Package: KOLaide (via r-universe)

May 31, 2026

Title Pick and Plot Key Opinion Leaders from a Network Given Constraints

Version 0.0.1

Description Assists researchers in choosing Key Opinion Leaders (KOLs) in a network to help disseminate or encourage adoption of an innovation by other network members. Potential KOL teams are evaluated using the ABCDE framework (Neal et al., 2025 <doi:10.31219/osf.io/3vxy9_v1>). This framework which considers: (1) the team members' Availability, (2) the Breadth of the team's network coverage, (3) the Cost of recruiting a team of a given size, and (4) the Diversity of the team's members, (5) which are pooled into a single Evaluation score.

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Encoding UTF-8

Roxygen list(markdown = TRUE)

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Depends R (>= 2.10)

Imports igraph, methods, utils

Suggests knitr, rmarkdown

URL https://github.com/zpneal/KOLaide

BugReports https://github.com/zpneal/KOLaide/issues

Config/pak/sysreqs libglpk-dev libxml2-dev

Repository https://zpneal.r-universe.dev

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Contents

`pick_kols` *Pick key opinion leaders from a network given constraints*

Description

Pick key opinion leaders from a network given constraints

Usage

```
pick_kols(
  network,
  tosource = TRUE,
  goal = "diffusion",
  m = 1,
  range = c(1, 1),
  top = NULL,
  include = NULL,
  exclude = NULL,
  attribute = NULL,
  alpha = 0.9,
  beta = 0.9,
  file = NULL
)
```

Arguments

`network`	a unipartite unweighted network as an adjacency `matrix` or `igraph` object
`tosource`	logical: edges point *toward* a source of information
`goal`	string: goal for the KOL team (either `"diffusion"` or `"adoption"`)
`m`	integer: KOL team centrality parameter (`m == 1` is equivalent to simple degree centrality)
`range`	vector: a vector of length 2 containing the minimum and maximum number of KOLs on a team
`top`	numeric: restrict scope to the `top` nodes with the highest degree, closeness, or betweenness (useful for large networks)
`include`	vector: names or indices of nodes that **must** be included on the KOL team
`exclude`	vector: names or indices of nodes that **can not** be included on the KOL team
`attribute`	string or vector: if `network` is an `igraph` object, the name of a node attribute. if `network` is an adjacency matrix, a vector containing a node attribute.

`alpha`	numeric: parameter to control relative weight of breadth and diversity in overall evaluation of KOL teams ($0.5 \leq \alpha \leq 1$)
`beta`	numeric: parameter to control weight of team size in overall evaluation of KOL teams ($0 \leq \beta \leq 2$)
`file`	string: filename to write a sorted list of possible KOL teams as a CSV.

Details

When seeking to diffuse a piece of information or encourage adoption of a behavior, it is often useful to recruit the assistance of *key opinion leaders* (KOL) in a network. `pick_kols` facilitates selecting members of a KOL team by returning a dataframe of possible teams. The selection of a KOL team often depends on several factors, which this function summarizes as ABCDE:

- Availability - The availability of individuals to serve as a KOL. This can be controlled by the `include` and `exclude` parameters.
- Breadth - The fraction of non-KOLs that the KOL team can influence. When `goal=="diffusion"`, breadth is measured as the fraction of non-KOLs that a KOL team can reach in `m` steps (i.e., m-reach). When `goal=="adoption"`, breadth is measured as the fraction of non-KOLs that are directly connected to at least `m` KOLs (i.e., m-contact).
- Cost - The number of KOLs to be recruited and trained (i.e., team size).
- Diversity - The fraction of values of `attribute` represented on the KOL team.
- Evaluation - Potential KOL teams must be compared and evaluated in a way that balances these considerations.

Evaluating KOL Teams

Potential KOL teams are evaluated on the basis of breadth (B), Cost (C), and (if `attribute` is provided), Diversity (D) using

$$\frac{B}{C^\beta} \text{ or } \frac{B^\alpha D^{1-\alpha}}{C^\beta}$$

The α parameter can take values $0.5 < \alpha < 1$ and controls the weight placed on breadth relative to diversity. Smaller values of α place less weight on breadth and more weight on diversity, while larger values of α place more weight on breadth and less weight on diversity. The default ($\alpha = 0.9$) places the majority of weight on the breadth of the network that KOL teams cover, while still considering the team's diversity (primarily as a tie-breaker).

The β parameter can take values $0 < \beta < 2$ and controls the cost of larger KOL team members. Smaller values of β imply decreasing marginal costs, while larger values of β imply increasing marginal costs. The default ($\beta = 0.9$) assumes that team members have a slight diminishing marginal cost (i.e. the cost of each additional team member is slightly smaller than the previous one).

Interpreting Edge Direction

If `network` is a directed network, then `tosource` controls how the direction of edges is interpreted:

- `tosource` = `TRUE` (default) - An edge i -> j is interpreted as "i gets information from j" or "i is influenced by j" (i.e., the edge points *toward* a source of information or influence). This type of data usually results from asking respondents to nominate the people from whom they seek advice. In this case, actors with high *in-degree* like *j* are generally better KOLs.

- `tosource = FALSE` - An edge i -> j is interpreted as "i sends information to j" or "i influences j" (i.e., the edge points *away* from a source of information or influence). This type of data usually results from asking respondents to report the people to whom they give advice. In this case, actors with high *out-degree* like *i* are generally better KOLs.

Value

A sorted list containing a data frame of possible KOL teams with their characteristics, the `network`, `m`, `goal`, and (optionally) `attribute`

Examples

```
network <- igraph::sample_smallworld(1,26,2,.2)  #An example network
igraph::V(network)$name <- letters[1:26]  #Give the nodes names
igraph::V(network)$gender <- sample(c("M","F"),26,replace=TRUE) #Give the nodes a "gender"
teams <- pick_kols(network,              #Find KOL teams in `network`
                   m = 2,
                   range = c(2,4),       #containing 2-4 members
                   attribute = "gender", #that are gender diverse
                   goal = "diffusion")   #and can help diffuse information
teams$teams[1:10,]  #Look at the top 10 teams
```

`plot_kols` *Plot a KOL team in a network*

Description

Plot a KOL team in a network

Usage

```
plot_kols(
  KOL,
  team = 1,
  kol = "red",
  reachable = "green",
  attribute = TRUE,
  ...
)
```

Arguments

`KOL`	a KOL object generated by `pick_kols()`
`team`	numeric: number of team in `KOL` to plot
`kol`	color to mark KOLs
`reachable`	color to mark nodes reachable by KOLs
`attribute`	boolean: if a node attribute was used to measure KOL team diversity, should nodes be colored accordingly
`...`	arguments passed to `igraph` plot function

Value

an igraph plot

Examples

```
network <- igraph::sample_smallworld(1,26,2,.2)  #An example network
teams <- pick_kols(network, m = 2)  #Find KOL teams
plot_kols(teams,
          vertex.label = NA,
          vertex.frame.width = 3)
```

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