

Debug

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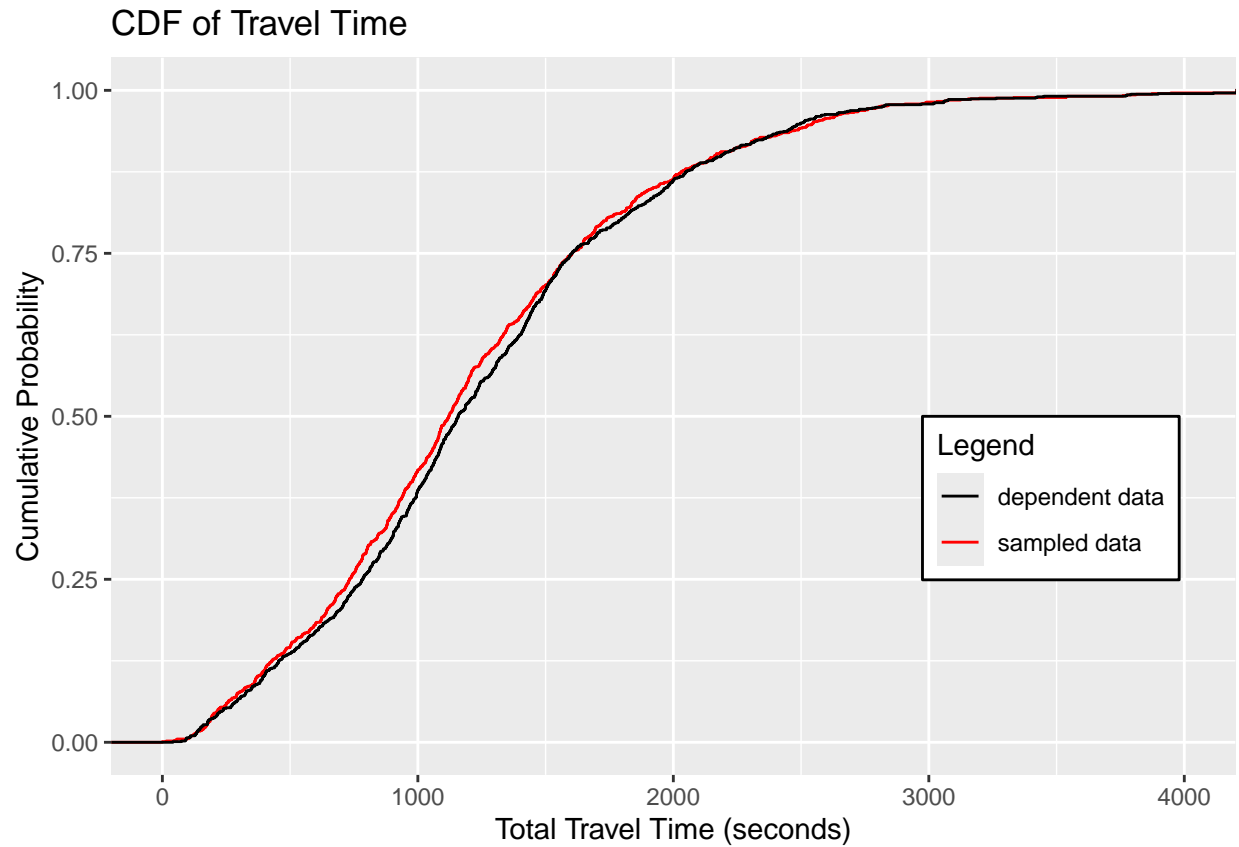
```
#source("traveltimeCLTfunctions.R")
#devtools::document()
# remove.packages("traveltimeCLT")
# devtools::install()
```

```
#devtools::install_github("Mingze-Li0625/traveltimeCLT", force = TRUE)
library(traveltimeCLT)
library(data.table)
```

```
## Warning: 'data.table' R 4.3.3
```

```
data(trips)
trips2=data.table(trips)
names(trips2)[c(1,2,5,6,7)]<-c("trip","linkId","duration","length","time")
trips= fread('data/trips.csv')
trips$time <- as.POSIXct(trips$time)
timeBin_x_edges=get_timeBin_x_edges(trips)
```

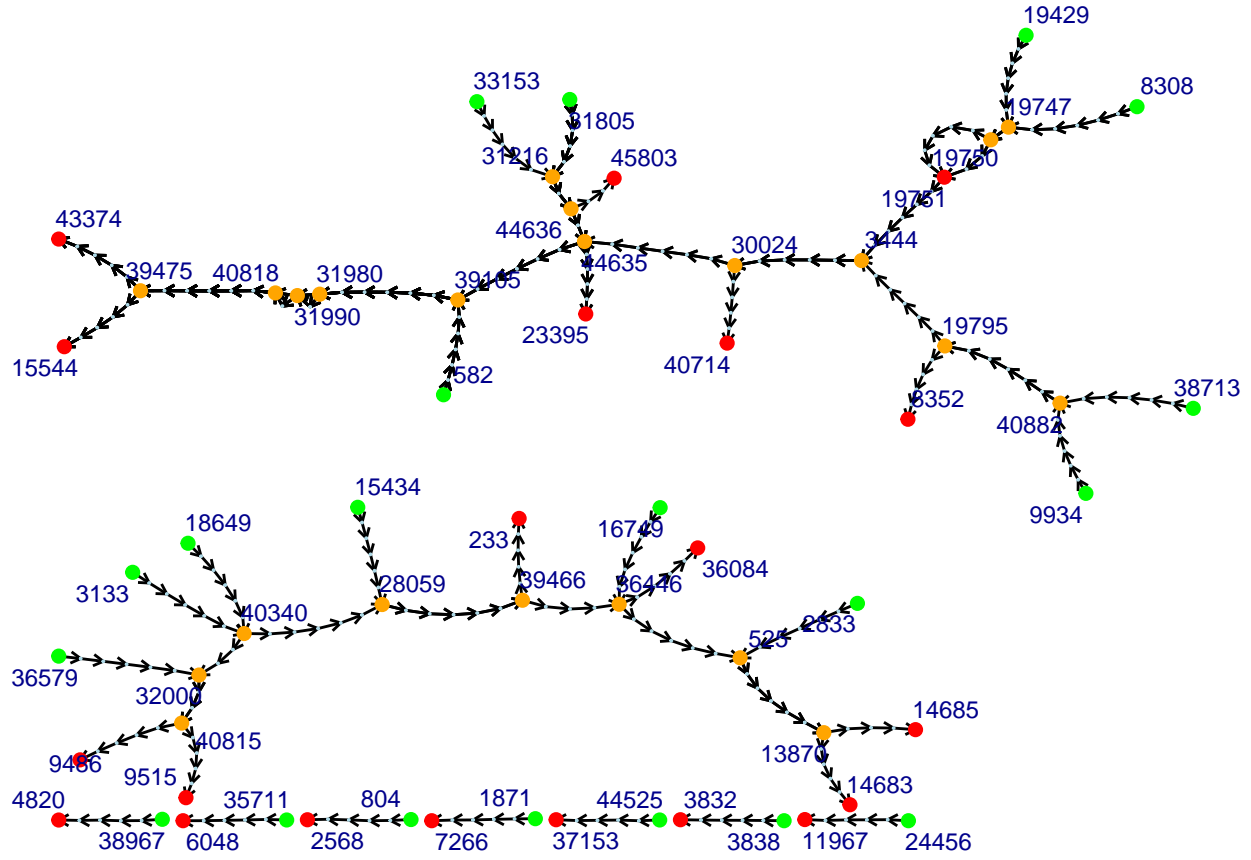
```
id <- sample(unique(trips$trip),1000)
sampled_1000_trips <- trips[trip %in% id, c("trip", "linkId", "time")]
sampled_1000_trips$timeBin<-time_bins_readable(sampled_1000_trips$time)
sampled_1000_trips$time<-NULL
sampled_1000_trips<-merge(sampled_1000_trips, timeBin_x_edges, by = c("linkId", "timeBin"), all.x = TRUE)
sampled_1000_trips<-na.omit(sampled_1000_trips)
sampled_time<-data.table(tripID=unique(sampled_1000_trips$trip),real_time=trips[trip %in%id, .(time[.N])])
sampled_time$real_time<-as.numeric(sampled_time$real_time)
sampled_time$dependent_time<-sampled_1000_trips[,.(sum(exp(mean+sd*qnorm(dependent_uniform(.N))))),trip]
sampled_time$independent_time<-sampled_1000_trips[,.(sum(exp(mean+sd*qnorm(runif(.N))))),trip]$V1
plot_CDF_compare(sampled_time$real_time,sampled_time$dependent_time,"dependent data")
```



```
timeBin_x_edges=get_timeBin_x_edges(tripID=trips$trip,time=trips$time,linkId=trips$linkId,length = trips$length)
View(timeBin_x_edges)
```

```
timeBin_x_connections=get_timeBin_x_connections(trips)
View(timeBin_x_connections)
```

```
id <- sample(unique(trips$trip),20)
sampledtrips <- trips[trip %in%id, ]
p=plot_metric_graph(sampledtrips)
p
```



```
graphs<-get_metric_graph(timeBin_x_connections)
x=findRoute(graphs,6494,1,2)
x
```

```
## $oneway
## $oneway[[1]]
## + 38/46311 vertices, named, from e136598:
## [1] 6494 6497 6495 6498 6499 6500 14610 25011 24535 24536 24933 24723
## [13] 24678 24677 24757 24891 24880 24883 20614 20593 20592 20610 22720 20556
## [25] 43575 43578 43582 43580 25013 25016 25017 13440 13442 36024 13831 7920
## [37] 41672 1
##
## $oneway[[2]]
## + 39/46311 vertices, named, from e136598:
## [1] 6494 6497 6495 6498 6499 6500 14610 25011 24535 24536 24933 24723
## [13] 24678 24677 24757 24891 24880 24883 20614 20593 20592 20610 22720 20556
## [25] 43575 43578 24812 43582 43580 25013 25016 25017 13440 13442 36024 13831
## [37] 7920 41672 1
##
##
## $oneway_legnth
## [1] 29789.02 29832.06
##
## $twoway
## $twoway[[1]]
## + 2/46311 vertices, named, from e136f4c:
```

```
