix(0, length(country.sender), length(unique(nigeria$receiver)))
empty.mat <- as.data.frame(empty.mat)
rownames(empty.mat) <- country.sender
colnames(empty.mat) <- unique(nigeria$receiver)
for (i in 1:length(country.sender)) {
  country.receiver <- unique(nigeria$receiver[nigeria$sender ==
    country.sender[i]])
  for (j in 1:length(country.receiver)) {
    empty.mat[rownames(empty.mat) == country.sender[i], colnames(empty.mat) ==
      country.receiver[j]] <- sum(nigeria$conflict[nigeria$sender ==
        country.sender[i] & nigeria$receiver == country.receiver[j]])
  }
}
names(network.mat)[18] <- "All Conflict"
network.mat[[18]] <- empty.mat

```

```

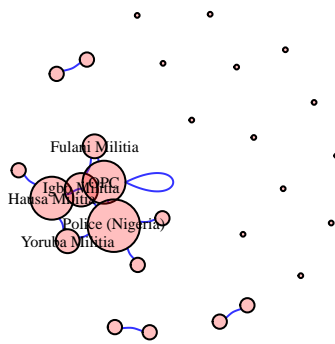
myblue <- rgb(red = 0, green = 0, blue = 1, alpha = .8)
mypink <- rgb(red = 1, green = 0, blue = 0, alpha = .25)

par(mfrow=c(2, 2), mar=c(0,0.2,1,0.2))
for(i in 1:4){
  g <- NULL
  g = graph_from_adjacency_matrix(as.matrix(network.mat[[i]]),
    mode='undirected')

