`netrb` Simulation Demos

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Mean distance

Take, for example, the Minnesota Roads network:

```
g_mn <- sample_natural_graph('mn')

summary(g_mn)
```

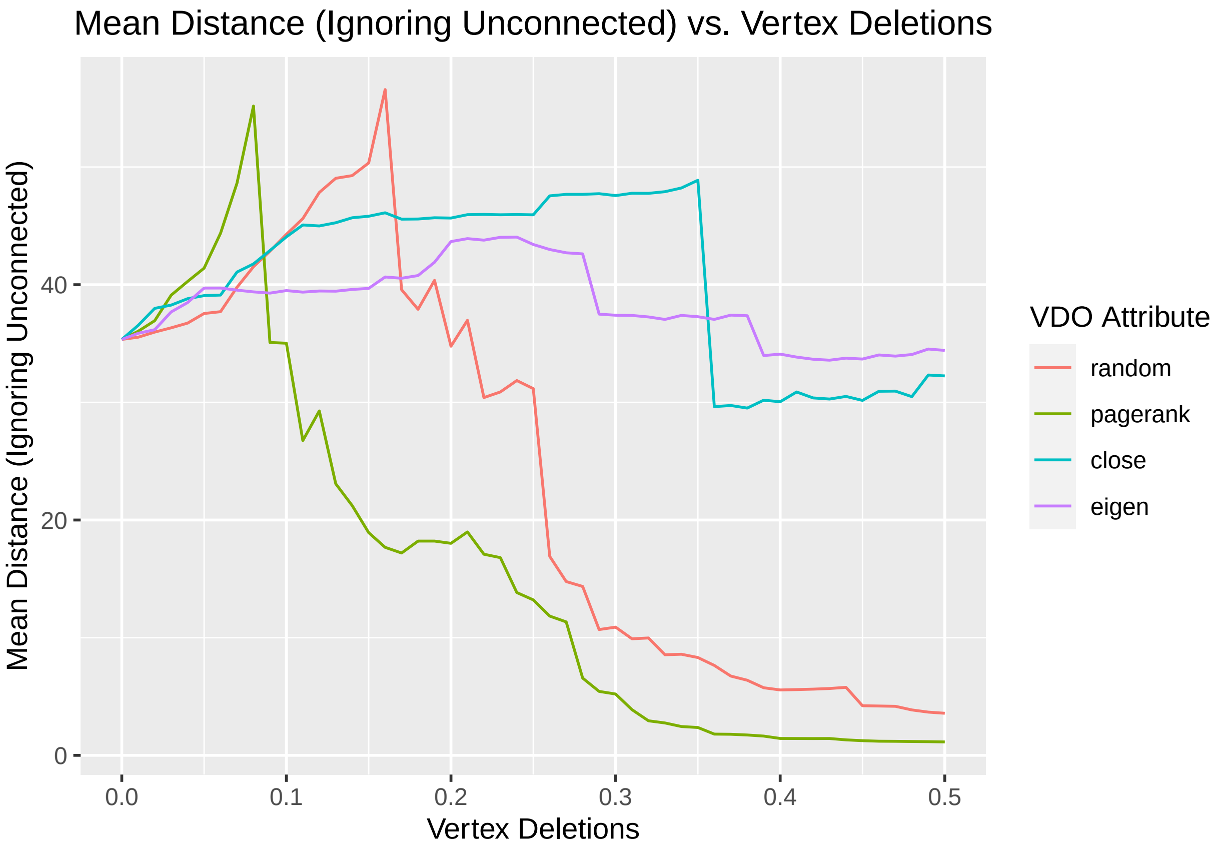
```
## IGRAPH 0c6f11c U--- 2642 3303 --
```

How its mean distance changes as vertices are deleted may be of interest. One important factor, as mentioned in the ReadMe, is how unconnected distances are treated.

