example: network study of corporate law firm

☑ association graph of dyad variables with $J > 0.15$

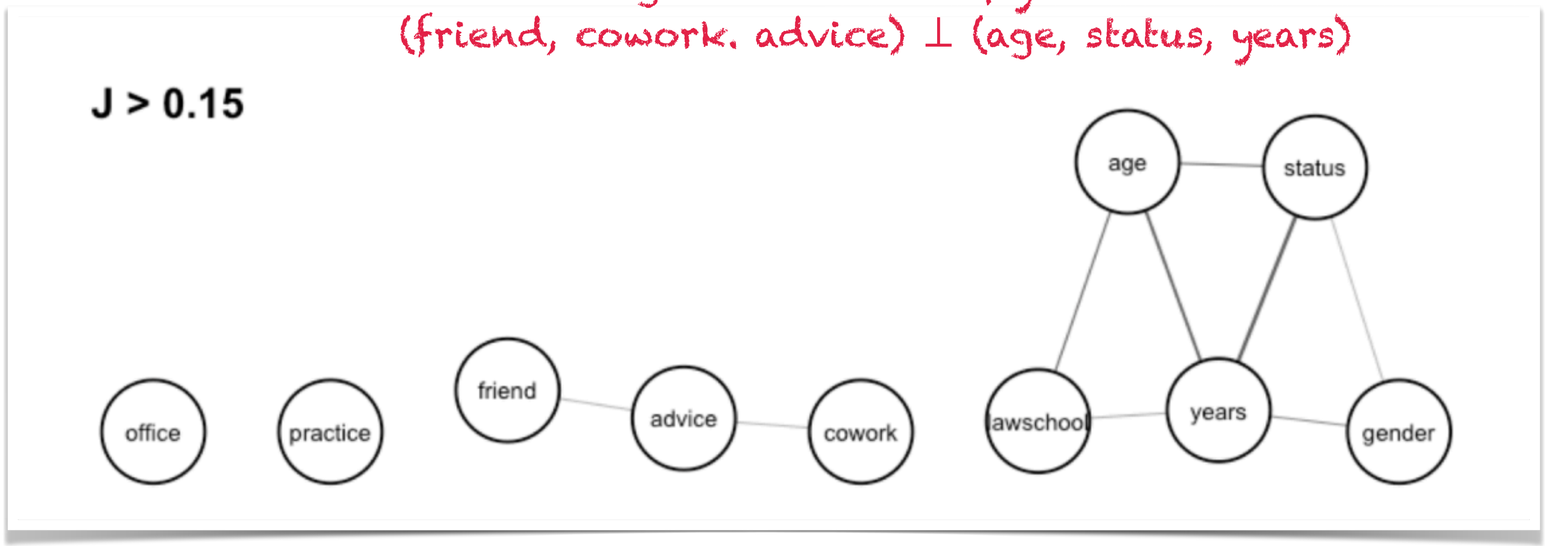
```
library(ggraph)
assoc_graph(dat, cutoff = 0)
```

example of structural models of interest:

friend ⊥ cowork | advice

gender ⊥ status | years

(friend, cowork. advice) ⊥ (age, status, years)



✓ associations between components and cliques

✓ comparisons and tests of tentative dependence structures

```
##        j  #(J = j) #(J >= j)
## 1   0.79         1         1
## 2   0.61         1         2
## 3   0.41         1         3
## 4   0.38         1         4
## 5   0.28         1         5
## 6    0.2         1         6
## 7   0.18         2         8
## 8   0.17         1         9
## 9   0.14         1        10
## 10  0.13         1        11
## 11   0.1         1        12
## 12 0.09         1        13
## 13 0.08         4        17
## 14 0.07         2        19
## 15 0.06         2        21
## 16 0.05         7        28
## 17 0.04         2        30
## 18 0.03         1        31
## 19 0.02         5        36
## 20 0.01         5        41
## 21    0         4        45
```

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☑ prediction power based one expected conditional entropy $EH(Z|X,Y)$

finding good predictors:
variables (almost) uniquely determined
by combinations of other

```
# prediction power matrix with E(Z|X,Y)
pp <- prediction_power(var, dat)
diag(pp) # single variable prediction EH(Z|X)
```

predicting $Z =$ status:

```
##           status gender office years   age practice lawschool cowork advice friend
## status        NA     NA     NA    NA    NA       NA         NA     NA     NA     NA
## gender        NA  1.375  1.180 0.670 0.855    1.304      1.225  1.306  1.263  1.270
## office        NA     NA  2.147 0.493 0.820    1.374      1.245  1.373  1.325  1.334
## years         NA     NA     NA 2.265 0.573    0.682      0.554  0.691  0.667  0.684
## age           NA     NA     NA    NA 1.877    1.089      0.958  1.087  1.052  1.058
## practice      NA     NA     NA    NA    NA    2.446      1.388  1.459  1.410  1.427
## lawschool     NA     NA     NA    NA    NA       NA      3.335  1.390  1.337  1.350
## cowork        NA     NA     NA    NA    NA       NA         NA  2.419  1.400  1.411
## advice        NA     NA     NA    NA    NA       NA         NA     NA  2.781  1.407
## friend        NA     NA     NA    NA    NA       NA         NA     NA     NA  3.408
```

best predictors of 'status':
(years, office)
(age, years)
(lawschool, years)

interpretation when EH is rounded to its closest integer:

- ✓ unambiguous prediction of Z when $EH < 0.5$
- ✓ two prediction values for Z when $0.5 \leq EH \leq 1$
- ✓ etc.