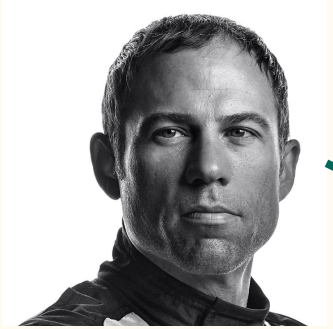
The Tangled Web

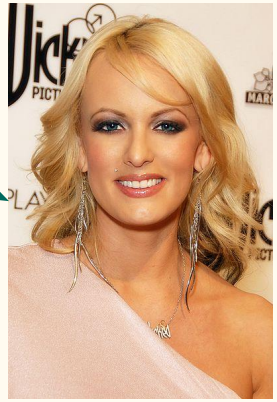
—

Brent Schneeman
2019-11-19
R User Group / RLadies ATX

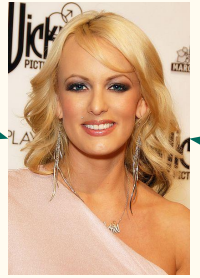
Who remembers this guy?

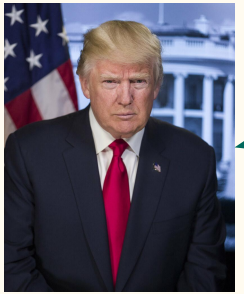
He represented *her*



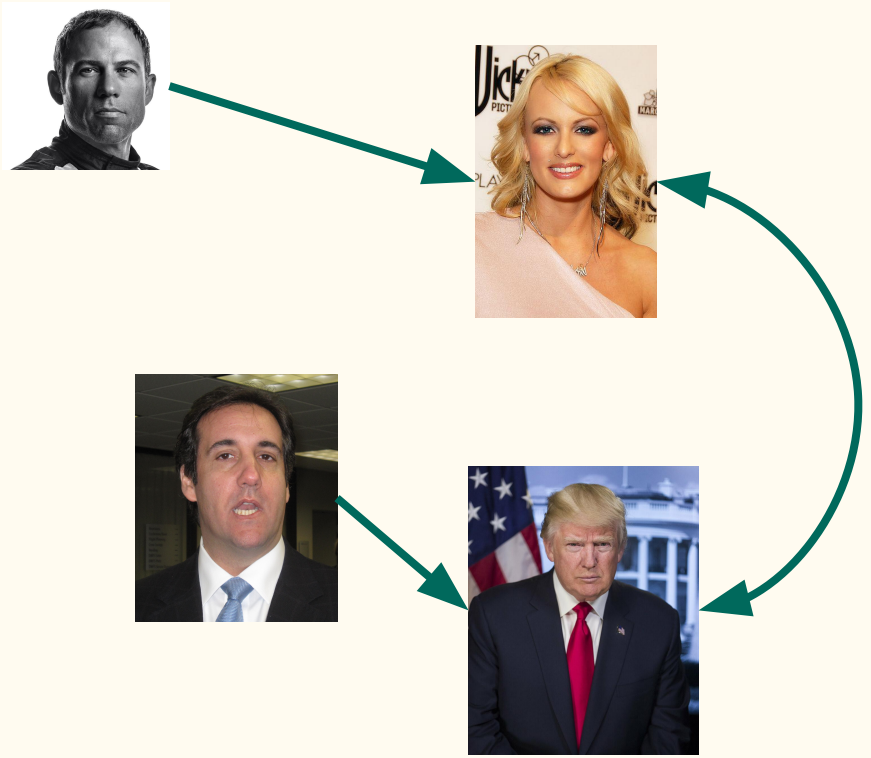


...when she and *this guy* "watched Shark Week" and she thought maybe that was important

