ERGM LAB: Exercises

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Contents

```
R> library(ergm)
R> library(sna)
R> library(coda)
```

Rural Arizona risk Networks

The Data

The data was aggregated by Martina Morris (University of Washington) and Richard Rothenberg (Emory University) and put online at ICPSR. The original data can be found here. In this exercise we are goint to investigate four networks derived from the *Rural Arizona risk networks* in Flagstaff, AZ. These networks were collected from May 1996 to Jan 1998 and originally had 95 respondents interviewed 5 times each. All participants are over 18 years old. This network was generated from random walk sampling strategy. **Warning** These networks are obviously from network sample and not *true* complete networks, but we are going to ignore that for this exercise and will treat them as complete.

- Name generator
  - Sex, needle, other (illicit) drug contact, social contact in last 6 months
  - Sampling strategy
    * Six seeds chosen at random within same geographic area (Flagstaff) from persons presumed to be at elevated risk for HIV acquisition (through sex and/or drug behaviors)

Networks

Here, I have constructed 4 networks with attributes: race, ethnicity, sex, and age.

Load the data:

```
R> load("data/flagstaff_rural.rda")
```

Needle Network

```
R> flag_needle_net
```
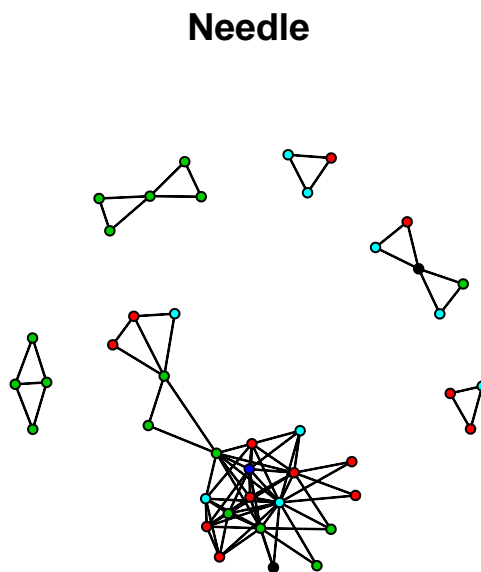
```
 Network attributes:
  vertices = 42
  directed = FALSE
  hyper = FALSE
  loops = FALSE
  multiple = FALSE
  bipartite = FALSE
  total edges= 87
    missing edges= 0
    non-missing edges= 87

 Vertex attribute names:
    age ethn id race sex vertex.names

No edge attributes
```

```
R> plot(flag_needle_net, vertex.col = "race", main = "Needle")
```

Needle

Sexual Contact Network

```
R> flag_sex_net
```

```
 Network attributes:
  vertices = 167
  directed = FALSE
  hyper = FALSE
  loops = FALSE
  multiple = FALSE
  bipartite = FALSE
  total edges= 282
    missing edges= 0
```

```
    non-missing edges= 282

 Vertex attribute names:
    age ethn id race sex vertex.names

No edge attributes
R> plot(flag_sex_net, vertex.col = "race", main = "Sex")
```
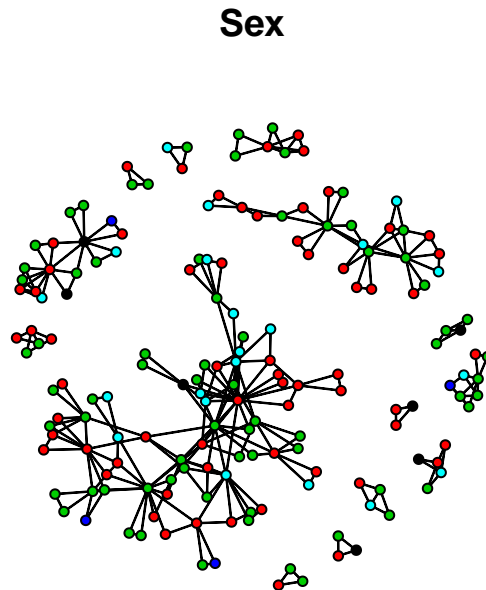
Sex

Social Contact Network

```
R> flag_social_net

 Network attributes:
  vertices = 523
  directed = FALSE
  hyper = FALSE
  loops = FALSE
  multiple = FALSE
  bipartite = FALSE
  total edges= 2713
    missing edges= 0
    non-missing edges= 2713

 Vertex attribute names:
    age ethn id race sex vertex.names

 Edge attribute names not shown
```
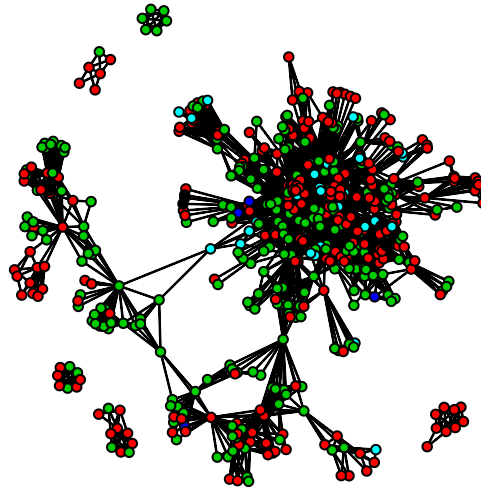
```
R> plot(flag_social_net, vertex.col = "race", main = "Social")
```

Social

Drug Contact Network

```
R> flag_drug_net
```

```
 Network attributes:
  vertices = 352
  directed = FALSE
  hyper = FALSE
  loops = FALSE
  multiple = FALSE
  bipartite = FALSE
  total edges= 1626
    missing edges= 0
    non-missing edges= 1626

 Vertex attribute names:
    age ethn id race sex vertex.names

 Edge attribute names not shown
```
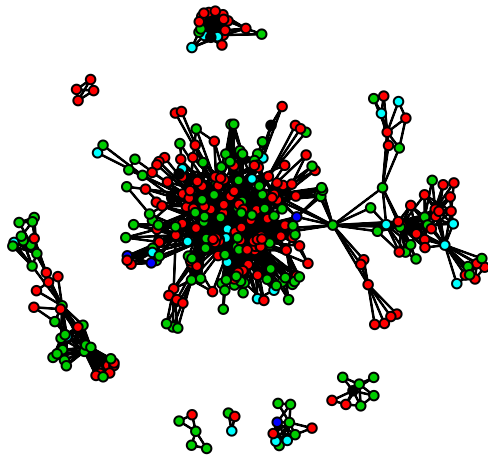
```
R> plot(flag_drug_net, vertex.col = "race", main = "Drug")
```

Drug

Exercise

For each network explore the basic properties of the network (e.g., mixing matrix, density, etc.) and then attempt to develop a "good" ERG model for each network. After you have the best ERG model you can construct, use the tutorial to try to interpret the predicted probabilities and odds ratio of a given conditional tie. Further, attempt to explain what these results would mean substantively.