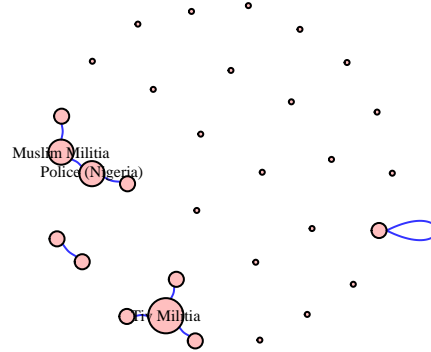
  tiesSum = apply(g[, 1, sum)
  # condition size based on # of ties
  V(g)$size <- (tiesSum+0.5)*6
  # only label if # ties greater than 10
  V(g)$label <- ifelse( tiesSum>1, V(g)$name, NA )
  V(g)$label.cex <- 0.6
  plot(g,main=paste("Year:", names(network.mat)[i]),
    vertex.label=V(g)$label,
    vertex.size=V(g)$size,
    vertex.color =mypink, # change color of nodes
    vertex.label.color = "black", # change color of labels
    edge.curved=.25, # add a 25% curve to the edges
    edge.color=myblue, # change edge color to grey
    layout=layout_with_fr)
}

```

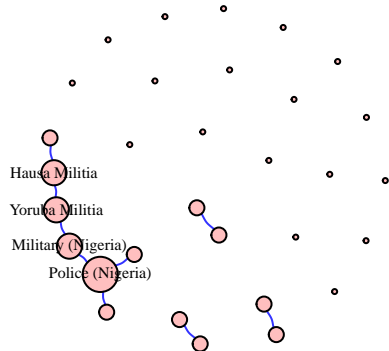
Year: 2000



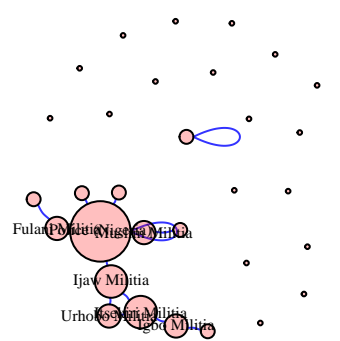
Year: 2001



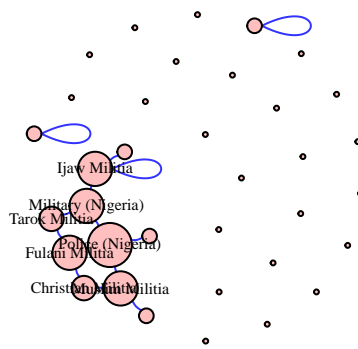
Year: 2002



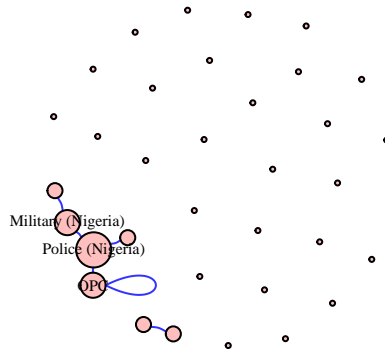
Year: 2003



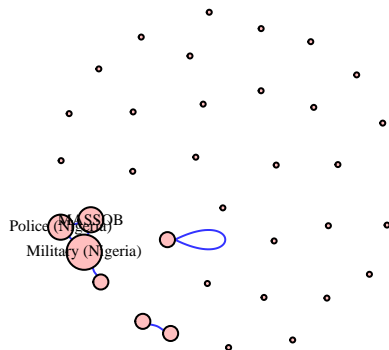
Year: 2004



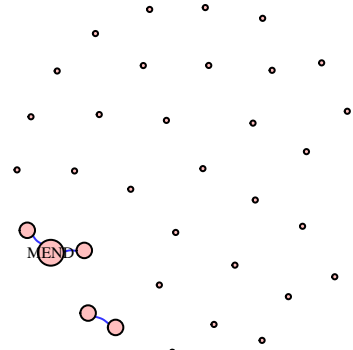
Year: 2005



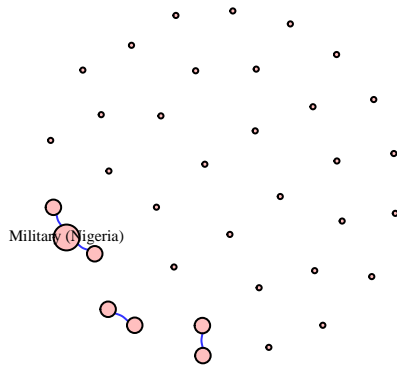
Year: 2006



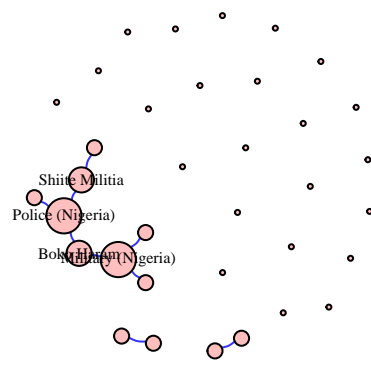
Year: 2007



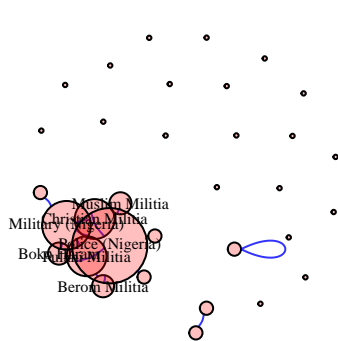
Year: 2008



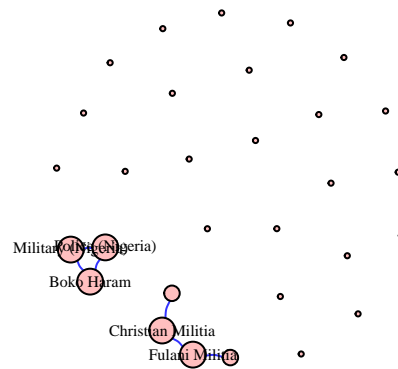
Year: 2009



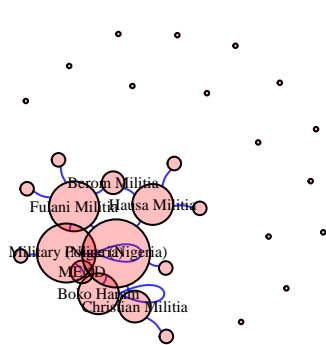
Year: 2010



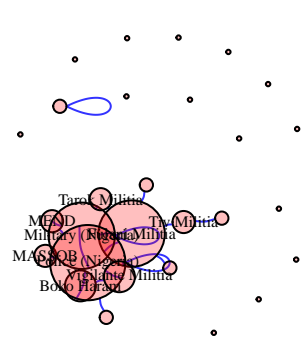
Year: 2011



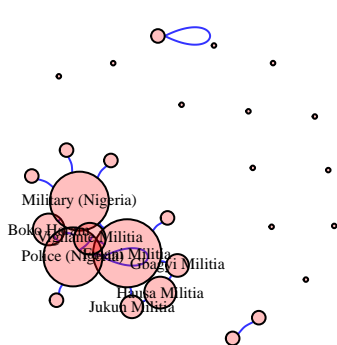
Year: 2012



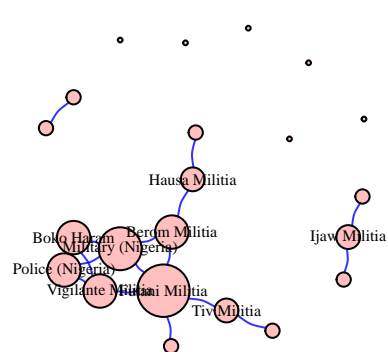
Year: 2013

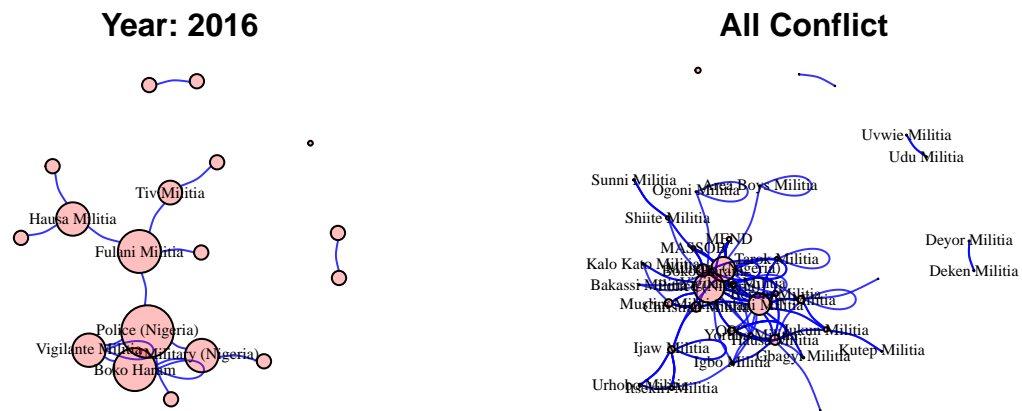


Year: 2014



Year: 2015





Exercise 2. Measurements & Community detection