## [1] 6494 1
##
## $twoway[[2]]
## + 3/46311 vertices, named, from e136f4c:
## [1] 6494 6541 1
##
##
## $twoway_length
## [1] 744.426 788.937

x_time=path_time(x$oneway,timeBin_x_connections)
x_time
```

```
## [[1]]
## [[1]]$expected_time
## [1] 1246.813
##
## [[1]]$expected_arrivetime
## [1] NA
##
## [[1]]$simulate_time
## [1] 1855.674
##
## [[1]]$sumulate_arrivetime
## [1] NA
##
## [[1]]$timebin
##      6494 -> 6497      6497 -> 6495      6495 -> 6498      6498 -> 6499      6499 -> 6500
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      43578 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016 25016 -> 25017
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831 13831 -> 7920
##      "Global"      "Global"      "Global"      "Global"      "Global"
##      7920 -> 41672      41672 -> 1
##      "Global"      "Global"
##
## [[1]]$fictional
##      6494 -> 6497      6497 -> 6495      6495 -> 6498      6498 -> 6499      6499 -> 6500
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
```

```

##          FALSE          FALSE          FALSE          FALSE          FALSE
## 43578 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016 25016 -> 25017
##          FALSE          FALSE          FALSE          FALSE          FALSE
## 25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831 13831 -> 7920
##          FALSE          FALSE          FALSE          FALSE          FALSE
## 7920 -> 41672      41672 -> 1
##          FALSE          FALSE
##
## [[1]]$frequency
## 6494 -> 6497 6497 -> 6495 6495 -> 6498 6498 -> 6499 6499 -> 6500
##          30          31          47          49          49
## 6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##          2          2          1          1          1
## 24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##          2          2          2          2          3
## 24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##          3          3          1          5          2
## 20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
##          3          2          2          2          41
## 43578 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016 25016 -> 25017
##          2          46          1          46          46
## 25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831 13831 -> 7920
##          17          17          16          4          4
## 7920 -> 41672      41672 -> 1
##          3          22
##
##
## [[2]]
## [[2]]$expected_time
## [1] 1246.994
##
## [[2]]$expected_arrivetime
## [1] NA
##
## [[2]]$simulate_time
## [1] 1690.011
##
## [[2]]$sumulate_arrivetime
## [1] NA
##
## [[2]]$timebin
## 6494 -> 6497 6497 -> 6495 6495 -> 6498 6498 -> 6499 6499 -> 6500
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 43578 -> 24812 24812 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016
