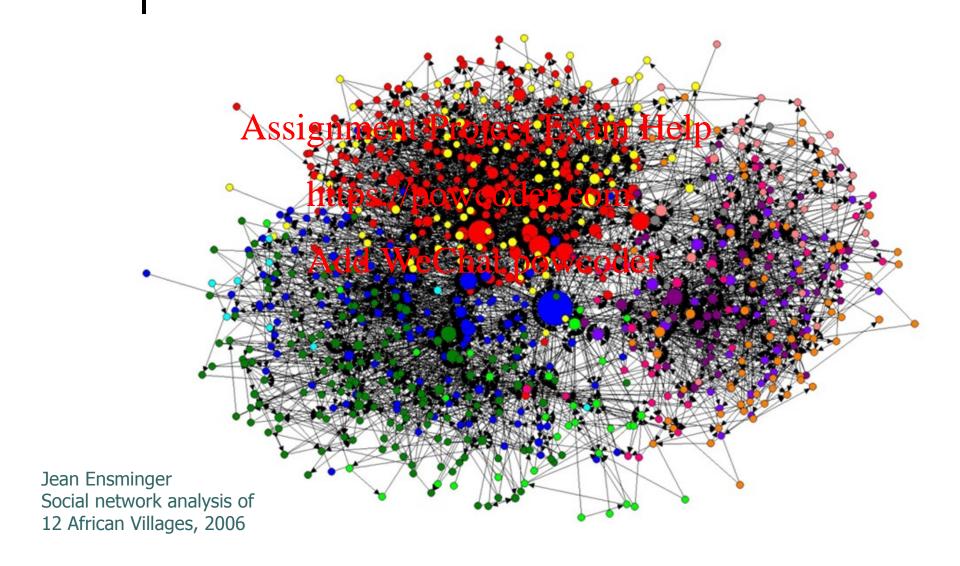
# Social Network Analysis Visualization Help

https://powcoder.com

Robind We Chat powcoder
DePaul University
Chicago, IL

# • • Network Visualization



# • • Harry Potter

 https://www.behance.net/gallery/ 249st0555/hdærrojeRotternrelationsnetwork https://powcoder.com

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#### • • Visual Elements

- Spatial layout of nodes
- o Spanialnayou Projectligean Help
  - determineso(moatly) by node layout
- Properties of nodes wechat powcoder
  - size, color, label, shape, texture
- Properties of edges
  - size, color, label, texture

#### • • Caveat

- Network size matters
  - As 2 ig modets Project Exam Help
  - ~ 100 podeswooder.com

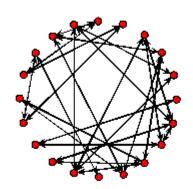
  - ~ 1000
    Add WeChat powcoder
    ~ 10000

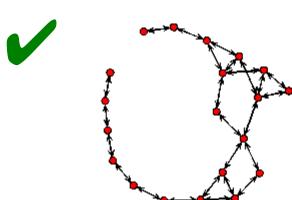
  - ~1,000,000
  - ~10,000,000

#### • • Layout: Node Distance

- Distances correspond to ties
  - Congected Pertices should be closer than disconnected ones https://powcoder.com
- Try to equalize edge length Add WeChat powcoder

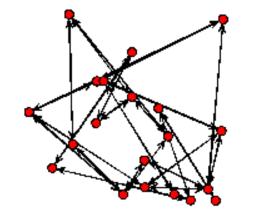






#### • • Layout: Avoid

- Vertices and edges too close together
  - hard to distinguish
- o Small arighest between incident edges Help
- Edges interest / po-incident edges
  - crossing lines look like vertices
- Non-edges pass through vertices der
  - this is usually avoidable





### • • Edge Layout

- Straight is customary
  - Assigntoused Pwheete Eanned below heading
- Curvedtedgeswhave adwocates
  - avoids collinearity (sometimes)
     Add WeChat powcoder
     this is a default in Gephi preview

  - I am NOT a fan

#### • • Layout Algorithms

- Placing nodes by hand very tedious
  - Absectionsystemic dolinguth Isofor you
- Different algorithms r.com
  - aim to preserve different properties
     impose different contraints