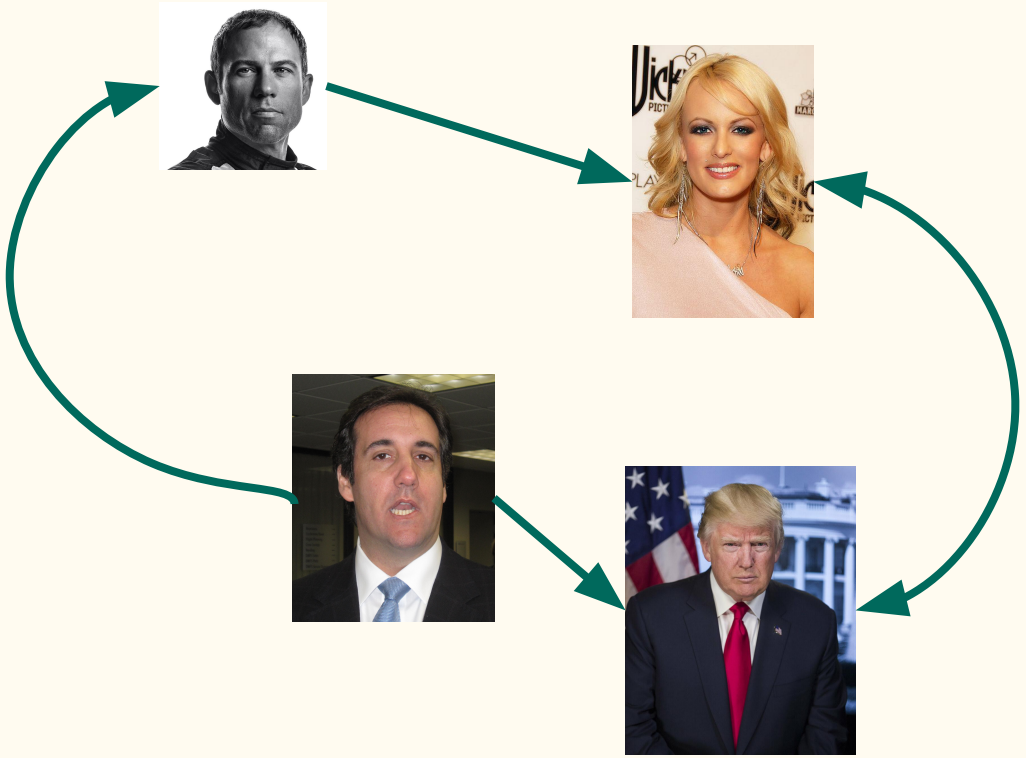




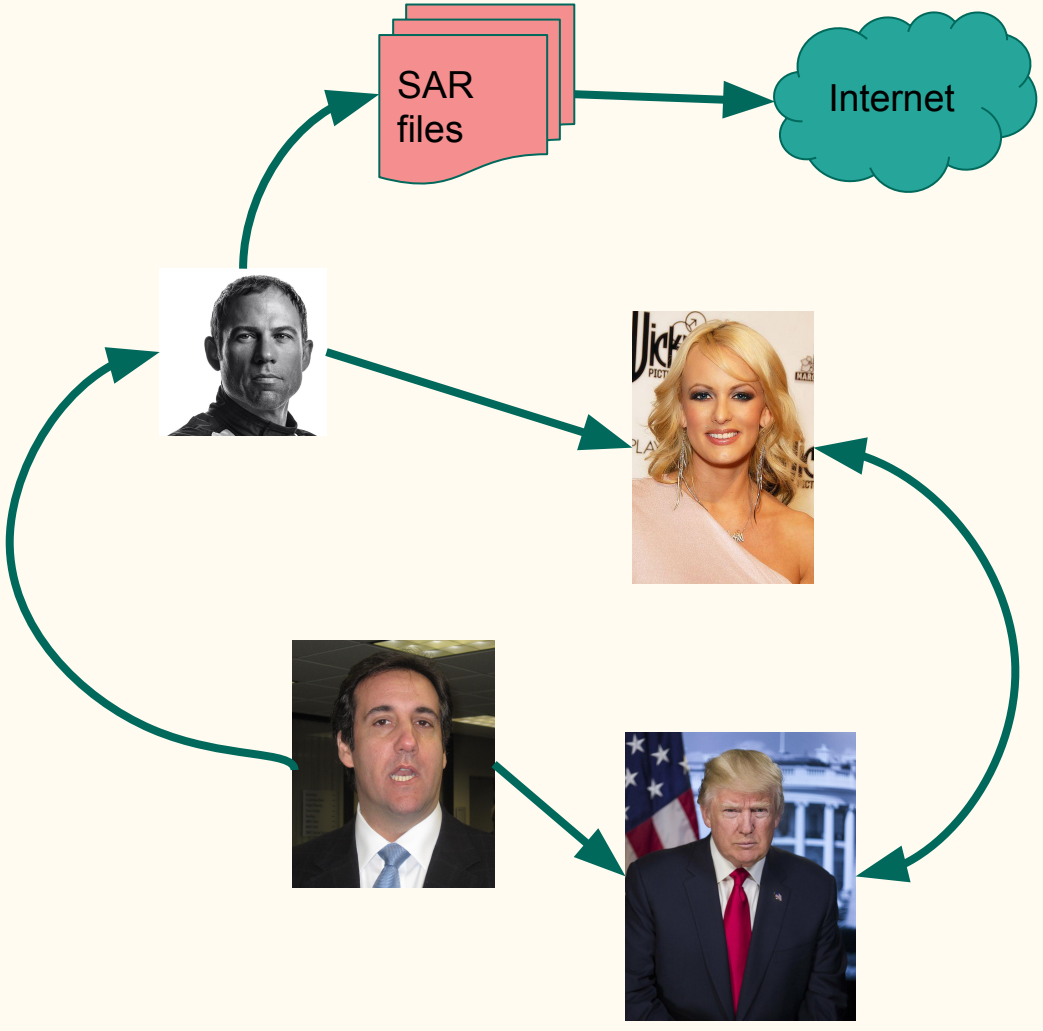
...and then *this guy* represented the other guy when the two of them decided to send $130,000 to her



...which was done through him



But then *he* got ahold of *his* IRS SAR report (illegally) and released it publicly



Which was too much for me to handle in my head, so I collected data.

And kept collecting it.

And now have and edge list with 989 edges and 391 nodes.

And growing.

date	from	to	e_type	note	source
2016-10-27	Essential Consultants	Stormy Daniels	payment	130000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-01-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-02-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-03-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-04-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-05-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-06-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-07-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-08-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2016-10-17	Michael D Cohen	Essential Consultants	association	founded	https://en.wikipedia.org/wiki/Stormy_Daniels%E2%80%93Donald_Trump_scandal
2016-01-15	Renova Group	Columbus Nova	investment	15000000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2016-01-20	Columbus Nova	Gawker Media	investment	15000000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2000-01-15	Andrew Intrater	Columbus Nova	association	runs	https://web.archive.org/web/20180509003139/http://www.columbusnova.com/andrew_intrater.html
2017-01-09	Andrew Intrater	Michael D Cohen	association	met	https://themoscowproject.org/collusion/new-york-times-reveals-meeting-between-cohen-vekselberg-intrater/
2016-01-01	Andrew Intrater	Trump Inauguration	payment	250000	
1990-01-01	Viktor Vekselberg	Renova Group	association	owner	https://en.wikipedia.org/wiki/Renova_Group
2017-01-01	Andrew Intrater	Viktor Vekselberg	association	cousin	
2017-01-01	Viktor Vekselberg	Andrew Intrater	association	cousin	
2017-01-20	Viktor Vekselberg	Trump Inauguration	association	attended	https://www.nbcnews.com/politics/donald-trump/meet-nice-russian-oligarch-linked-trump-lawyer-michael-cohen-n872716
2017-01-20	Andrew Intrater	Trump Inauguration	association	attended	https://nypost.com/2018/05/11/mueller-probing-foreign-donations-to-trumps-inauguration-committee/
2018-04-06	US Govt	Viktor Vekselberg	association	sanctioned for m	http://time.com/5271000/michael-cohen-essential-consultants-novartis-vekselberg-att/
2006-06-01	Michael D Cohen	Donald J Trump	association	works for	https://www.usnews.com/news/national-news/articles/2018-04-16/10-things-you-didnt-know-about-michael-cohen
2017-10-05	Novartis	Essential Consultants	payment	99980	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-11-03	Novartis	Essential Consultants	payment	99980	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-12-01	Novartis	Essential Consultants	payment	99980	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-01-05	Novartis	Essential Consultants	payment	99980	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-01-30	Novartis	Essential Consultants	payment	800080	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-12-10	ATT	Essential Consultants	payment	600000	https://www.theatlantic.com/technology/archive/2018/05/the-strange-case-of-atts-payments-to-michael-cohen/559994/
2011-05-01	Stormy Daniels	Keith M Davidson	association	represented by	https://www.cnn.com/2018/04/04/politics/stormy-daniels-karen-mcdougal-deals-keith-davidson-invs/index.html
2015-12-01	Viktor Vekselberg	Vladimir Putin	association	dines with	https://www.nbcnews.com/politics/donald-trump/meet-nice-russian-oligarch-linked-trump-lawyer-michael-cohen-n872716
2017-11-27	Korea Aerospace	Essential Consultants	payment	150000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-04-03	Elliott Broidy	Republican National Cor	association	Finance Committ	https://gop.com/rnc-announces-additions-to-rnc-finance-leadership-team/
1991-01-01	Elliott Broidy	Elliott Broidy Capital Mar	association	founded	https://en.wikipedia.org/wiki/Elliott_Broidy
2001-01-01	Elliott Broidy	Circinus	association	owns	https://www.bloomberg.com/profiles/companies/0136784D:US-circinus-llc
2017-11-30	Elliott Broidy	REAG (CNB)	payment	200000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-12-05	REAG (CNB)	Stormy Daniels	payment	200000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-12-29	Elliott Broidy	REAG (CNB)	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-01-02	REAG (CNB)	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-01-31	Elliott Broidy	REAG (CNB)	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-01-31	REAG (CNB)	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-03-01	Elliott Broidy	REAG (CNB)	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2018-03-01	REAG (CNB)	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-01-01	Michael D Cohen	Morgan Stanley	association		
2017-07-13	Essential Consultants	Morgan Stanley	payment	505000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-09-08	Essential Consultants	Morgan Stanley	payment	250000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-08-15	Essential Consultants	Morgan Stanley	payment	250000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-01-20	Donald J Trump	The White House	association	lives at	
2006-07-15	Donald J Trump	Stormy Daniels	association	Shark Week	
2006-07-15	Stormy Daniels	Donald J Trump	association	Spanked	
2006-06-01	Michael D Cohen	Trump Organization	association		
2017-04-03	Michael D Cohen	Republican National Cor	association	Finance Committ	https://gop.com/rnc-announces-additions-to-rnc-finance-leadership-team/
2017-06-01	Essential Consultants	Demeter Direct	payment		assumed date
2017-06-01	Mark S Ko	Demeter Direct	association	head of	https://www.cnn.com/2018/05/11/politics/demeter-direct-michael-cohen/index.html
2017-06-01	Mark S Ko	PK2 Entertainment	association	head of	https://www.businessinsider.com/demeter-direct-michael-cohen-essential-consultants-paid-money-2018-5
2017-06-01	Mark S Ko	Michael D Cohen	association	translator	assumed date
2017-06-01	Mark S Ko	Korea Aerospace	association	translator	assumed date
1971-01-01	Donald J Trump	Trump Organization	association	executive leader	
2016-12-12	Michael D Cohen	Ahmed al Rumaihi	association	Tower Meeting	
2016-12-12	Michael Flynn	Michael D Cohen	association	Tower Meeting	
2016-12-12	Michael Flynn	Ahmed al Rumaihi	association	Tower Meeting	
2016-12-12	Michael D Cohen	Trump Tower Elevator	association	rode on	
2016-12-12	Michael Flynn	Trump Tower Elevator	association	rode on	
2016-12-12	Ahmed al Rumaihi	Trump Tower Elevator	association	road on	
2017-07-01	Ahmed al Rumaihi	Jeff Kwatinetz	association	Approached	http://www.dailymail.co.uk/news/article-5711031/Steve-Bannon-target-bribery-plot-Ice-Cubes-basketball-league-rapper-claims.html
2017-07-01	Jeff Kwatinetz	Ahmed al Rumaihi	association	Rejected	http://www.dailymail.co.uk/news/article-5711031/Steve-Bannon-target-bribery-plot-Ice-Cubes-basketball-league-rapper-claims.html
2017-01-11	BIG3	Ice Cube	association	founded by	https://en.wikipedia.org/wiki/BIG3
1997-01-01	The Firm	Jeff Kwatinetz	association	founded by	https://en.wikipedia.org/wiki/Jeff_Kwatinetz
2017-01-11	BIG3	Jeff Kwatinetz	association	founded by	https://en.wikipedia.org/wiki/BIG3
1998-01-01	Steve Bannon	The Firm	association	partner in	https://www.biography.com/people/steve-bannon-022417
2015-01-01	Ahmed al Rumaihi	Qatari Gov't	association	former diplomat	https://en.wikipedia.org/wiki/Ahmed_Al-Rumaihi
2016-12-12	Ahmed al Rumaihi	Michael Flynn	association	Allegedly Bribed	https://assets.documentcloud.org/documents/4456972/Jeff-Kwatinetz-Sworn-Declaration.pdf
2017-02-27	Ajit Pai	ATT	association	Net Neutrality	https://gizmodo.com/at-t-deeply-regrets-paying-the-presidents-lawyer-to-hel-1825958845
2017-10-02	Ajit Pai	Donald J Trump	association	reports to	