##          "Global"      "Global"      "Global"      "Global"      "Global"
## 25016 -> 25017 25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831

```

```

##      "Global"      "Global"      "Global"      "Global"      "Global"
## 13831 -> 7920  7920 -> 41672  41672 -> 1
##      "Global"      "Global"      "Global"
##
## [[2]]$fictional
## 6494 -> 6497  6497 -> 6495  6495 -> 6498  6498 -> 6499  6499 -> 6500
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 43578 -> 24812 24812 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 25016 -> 25017 25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831
##      FALSE      FALSE      FALSE      FALSE      FALSE
## 13831 -> 7920  7920 -> 41672  41672 -> 1
##      FALSE      FALSE      FALSE
##
## [[2]]$frequency
## 6494 -> 6497  6497 -> 6495  6495 -> 6498  6498 -> 6499  6499 -> 6500
##      30      31      47      49      49
## 6500 -> 14610 14610 -> 25011 25011 -> 24535 24535 -> 24536 24536 -> 24933
##      2      2      1      1      1
## 24933 -> 24723 24723 -> 24678 24678 -> 24677 24677 -> 24757 24757 -> 24891
##      2      2      2      2      3
## 24891 -> 24880 24880 -> 24883 24883 -> 20614 20614 -> 20593 20593 -> 20592
##      3      3      1      5      2
## 20592 -> 20610 20610 -> 22720 22720 -> 20556 20556 -> 43575 43575 -> 43578
##      3      2      2      2      41
## 43578 -> 24812 24812 -> 43582 43582 -> 43580 43580 -> 25013 25013 -> 25016
##      46      46      46      1      46
## 25016 -> 25017 25017 -> 13440 13440 -> 13442 13442 -> 36024 36024 -> 13831
##      46      17      17      16      4
## 13831 -> 7920  7920 -> 41672  41672 -> 1
##      4      3      22

```

```

b=findRoute(graphs,123,321,2)
path_time(b$twoway,timeBin_x_connections,time="2023-09-01 14:15:02","Dependent",0.2)

```

```

## [[1]]
## [[1]]$expected_time
## [1] 396.4036
##
## [[1]]$expected_arrivetime
## [1] "2023-09-01 14:21:38 EDT"
##
## [[1]]$simulate_time
## [1] 381.5782
##
## [[1]]$sumulate_arrivetime

```

```

## [1] "2023-09-01 14:21:23 EDT"
##
## [[1]]$timebin
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      4311 -> 4306      4306 -> 44728      44728 -> 44730      44730 -> 44733      44733 -> 4303
##      "Global"      "Weekday"      "Global"      "Weekday"      "Weekday"
##      4303 -> 27350      27350 -> 2569      2569 -> 2570      2570 -> 2568      2568 -> 1498
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Global"
##      1498 -> 4302      4302 -> 40965      40965 -> 4294      4294 -> 28101      28101 -> 3320
##      "Global"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      3320 -> 3319      3319 -> 28108      28108 -> 1496      1496 -> 46268      46268 -> 4232
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      4232 -> 4233      4233 -> 119      119 -> 168      168 -> 174      174 -> 4266