  - work better or worse on networks of different types

# • • But

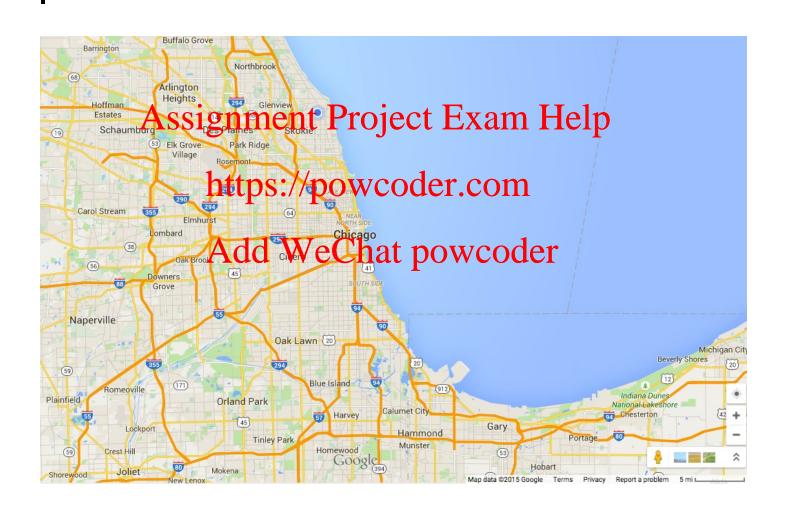
- Layout algorithms will only get you 80-90%signaneo Ordojestultxam Help
- You should expect to tweak algorithmic layouts by hand Add WeChat powcoder
  For finished product

  - Easy to do in Gephi

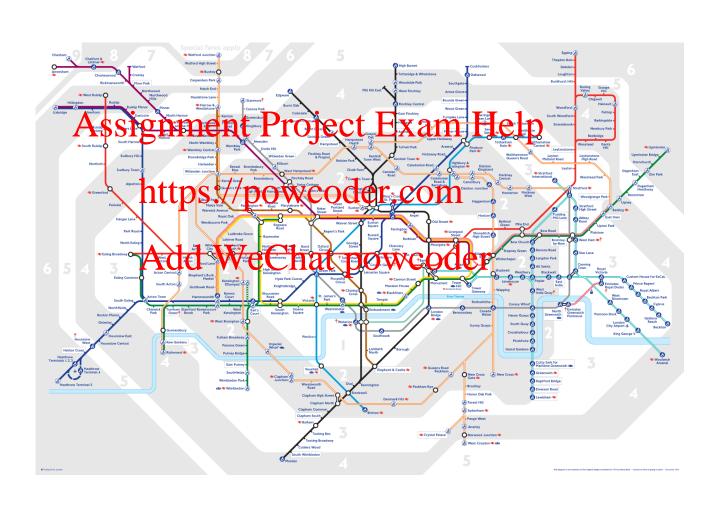
#### Inspiration: Maps



#### Different scale



#### Another Type



#### • • Node Properties

- Mappings
  - Assignmenti Pptasc p Forger thelp
- Labelhttps://powcoder.com
- Size Add WeChat powcoder
- Color
- Shape

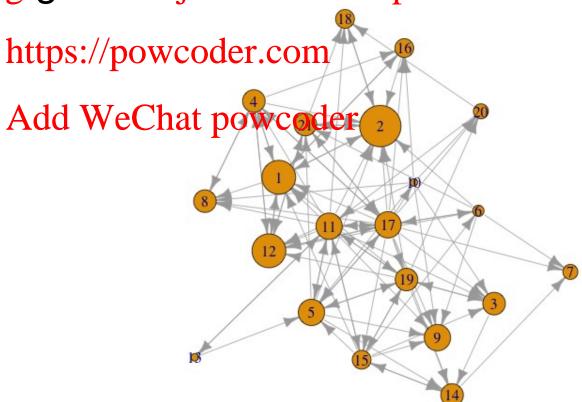
#### • • Node Label

- Makes sense if
  - Anestignonteist Project Exam Help
  - labels are meaning fulm
- Can also identify a small number of NeChat powcoder nodes to label
  - leave the rest blank
- Can scale the label by value
  - easy to do in Gephi

#### • • Anti-example

Node ids are not

 Measignate ht Project Exam Help



#### Anti-example

```
Too much text
O Unreadablet Projectoria de Composition de la composition della c
                                                                                                           https://powwoode
                                                                                                                                                                                                                       Johannistanian DE Dentston Condens & Dempsey
                                                                                                                                                                                                                                                                          reditanstalt Bankweround Skholder CArps
                                                                                                                                                                                                                                                                                                                                                           CO Couldert Brothers Lamb Greene & Machae
                                                                                                                                                                                                                                                                                  Minneapolis
                                                                                                                                                                                                                                                                                    WE Wilson, Elser, Moskowitz, Edelman & Dicker
                                                                                                                                                                                                                                                                                                                                                                                                                                                                BC Bryan Cave
```

DW Dorsey &

Whitney

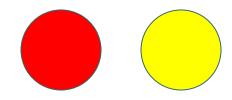
- Large size highlights important nodes
- they occupy more visual space
   Assignment Project Exam Help
- But other not available for nodes
   https://powcoder.com
   Usually size parameter controls radius but
  - actual 2D size is the square of radius Add WeChat powcoder
  - a value twice as big appears 4x more
- Acceptable size range is limited
  - too small nodes disappear
  - too large node overlap
- Layout algorithms usually do not take node size into account
  - Some Gephi layouts do