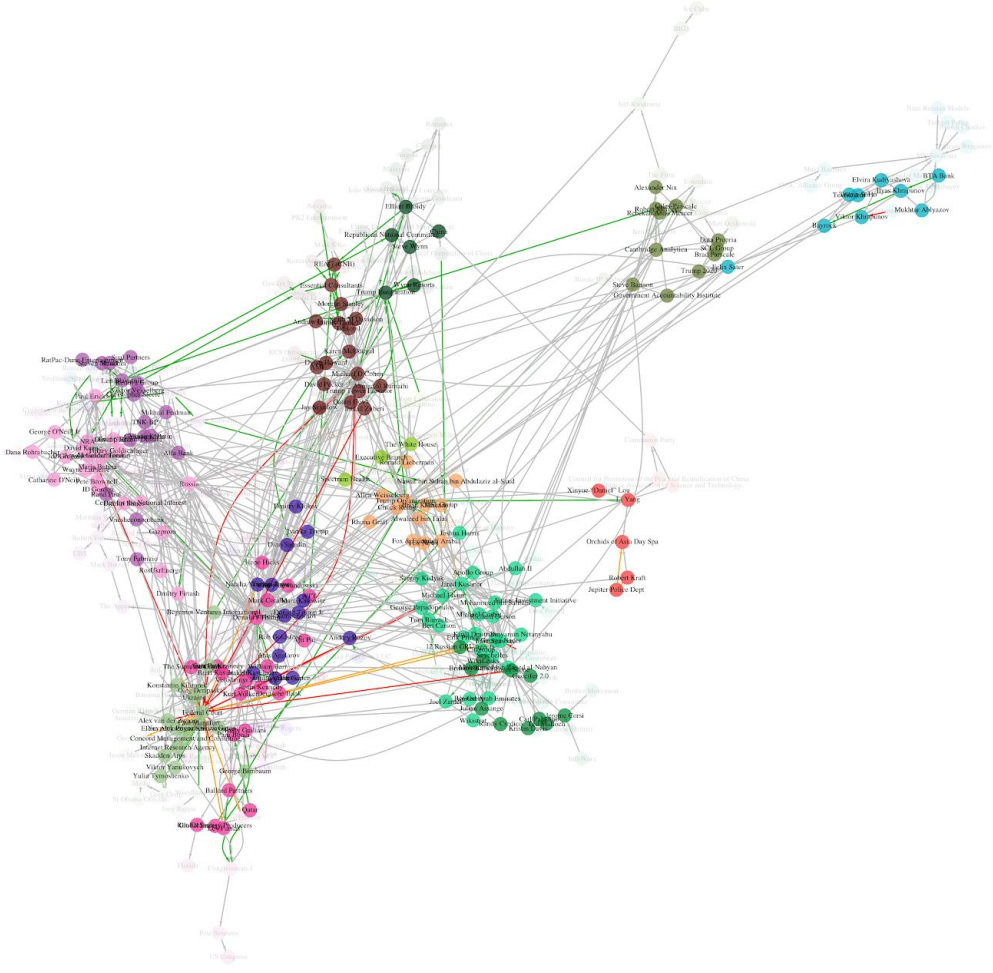
I also wrote code.

In **R**.