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Global"
##      4266 -> 201      201 -> 286      286 -> 326      326 -> 327      327 -> 2838
##      "Weekday"      "Weekday"      "Global"      "Global"      "Global"
##      2838 -> 2835      2835 -> 321
##      "Weekday"      "Weekday"
##
## [[1]]$fictional
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      4311 -> 4306      4306 -> 44728      44728 -> 44730      44730 -> 44733      44733 -> 4303
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      4303 -> 27350      27350 -> 2569      2569 -> 2570      2570 -> 2568      2568 -> 1498
##      FALSE      FALSE      FALSE      TRUE      TRUE
##      1498 -> 4302      4302 -> 40965      40965 -> 4294      4294 -> 28101      28101 -> 3320
##      TRUE      TRUE      TRUE      TRUE      TRUE
##      3320 -> 3319      3319 -> 28108      28108 -> 1496      1496 -> 46268      46268 -> 4232
##      FALSE      FALSE      TRUE      TRUE      TRUE
##      4232 -> 4233      4233 -> 119      119 -> 168      168 -> 174      174 -> 4266
##      TRUE      TRUE      TRUE      TRUE      FALSE
##      4266 -> 201      201 -> 286      286 -> 326      326 -> 327      327 -> 2838
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      2838 -> 2835      2835 -> 321
##      FALSE      FALSE
##
## [[1]]$frequency
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311
##      1      1      1      1      1
##      4311 -> 4306      4306 -> 44728      44728 -> 44730      44730 -> 44733      44733 -> 4303
##      1      2      1      3      5
##      4303 -> 27350      27350 -> 2569      2569 -> 2570      2570 -> 2568      2568 -> 1498
##      5      1      1      1      17
##      1498 -> 4302      4302 -> 40965      40965 -> 4294      4294 -> 28101      28101 -> 3320
##      18      24      76      104      133
##      3320 -> 3319      3319 -> 28108      28108 -> 1496      1496 -> 46268      46268 -> 4232
##      102      103      160      57      106
##      4232 -> 4233      4233 -> 119      119 -> 168      168 -> 174      174 -> 4266
##      110      110      90      1      2
##      4266 -> 201      201 -> 286      286 -> 326      326 -> 327      327 -> 2838
##      1      1      7      1      3
##      2838 -> 2835      2835 -> 321

```

```

##          4          1
##
##
## [[2]]
## [[2]]$expected_time
## [1] 412.3367
##
## [[2]]$expected_arrivetime
## [1] "2023-09-01 14:21:54 EDT"
##
## [[2]]$simulate_time
## [1] 415.4424
##
## [[2]]$sumulate_arrivetime
## [1] "2023-09-01 14:21:57 EDT"
##
## [[2]]$timebin
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      4311 -> 4306      4306 -> 44728      44728 -> 44730      44730 -> 44733      44733 -> 4303