We can plot this metric for deletion order according to, for example, the following vertex attributes:

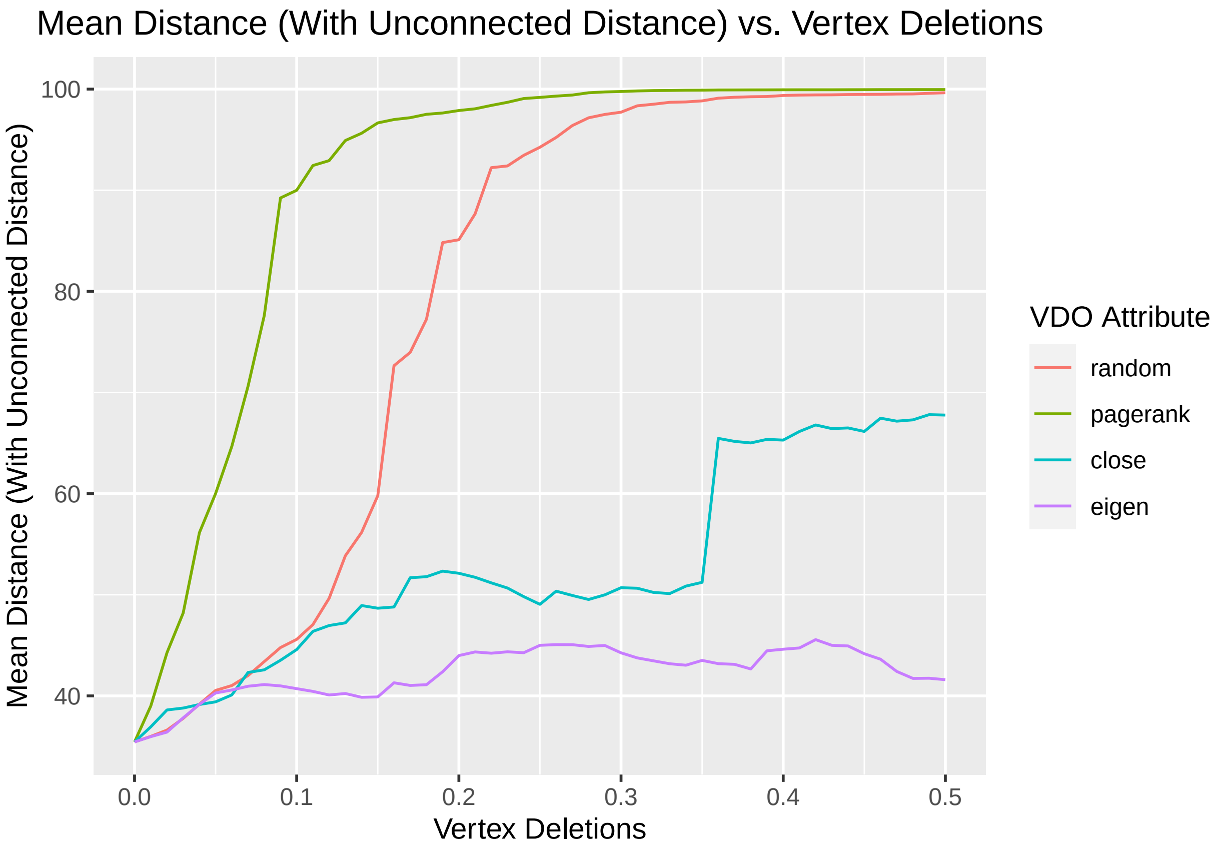
Ignoring unconnected distances (`igraph` default)

```
del_attrs <- c(
  'random',
  'pagerank',
  'close',
  'eigen'
)

mn_md_ignore <- metric_vs_del(
  igraph::mean_distance,
  graph     = g_mn,
  del_attrs = del_attrs,
  nchunks   = 50,
  plot      = FALSE
)

plot_Ys_vs_X(
  mn_md_ignore,
  y_axis_label = 'Mean Distance (Ignoring Unconnected)',
  x_axis_label = 'Vertex Deletions'
)
```



Using unconnected distance of diameter $+1$

```
mn_md_unconn_dist <- metric_vs_del(
  netrb::mean_distance,
  unconn_dist = sample_natural_graph_diameter('mn') + 1,
  graph = g_mn,
  del_attrs = del_attrs,
  nchunks = 50,
  plot = FALSE
)

plot_Ys_vs_X(
  mn_md_unconn_dist,
  y_axis_label = 'Mean Distance (With Unconnected Distance)',
  x_axis_label = 'Vertex Deletions'
)
```



Anonymous function

Note: An anonymous function passed as the response metric MUST include a parameter named `graph` unless `pass_graph == FALSE` is passed. This parameter was named as such to support common `igraph` functions.