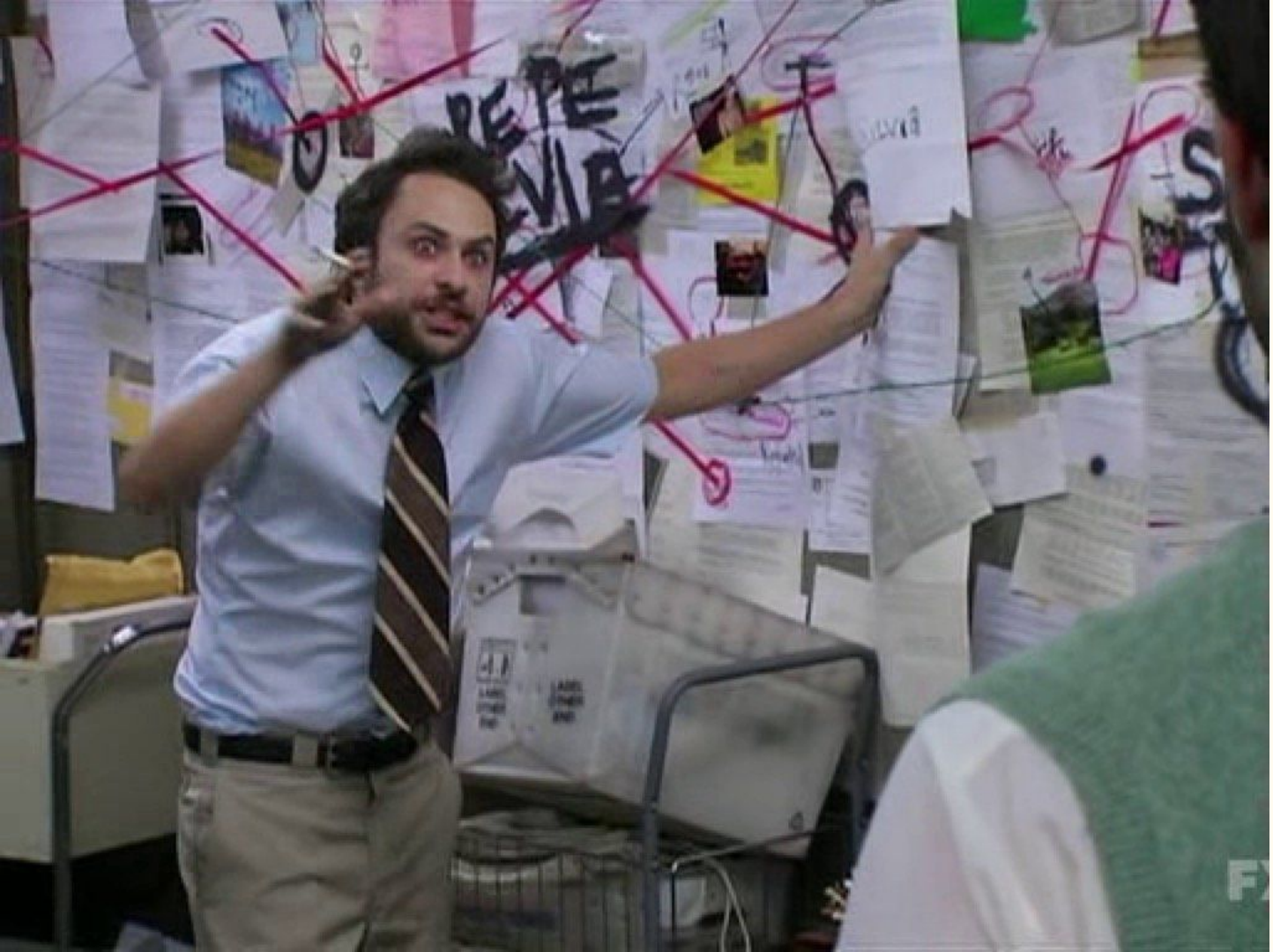
Using **tidygraph**, **ggraph**, all the tidy things, and some less tidy things

```
library(readr)
library(ggraph)
library(dplyr)
library(tidygraph)
library(networkD3)
library(ggthemes)
library(RColorBrewer)
library(scales)
library(lubridate)
library(recommenderlab)
library(igraph)

make_graph <- function(tangled) {

  tangled <- tangled %>% mutate(note = if_else(is.na(note), "",note))

  # attempt to roll up the payments
  money_types <- c("payment", "loan", "investment", "fine")
  tangled <- tangled %>% filter(e_type %in% money_types) %>%
    mutate(amt = as.numeric(note)) %>%
    group_by(from, to, e_type) %>%
    summarize(date = last(date),
              sum = sum(amt),
              note = if_else(is.na(sum), last(note), format(sum,
scientific = F))
    ) %>% bind_rows(
      tangled %>% filter(!(e_type %in% money_types))
    )
  ...
```