##      "Global"      "Weekday"      "Global"      "Weekday"      "Weekday"
##      4303 -> 27350      27350 -> 27343      27343 -> 2571      2571 -> 2568      2568 -> 1498
##      "Weekday"      "Weekday"      "Weekday"      "Global"      "Global"
##      1498 -> 4302      4302 -> 40965      40965 -> 4294      4294 -> 28101      28101 -> 3320
##      "Global"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      3320 -> 3319      3319 -> 28108      28108 -> 1496      1496 -> 46268      46268 -> 4232
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Weekday"
##      4232 -> 4233      4233 -> 119      119 -> 168      168 -> 174      174 -> 4266
##      "Weekday"      "Weekday"      "Weekday"      "Weekday"      "Global"
##      4266 -> 201      201 -> 286      286 -> 326      326 -> 327      327 -> 2838
##      "Weekday"      "Weekday"      "Global"      "Global"      "Global"
##      2838 -> 2835      2835 -> 321
##      "Weekday"      "Weekday"
##
## [[2]]$fictional
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      4311 -> 4306      4306 -> 44728      44728 -> 44730      44730 -> 44733      44733 -> 4303
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      4303 -> 27350      27350 -> 27343      27343 -> 2571      2571 -> 2568      2568 -> 1498
##      FALSE      FALSE      TRUE      TRUE      TRUE
##      1498 -> 4302      4302 -> 40965      40965 -> 4294      4294 -> 28101      28101 -> 3320
##      TRUE      TRUE      TRUE      TRUE      TRUE
##      3320 -> 3319      3319 -> 28108      28108 -> 1496      1496 -> 46268      46268 -> 4232
##      FALSE      FALSE      TRUE      TRUE      TRUE
##      4232 -> 4233      4233 -> 119      119 -> 168      168 -> 174      174 -> 4266
##      TRUE      TRUE      TRUE      TRUE      FALSE
##      4266 -> 201      201 -> 286      286 -> 326      326 -> 327      327 -> 2838
##      FALSE      FALSE      FALSE      FALSE      FALSE
##      2838 -> 2835      2835 -> 321
##      FALSE      FALSE
##
## [[2]]$frequency
##      123 -> 124      124 -> 16213      16213 -> 4310      4310 -> 4314      4314 -> 4311

```



```
##          1          1          1          1          1
## 4311 -> 4306 4306 -> 44728 44728 -> 44730 44730 -> 44733 44733 -> 4303
##          1          2          1          3          5
## 4303 -> 27350 27350 -> 27343 27343 -> 2571 2571 -> 2568 2568 -> 1498
##          5          4          4          14          17
## 1498 -> 4302 4302 -> 40965 40965 -> 4294 4294 -> 28101 28101 -> 3320
##          18          24          76          104          133
## 3320 -> 3319 