#### Anti-example

Small nodes hard to see

o Centrian models of vertagem Help https://powcoder.com Add WeChat powcoder

#### Color

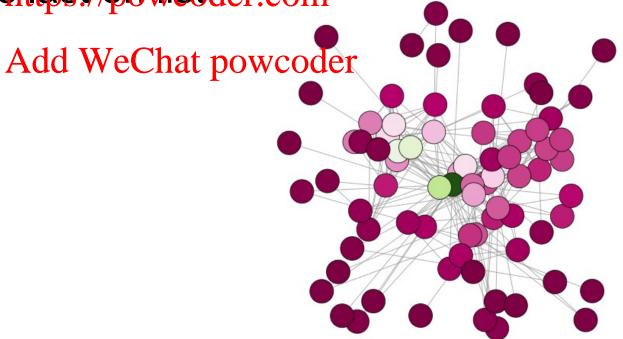


- Eye can detect many different colors
  - Astiglisting Listing Detweldals hades somewhat difficult https://bowcoder.com
    - esp. if not adjacent
  - people vary in term perception
- Hue has no natural order
  - is blue > green?
- Hue is last in the quantitative list

#### • • Anti-example

- Shades hard to distinguish
- o Schrighancht Project pretam Help

• Hue istast/powistder.com



#### Better

Mapping to density Assignment Project Exam Help https://powcoder.com Add WeChar poweode

#### • Shape

- Node shape can be used
  - toAdissinguisthPaojeonthFrainseHelp

Ouasi MN23 SMIN5

Oscar

Fork

Thumper

TR020 TR88

- Cross ex. multimode network
- Supported in igraph only

   Add WeChat powcoder

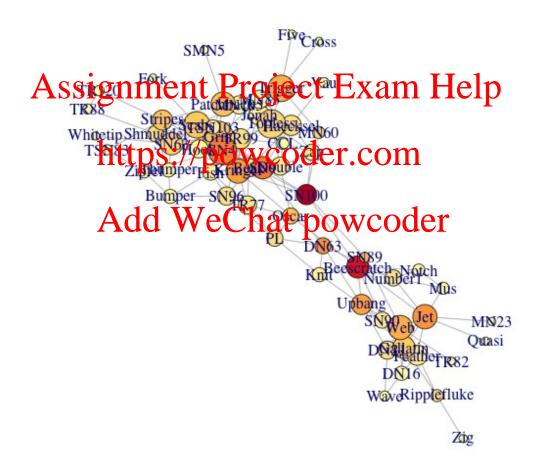
   not Gephi
- Hard to distinguish shapes for small node sizes

#### • • Multidimensional Display

- Possible to show multiple dimensions
  - Assigning not Propject Esize Help
- Helpshidentify contrasts and outliers

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### • • Example



### Mapped Ranges

- Every mapping has an input range and an output range
  - and sometimes a transformation
- Example implies Peroject Exam Help
  - input: 1 12
  - output: 3https://powcoder.com
  - transform: none
- Example: Leddis Weightet degree coder
  - input: 1 -158
  - output: 3 18
  - transform: log
    - makes the scale manageable
    - esp. when only a few large outliers
- "Spline" technique in Gephi

#### • • Node Properties

- Effective use of node property mappingsent Project Exam Help
  - makes for informative visualizations
- Have to choose
   Add WeChat powcoder
   best mapping for a data type

  - appropriate transformations

## • • Edge Properties

- Definitely less important than node prasent Project Exam Help
- Many more edges than nodes
- can't hang too much information there Add WeChat powcoder
   Unless the network is very small

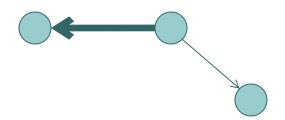
### • • Edge Properties

- Mappings
  - Assignmenti Spragc p Forger thelp
- Labelhttps://powcoder.com
- Width Add WeChat powcoder
- Color
- Arc

### • • Edge Label

- Similar to node labels
- o Makeigngent Project Exam Help
  - network: ispsmælder.com
- labels are meaningful Add WeChat powcoder
   Can also identify a small number of edges to label
  - leave the rest blank
- Can scale the label by edge weight