[redacted]'s Tangled Web



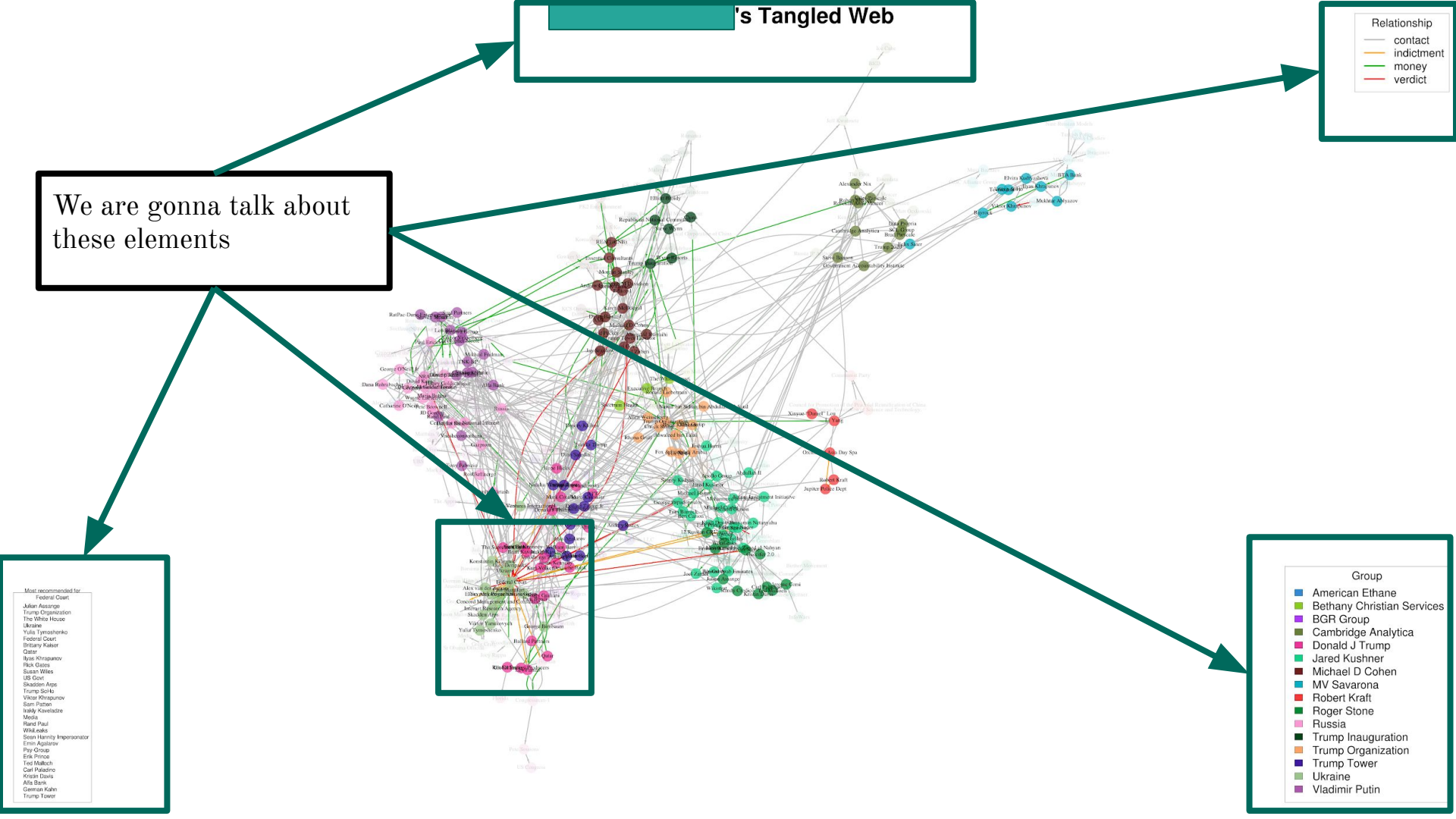
Which is a little…well…

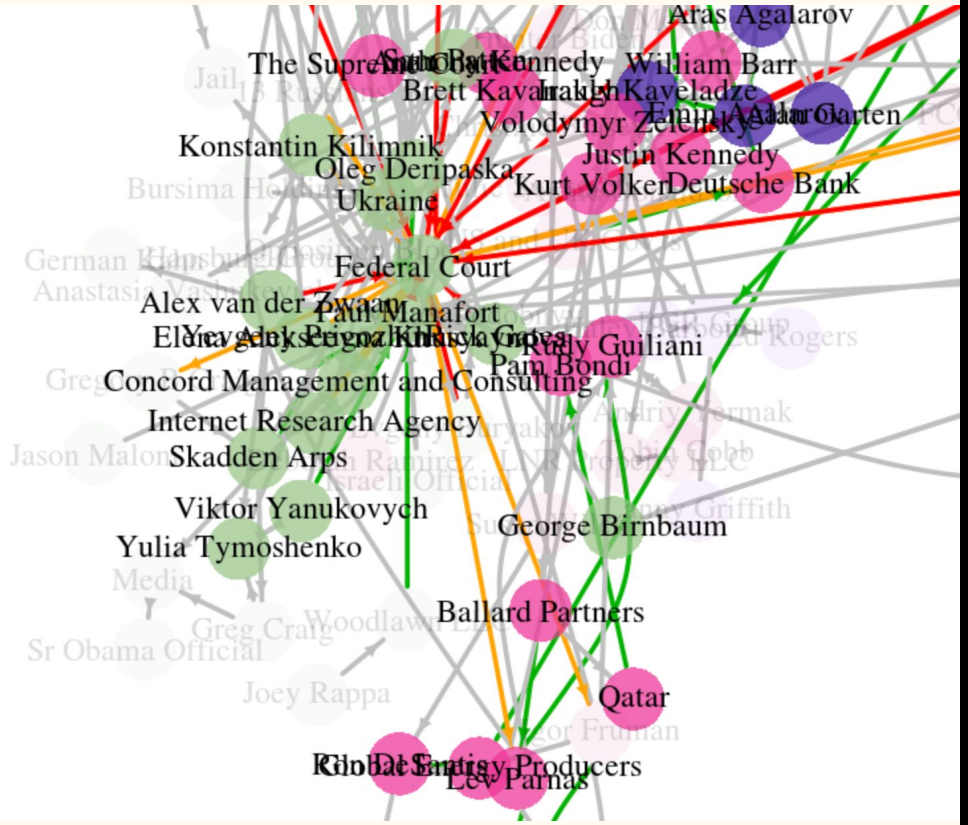


...OK, not a *little*

[redacted]'s Tangled Web

We are gonna talk about these elements





- Variable Transparency
- Multiple Colors
  - Edges and Nodes
- Node Annotations
- Layout

date	from	to	e_type	note	source
2016-10-27	Essential Consultants	Stormy Daniels	payment	130000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-01-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-02-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-03-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-04-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-05-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-06-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-07-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2017-08-15	Columbus Nova	Essential Consultants	payment	62500	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records
2016-10-17	Michael D Cohen	Essential Consultants	association	founded	https://en.wikipedia.org/wiki/Stormy_Daniels%E2%80%93Donald_Trump_scandal
2016-01-15	Renova Group	Columbus Nova	investment	15000000	https://www.vox.com/2018/5/16/17363242/michael-cohen-trump-avenatti-leaks-financial-records

The Edge List:

- date
- from
- to
- e_type
- note
- source

date of the event, not the entry

from / to denote directionality

e_type is the edge type, and is a color aesthetic

note decorates the edge

source for defense

Read in the CSV

```
tangled <-
read_csv("https://docs.google.com/spreadsheets/d/e/2PACX-1vSosbIjCD2KyWJCm712HsEHCkSOdR75Gba5DbobZxlgNSeHjNutef7KkNHRiPU861sA10RfJwyQujuK/pub?gid=0&single=true&output=csv")


tangled <- tangled %>% mutate(note = if_else(is.na(note), "",note))

  # attempt to roll up the payments
  money_types <- c("payment", "loan", "investment", "fine")
  tangled <- tangled %>% filter(e_type %in% money_types) %>%
    mutate(amt = as.numeric(note)) %>%
    group_by(from, to, e_type) %>%
    summarize(date = last(date),
              sum = sum(amt),
              note = if_else(is.na(sum), last(note), format(sum, scientific = F))
    ) %>% bind_rows(
      tangled %>% filter(!(e_type %in% money_types))
    )
```

Make the Graph object-> tidygraph::as_tbl_graph

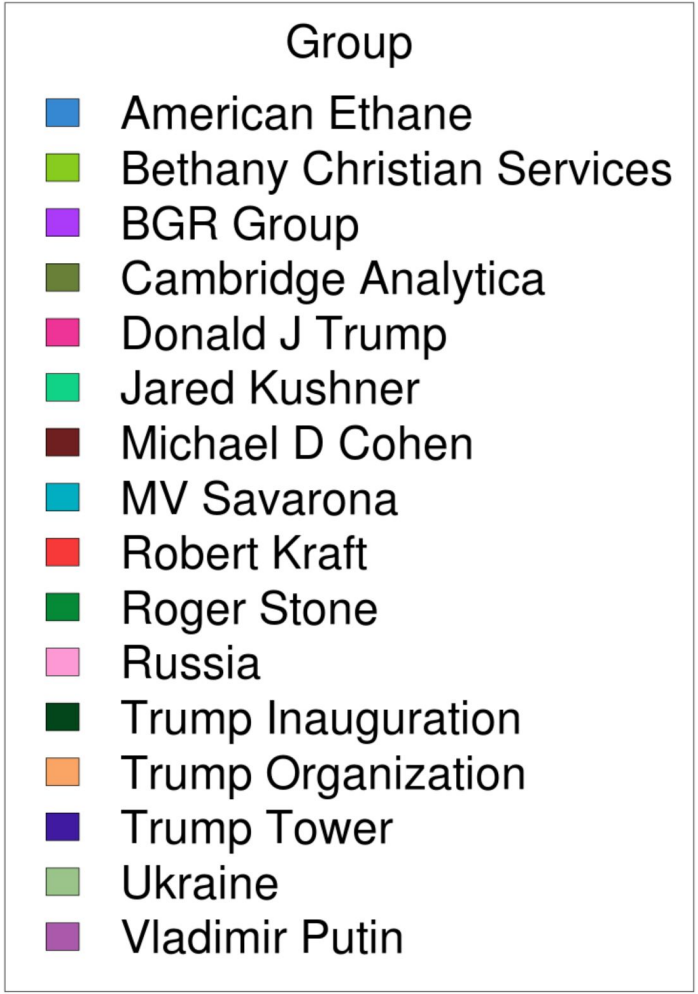
```
# make a new type that summarizes the original types

display_types <- tibble(
  e_type = c("payment", "association", "investment", "loan", "fine", "verdict", "indictment" ),
  d_type = c("money", "contact", "money", "money", "money", "verdict", "indictment")
)

tangled <- tangled %>%
  full_join(display_types, by = c("e_type" = "e_type"))

graph <- as_tbl_graph(tangled) %>%
    mutate(group = as.character(group_spinglass()))
```