3319 -> 28108 28108 -> 1496 1496 -> 46268 46268 -> 4232
##          102          103          160          57          106
## 4232 -> 4233 4233 -> 119 119 -> 168 168 -> 174 174 -> 4266
##          110          110          90          1          2
## 4266 -> 201 201 -> 286 286 -> 326 326 -> 327 327 -> 2838
##          1          1          7          1          3
## 2838 -> 2835 2835 -> 321
##          4          1
```

```
path_length(b$twoway,timeBin_x_connections)
```

```
## [[1]]
## [[1]]$total_length
## [1] 7984.628
##
## [[1]]$length_list
##      123 -> 124      124 -> 16213 16213 -> 4310 4310 -> 4314 4314 -> 4311
##      142.203          27.886      102.296          93.424          82.856
## 4311 -> 4306 4306 -> 44728 44728 -> 44730 44730 -> 44733 44733 -> 4303
##      990.359          135.676          79.688          13.213          135.664
## 4303 -> 27350 27350 -> 2569 2569 -> 2570 2570 -> 2568 2568 -> 1498
##      53.380          194.093          112.866          38.601          38.601
## 1498 -> 4302 4302 -> 40965 40965 -> 4294 4294 -> 28101 28101 -> 3320
##      130.576          829.254          1554.644          707.590          387.050
## 3320 -> 3319 3319 -> 28108 28108 -> 1496 1496 -> 46268 46268 -> 4232
##      61.612          179.852          47.196          189.932          185.483
## 4232 -> 4233 4233 -> 119 119 -> 168 168 -> 174 174 -> 4266
##      341.363          372.571          299.882          16.486          69.033
## 4266 -> 201 201 -> 286 286 -> 326 326 -> 327 327 -> 2838
##      105.040          11.972          87.182          41.524          39.527
## 2838 -> 2835 2835 -> 321
##      32.443          53.610
##
##
## [[2]]
## [[2]]$total_length
## [1] 8005.588
##
## [[2]]$length_list
##      123 -> 124      124 -> 16213 16213 -> 4310 4310 -> 4314 4314 -> 4311
##      142.203          27.886          102.296          93.424          82.856
## 4311 -> 4306 4306 -> 44728 44728 -> 44730 44730 -> 44733 44733 -> 4303
##      990.359          135.676          79.688          13.213          135.664
## 4303 -> 27350 27350 -> 27343 27343 -> 2571 2571 -> 2568 2568 -> 1498
##      53.380          194.093          59.561          112.866          38.601
## 1498 -> 4302 4302 -> 40965 40965 -> 4294 4294 -> 28101 28101 -> 3320
##      130.576          829.254          1554.644          707.590          387.050
```

##	3320 -> 3319	3319 -> 28108	28108 -> 1496	1496 -> 46268	46268 -> 4232
##	61.612	179.852	47.196	189.932	185.483
##	4232 -> 4233	4233 -> 119	119 -> 168	168 -> 174	174 -> 4266
##	341.363	372.571	299.882	16.486	69.033
##	4266 -> 201	201 -> 286	286 -> 326	326 -> 327	327 -> 2838
##	105.040	11.972	87.182	41.524	39.527
##	2838 -> 2835	2835 -> 321			
##	32.443	53.610			