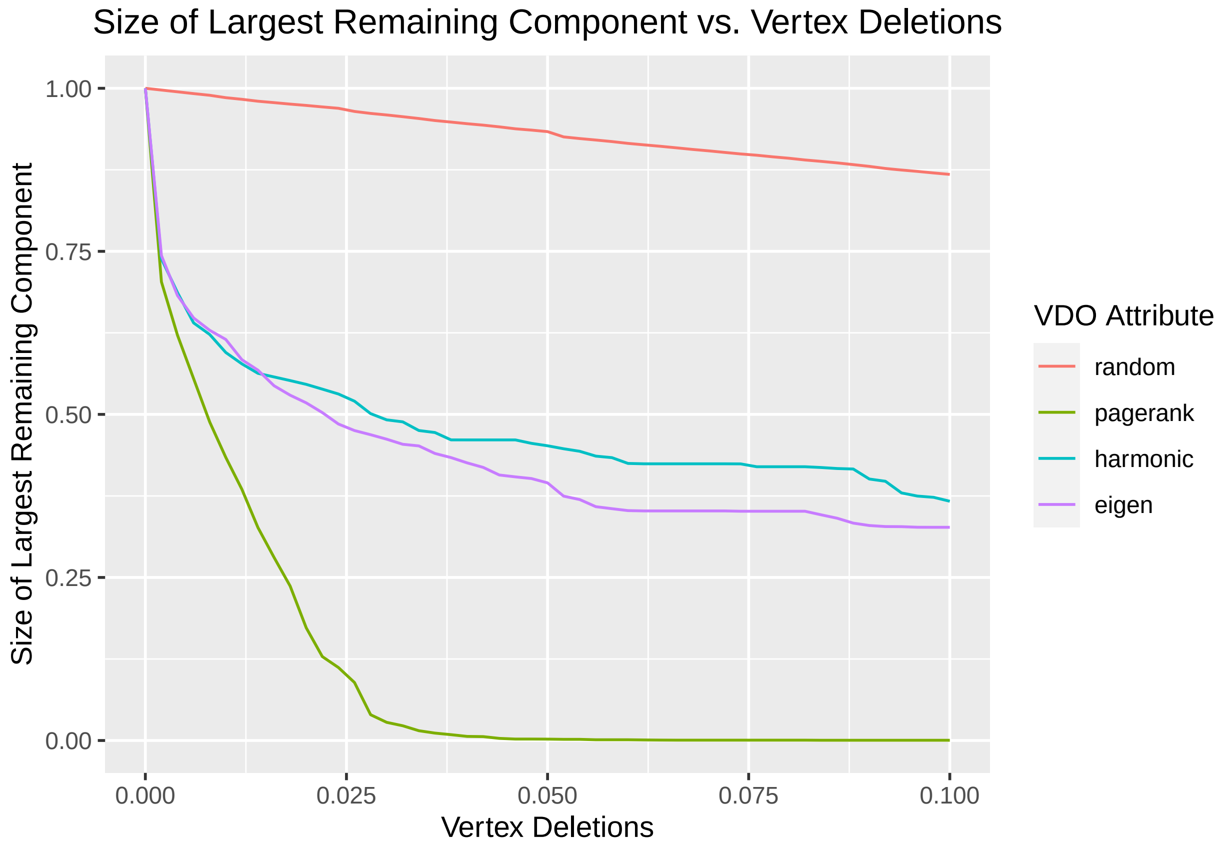
Perhaps the size of the largest remaining component, compared to the original number of vertices, is of interest:

Take, for example, the Internet Routers network:

Size of largest remaining component

```
g_ir <- sample_natural_graph('ir')

vcount_orig <- vcount(g_ir)

ir_lc <- metric_vs_del(
 graph = g_ir,
 function(graph) {
   lc_size <- vcount(largest_component(graph))
   return(lc_size / vcount_orig)
 },
 del_max = 0.1,
 nchunks = 50,
 del_attrs = c('random', 'pagerank', 'harmonic', 'eigen'),
 plot = FALSE
)
```

```
plot_Ys_vs_X(
  ir_lc,
  y_axis_label = 'Size of Largest Remaining Component',
  x_axis_label = 'Vertex Deletions'
)
```


Size of Largest Remaining Component vs. Vertex Deletions
Size of Largest Remaining Component
Vertex Deletions
VDO Attribute
random
pagerank
harmonic
eigen