Note that last line: dplyr verbs on the ‘graph’ object. AND the graph object maintains both Nodes and Edges (i.e. ‘group’ is a Node’s group)

That’s handy

What is a tidygraph::tbl_graph?

```
> graph
# A tbl_graph: 391 nodes and 967 edges
#
# A directed multigraph with 1 component
#
# Node Data: 391 x 7 (active)
  name                group centrality  g_max group_label                n_tri the_alpha
  <chr>               <chr>      <dbl>  <dbl> <chr>                      <dbl>     <dbl>
1 Abbott Laboratories 13      0.000626 0.0104 Bethany Christian Services     0         0
2 Alexander Voloshin  7       0.00495  0.0112 NRA                            0         0
3 Alwaleed bin Talal  8       0.000626 0.0287 Trump Organization             1         0.75
4 AMI                 5       0.00564  0.0287 Michael D Cohen                6         0.75
5 Andrew Intrater     5       0.000989 0.0287 Michael D Cohen                2         0.75
6 Apollo Group        2       0.00105  0.0187 Jared Kushner                  1         0.75
# … with 385 more rows
#
# Edge Data: 967 x 9
   from    to e_type      date      sum note     source d_type weight
  <int> <int> <chr>      <dbl>    <dbl> <chr>    <chr>  <chr>   <dbl>
1     1    63 payment    17187   100000 100000   NA     money    0.08
2     2   112 investment 16222  1250000 1250000  NA     money    0.5
3     3    64 payment     7670 20000000 20000000 NA     money    0.5
# … with 964 more rows
```



- Cluster detection
- Cluster names

Group Detection

```
graph <- as_tbl_graph(tangled) %>%
    mutate(group = as.character(group_spinglass()))
```

`?group_spinglass`

This function tries to find communities in a graph. A community is a set of nodes with many edges inside the community and few edges between outside it (i.e. between the community itself and the rest of the graph.)

Spinglass uses simulated annealing

Other community detection algos:

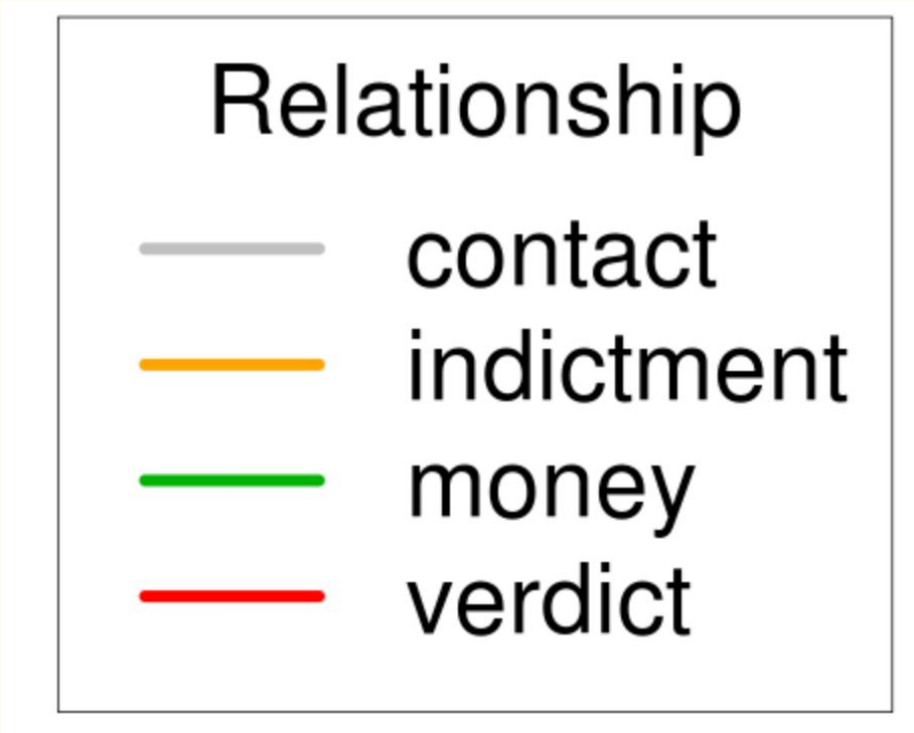
```
group_components(type = "weak")
group_edge_betweenness(weights = NULL, directed =
TRUE)
group_fast_greedy(weights = NULL)
group_infomap(weights = NULL, node_weights = NULL,
trials = 10)\
group_label_prop(weights = NULL, label = NULL, fixed
= NULL)
group_leading_eigen(weights = NULL, steps = -1,
label = NULL,
  options = igraph::arpack_defaults)
group_louvain(weights = NULL)
group_optimal(weights = NULL)
group_spinglass(weights = NULL, ...)
group_walktrap(weights = NULL, steps = 4)
group_biconnected_component()
```

Group Name

```
# the below few line will find the pagerank for all nodes, and use the
# max pagerank as the group label
        g<-graph %>%
          mutate(centrality = centrality_pagerank()) %>% activate(nodes) %>%
          group_by(group) %>% mutate(g_max =  max(centrality))


        max_cent_df <- g %>% activate(nodes) %>%
          as_tibble() %>%
          group_by(group) %>%
          summarize(g_max = max(centrality))
```

```
?centrality_pagerank
```

Use the Pagerank algorithm to rank all the nodes, and then use the name of the highest ranking node per group as the group's name



- Edge types!

(we already saw the code back when we were constructing the graph for the first time)

Most recommended for Federal Court

Julian Assange
Trump Organization
The White House
Ukraine
Yulia Tymoshenko
Federal Court
Brittany Kaiser
Qatar
Ilyas Khrapunov
Rick Gates
Susan Wiles
US Govt
Skadden Arps
Trump SoHo
Viktor Khrapunov
Sam Patten
Irakly Kaveladze
Media
Rand Paul
WikiLeaks
Sean Hannity Impersonator
Emin Agalarov
Psy-Group
Erik Prince
Ted Malloch
Carl Paladino
Kristin Davis
Alfa Bank
German Kahn
Trump Tower

- Recommendations!