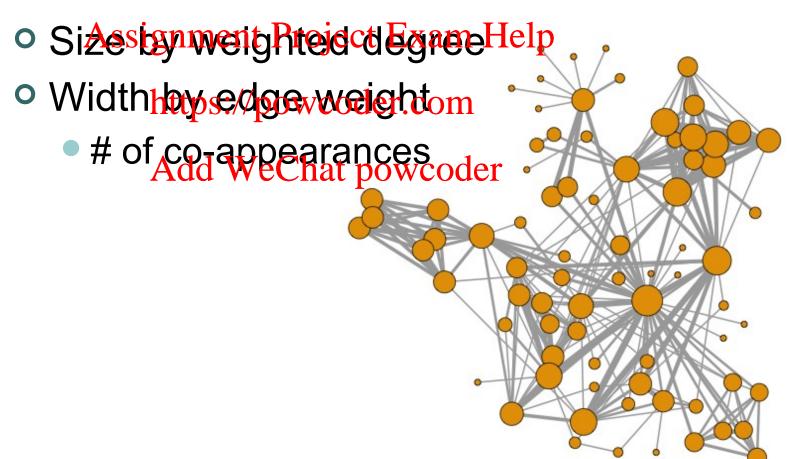
#### • • Width



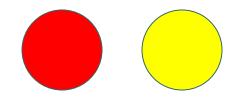
- Width highlights important edges
  - Assignment Project Exam Help they occupy more visual space
- Effectively area coder.com
- Acceptable width range is limited
  - too small edges disappear
  - too large they compete with nodes visually

#### • • Example

Les Miserable network



#### Color



- Similar to node color
  - Aseighinbynd Efairlet Colors Edges based on the nodes they connect https://powcoder.com
- Allows contrast without problems of size

  Add WeChat powcoder
- But remember
  - Hue is the worst
  - Density is better

#### • • Example

Les Miserables
 with eggecotorjecweight Help



#### Multidimensional Display

- Possible to show multiple dimensions
  - Assigning nto Propjecto Esize Help
- Usuallytyoupdon't havenas many edge attributes Add WeChat powcoder

# • • Layout is Complex

- Impossible to meet all the constraints in a larges granhent Project Exam Help
  - connected nodes close https://powcoder.com edges similar length

  - avoidActos Mass hat powcoder
  - avoid small angles
  - etc.
- Layout algorithms try to approximate solutions in different ways

#### • • Force-directed layout

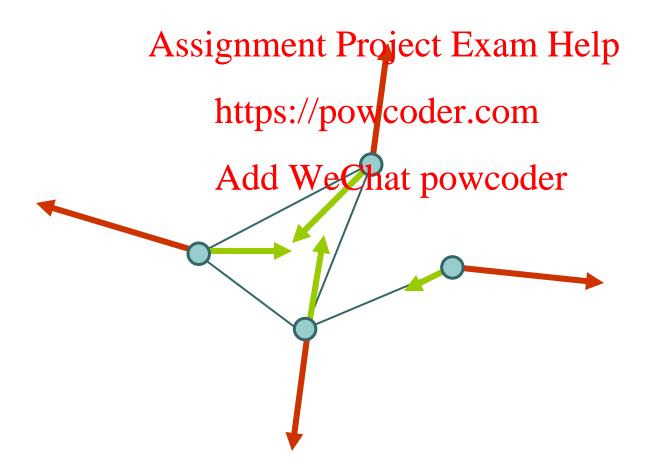
- Basic idea
  - simulate a simulate
- For examplehttps://powcoder.com
  - Vertices are charged particles
    - Exert a repulsive force
  - Edges are springs
    - Keep connected vertices together

#### • • Goal: minimum energy

- Vertices not too close
  - Aspigisivent Perject Exam Help
- Edgesthot toom
  - stretch energy Add WeChat powcoder

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#### Assignment Project Exam Help

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### • • Physical models

- FR
  - AssittoleeattPacieetrepan Help
- Otherattps://powcoder.com
  - springs only Add WeChat powcoder
- Optimizations
  - consider only local forces
  - multi-scale

### • • Termination

- When to stop?
  - 50 sterntient Project Exam Help

  - Energy threshold?
     https://powcoder.com
     Local minimum reached?
  - UserAndallWeChat powcoder
- o In R
  - default to 500 iterations
- In Gephi
  - user stops the process

### • • What layout is best?

- Depends

  - on the graph
     Assignment Project Exam Help
     on what you are trying to show
- More in the lab://powcoder.com
- Rule of thumb
  - if graph/Aschibanhoedted quantities
    - try FR first
  - otherwise try Force Atlas 2 first
    - Kamada-Kawai in igraph
  - if graph is very large
    - Yifan Hu Proportional in Gephi
    - use drl or lgl in igraph

# • • Gephi

- much more user-friendly for graph
   output by ment Project Exam Help
- interactive controllover layout parameters
- Add WeChat powcoder
   ability to drag and drop nodes

## • • Break

Lab Daley 505

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