Who else should be ‘friends’ with Federal Court?

date	from	to	e_type	note	s
2018-02-23	Rick Gates	Federal Court	verdict	pled guilty	h
2017-12-01	Michael Flynn	Federal Court	verdict	pled guilty	h
2018-08-21	Michael D Cohen	Federal Court	verdict	pled guilty	h
2018-08-31	Sam Patten	Federal Court	verdict	pled guilty	h
2017-10-30	George Papadopoulos	Federal Court	verdict	pled guilty	h
2018-09-14	Paul Manafort	Federal Court	verdict	pleads guilty to c	h
2018-02-20	Alex van der Zwaan	Federal Court	verdict	pled guilty	h
2018-11-29	Michael D Cohen	Federal Court	verdict	pled guilty of lyin	h
2018-12-10	Maria Butina	Federal Court	verdict	pled guilty of con	h
2015-01-26	Evgeny Buryakov	Federal Court	verdict	pled guilty to spy	h
2019-10-22	Imaad Zuberi	Federal Court	verdict	pled guilt to illega	h
2019-11-15	Roger Stone	Federal Court	verdict	convicted on 7 c	h

RecommenderLab::Recommender

```
topReqs <- graph %>% as_adj() %>%
  as("realRatingMatrix") %>%
  recommenderlab::normalize() %>%
  recommenderlab::binarize(minRating=-2) %>%
  assign("b_adj", ., envir = .GlobalEnv) %>%
  Recommender(method = "ALS") %>%
  predict( b_adj[the_node,], n=50) %>%
  bestN(n=30)
```

```
recommenderRegistry$get_entries(dataType =
"realRatingMatrix")
```

Recommender method: ALS for realRatingMatrix
Description: Recommender for explicit ratings based on latent factors, calculated by alternating least squares algorithm.
Reference: Yunhong Zhou, Dennis Wilkinson, Robert Schreiber, Rong Pan (2008). Large-Scale Parallel Collaborative Filtering for the Netflix Prize, 4th Int'l Conf. Algorithmic Aspects in Information and Management, LNCS 5034.

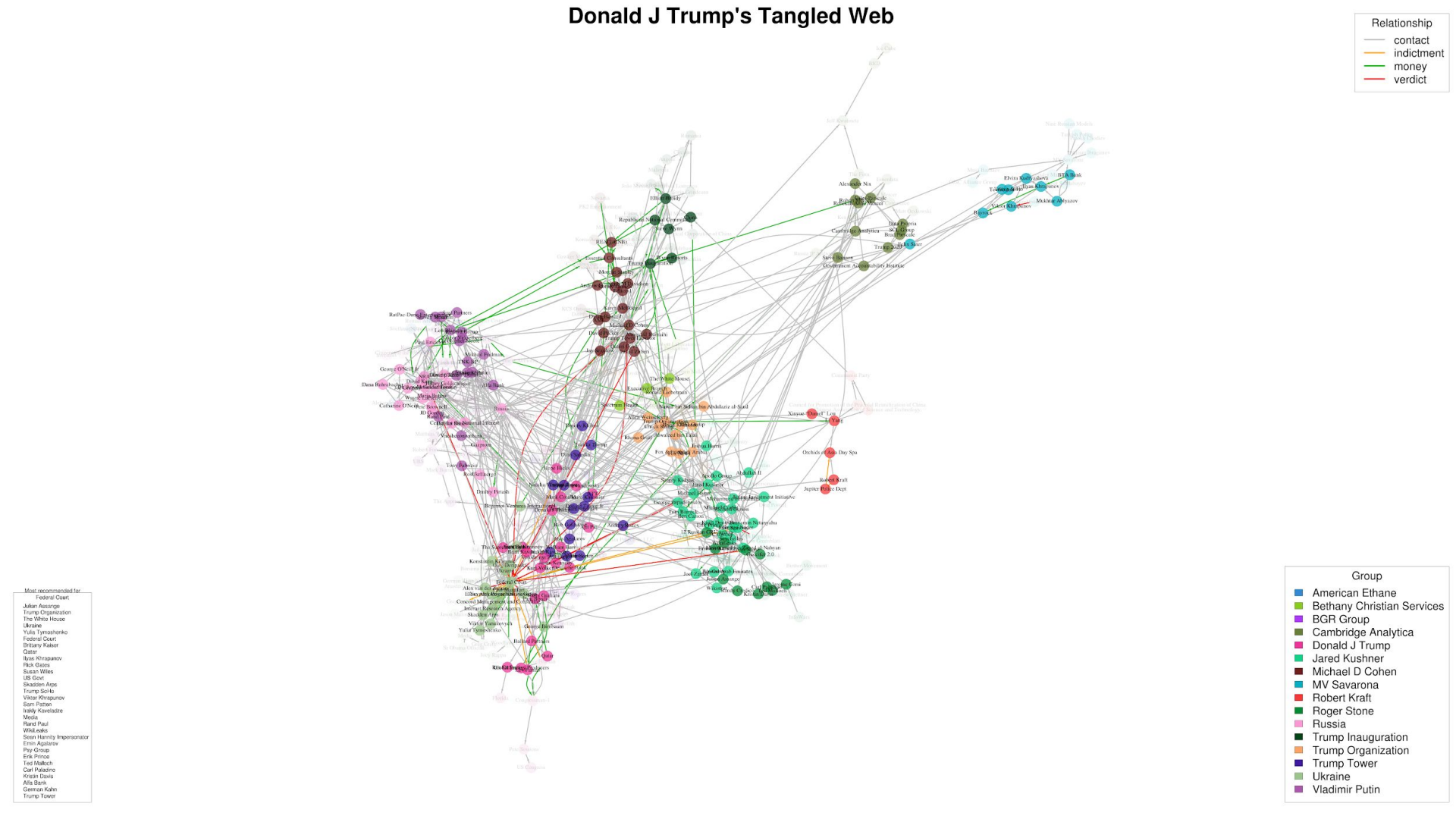
So, who’s web is it?

We already have `centrality`, so....

```
graph %>% activate(nodes) %>%

  as_tibble() %>%

  arrange(desc(centrality)) %>%

  dplyr::top_n(10, centrality) %>%

  select(name, centrality) %>%

  knitr::kable()
```

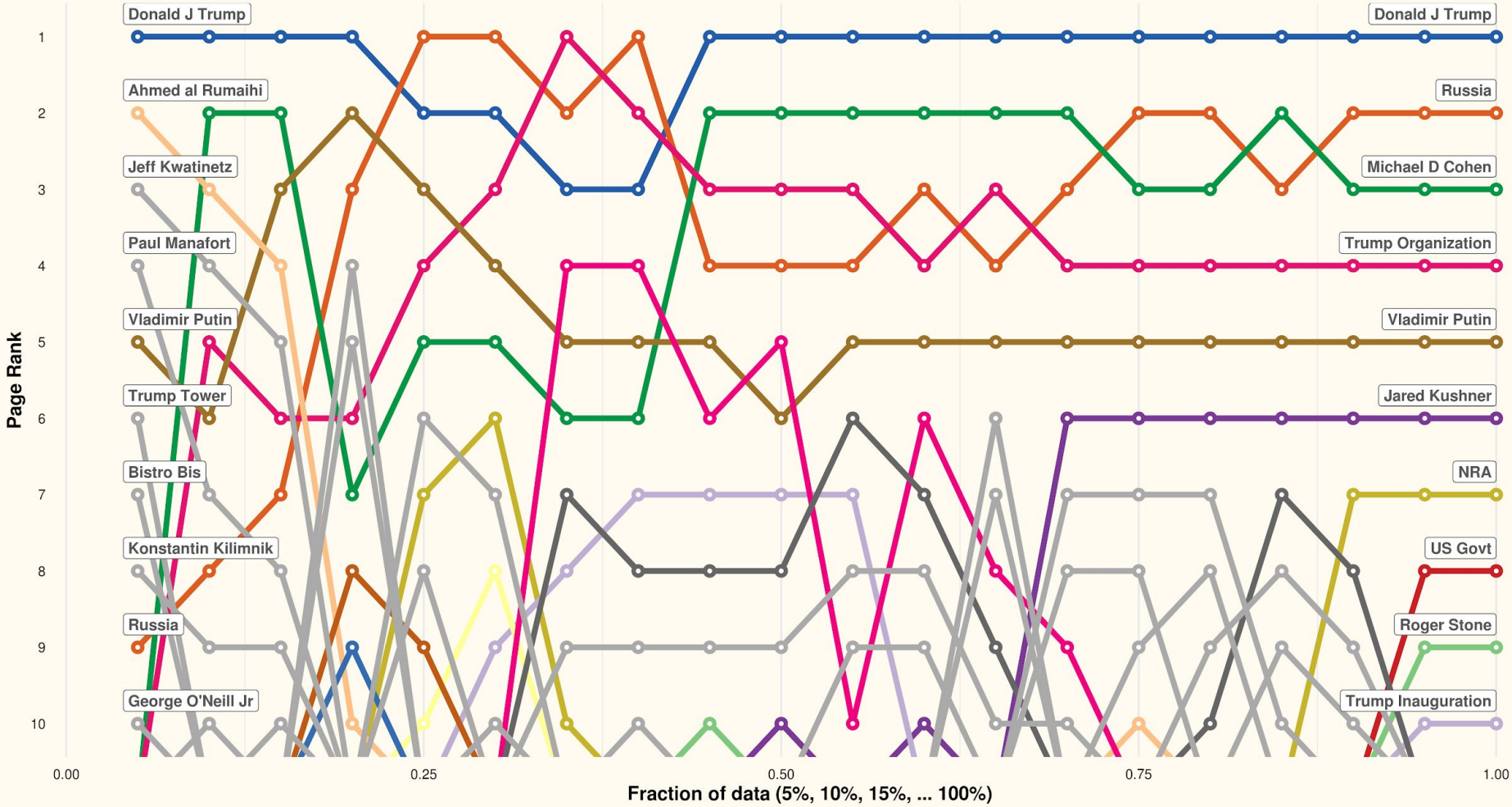
name	centrality
Donald J Trump	0.0559927
Michael D Cohen	0.0287299
Trump Organization	0.0286570
Russia	0.0281925
Vladimir Putin	0.0198420
Jared Kushner	0.0187228
Trump Tower	0.0117356
NRA	0.0112438
US Govt	0.0111882
Bethany Christian Services	0.0103730

Donald J Trump's Tangled Web



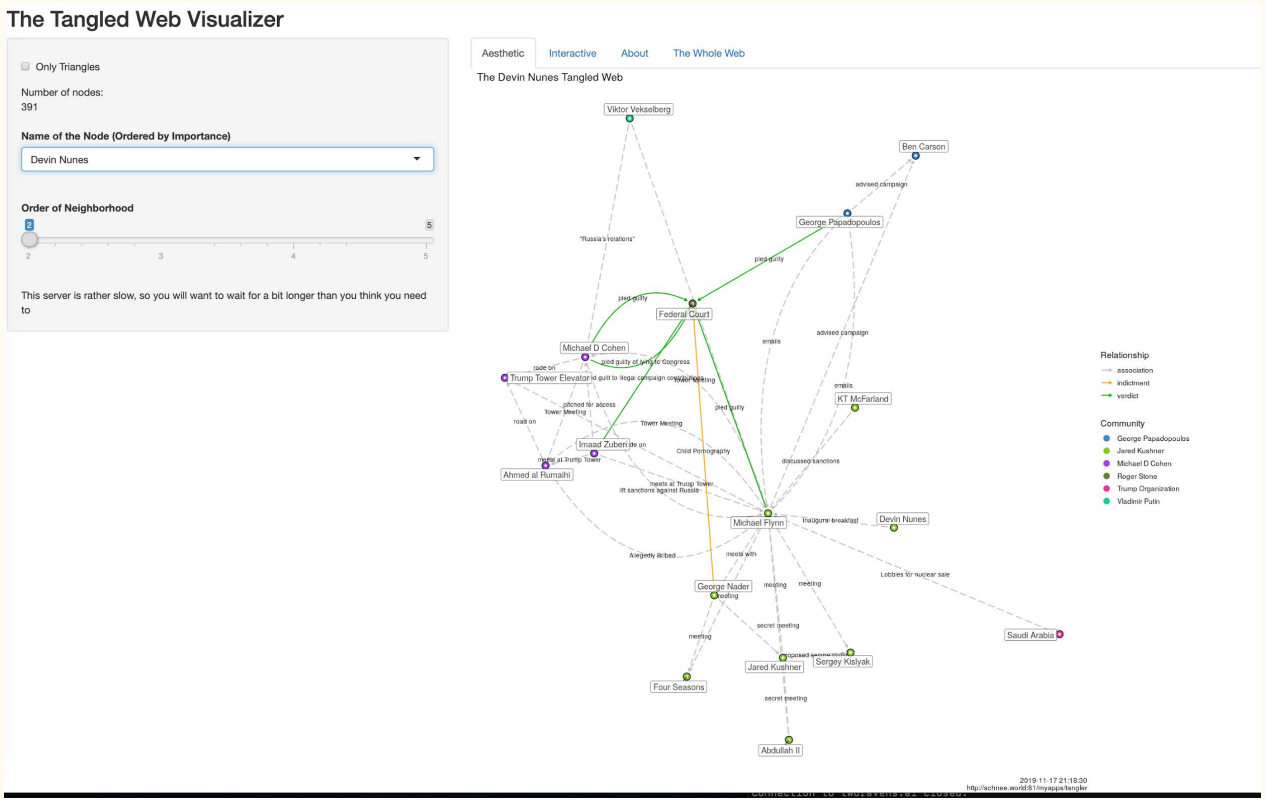
Who's web *was* it?

The Tangled Web's Most Important Names



Data ordered by entry date, not event date

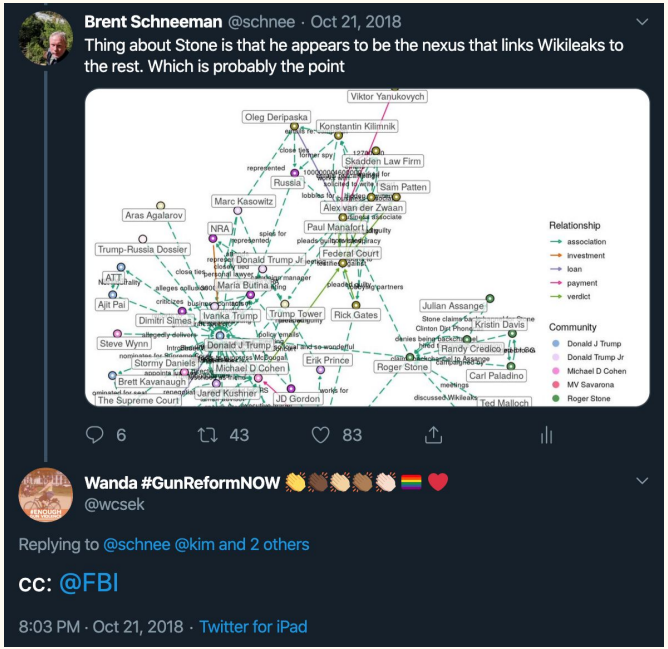
A web app exists...



Written in Shiny!

But the server is very very slow (because of the hardware)

Selected Reactions from Twitter



Questions?

https://schnee.github.io/tangled

“schnee” “github” “tangled” should be enough keywords to get to here, to links to the data, and to the interactive webapp

Twitter: @schnee