

Calculate geographical distance - repex

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Example data

```
pacman::p_load(data.table, lubridate, kableExtra, magrittr)

ex = function(){
  df = data.table(driver = c("acot", "acot", "acot", "acot", "acot",
    "acot", "acot", "acot", "acot", "acot", "zima4", "zima4", "zima4",
    "zima4", "zima4", "zima4", "zima4", "zima4", "zima4", "zima4"),
    ping_id = c(1L, 2L, 3L, 4L, 5L, 6L, 7L, 8L, 9L, 10L, 6766359L,
    6766360L, 6766361L, 6766362L, 6766363L, 6766364L, 6766365L, 6766366L,
    6766367L, 6766368L), trip_id = c(100270801L, 100270801L, 100270802L,
    100270802L, 100270802L, 100270802L, 100270803L, 100270803L, 100270803L,
    100270803L, 100171344L, 100171344L, 100171344L, 100171344L, 100171344L,
    100171344L, 100171344L, 100171344L, 100171344L, 100171344L),
    ping_time = structure(c(1428559630, 1428560518, 1428564130,
    1428565020, 1428565030, 1428565496, 1428588948, 1428589292,
    1428589298, 1428589330, 1427864710, 1427865600, 1427865610,
    1427866500, 1427866512, 1427867400, 1427867412, 1427868300,
    1427868312, 1427869200), class = c("POSIXct", "POSIXt"), tzone = "UTC"),
    lon = c(-76.8371288, -76.8872324, -76.8919562, -76.7774871,
    -76.7758961, -76.7668669, -76.7668669, -76.9617213, -76.9617994,
    -76.9618486, -78.1493029, -78.240918, -78.2373618, -78.0423679,
    -78.0393196, -77.875084, -77.8719141, -77.6481797, -77.6465663,
    -77.5223926), lat = c(40.2515512, 40.3067711, 40.313665,
    40.1008598, 40.0984966, 40.0702363, 40.0702363, 39.8249557,
    39.8250498, 39.8250029, 35.577303, 35.4827431, 35.4820191,
    35.4158038, 35.4143296, 35.3275635, 35.3263614, 35.261458,
    35.2617837, 35.2205192))

  df[,ping_id := .I]
  return(df)
}

df = ex()

knitr::kable(df, "latex", booktabs = TRUE, caption = "Example data") %>%
  kable_styling(latex_options = "hold_position")
```

Table 1: Example data

driver	ping_id	trip_id	ping_time	lon	lat
acot	1	100270801	2015-04-09 06:07:10	-76.83713	40.25155
acot	2	100270801	2015-04-09 06:21:58	-76.88723	40.30677
acot	3	100270802	2015-04-09 07:22:10	-76.89196	40.31367
acot	4	100270802	2015-04-09 07:37:00	-76.77749	40.10086
acot	5	100270802	2015-04-09 07:37:10	-76.77590	40.09850
acot	6	100270802	2015-04-09 07:44:56	-76.76687	40.07024
acot	7	100270803	2015-04-09 14:15:48	-76.76687	40.07024
acot	8	100270803	2015-04-09 14:21:32	-76.96172	39.82496
acot	9	100270803	2015-04-09 14:21:38	-76.96180	39.82505
acot	10	100270803	2015-04-09 14:22:10	-76.96185	39.82500
zima4	11	100171344	2015-04-01 05:05:10	-78.14930	35.57730
zima4	12	100171344	2015-04-01 05:20:00	-78.24092	35.48274
zima4	13	100171344	2015-04-01 05:20:10	-78.23736	35.48202
zima4	14	100171344	2015-04-01 05:35:00	-78.04237	35.41580
zima4	15	100171344	2015-04-01 05:35:12	-78.03932	35.41433
zima4	16	100171344	2015-04-01 05:50:00	-77.87508	35.32756
zima4	17	100171344	2015-04-01 05:50:12	-77.87191	35.32636
zima4	18	100171344	2015-04-01 06:05:00	-77.64818	35.26146
zima4	19	100171344	2015-04-01 06:05:12	-77.64657	35.26178
zima4	20	100171344	2015-04-01 06:20:00	-77.52239	35.22052

1 Calculate distance

```
df = ex()
df[,ping_time := NULL]
df[,`:=`(lon1 = shift(lon, type = "lag", fill = NA),
        lat1 = shift(lat, type = "lag", fill = NA)),
    by = driver]

df[,distance := geosphere::distHaversine(cbind(lon, lat),
                                           cbind(lon1, lat1))]
df[,distance := round(distance/1609.344, 3)]

knitr::kable(df, "latex", booktabs = TRUE, caption = "Distance in miles") %>%
  kable_styling(latex_options = "hold_position")
```

Table 2: Distance in miles

driver	ping_id	trip_id	lon	lat	lon1	lat1	distance
acot	1	100270801	-76.83713	40.25155	NA	NA	NA
acot	2	100270801	-76.88723	40.30677	-76.83713	40.25155	4.645
acot	3	100270802	-76.89196	40.31367	-76.88723	40.30677	0.538
acot	4	100270802	-76.77749	40.10086	-76.89196	40.31367	15.914
acot	5	100270802	-76.77590	40.09850	-76.77749	40.10086	0.184
acot	6	100270802	-76.76687	40.07024	-76.77590	40.09850	2.012
acot	7	100270803	-76.76687	40.07024	-76.76687	40.07024	0.000
acot	8	100270803	-76.96172	39.82496	-76.76687	40.07024	19.865
acot	9	100270803	-76.96180	39.82505	-76.96172	39.82496	0.008
acot	10	100270803	-76.96185	39.82500	-76.96180	39.82505	0.004
zima4	11	100171344	-78.14930	35.57730	NA	NA	NA
zima4	12	100171344	-78.24092	35.48274	-78.14930	35.57730	8.329
zima4	13	100171344	-78.23736	35.48202	-78.24092	35.48274	0.206
zima4	14	100171344	-78.04237	35.41580	-78.23736	35.48202	11.904
zima4	15	100171344	-78.03932	35.41433	-78.04237	35.41580	0.200
zima4	16	100171344	-77.87508	35.32756	-78.03932	35.41433	11.038
zima4	17	100171344	-77.87191	35.32636	-77.87508	35.32756	0.197
zima4	18	100171344	-77.64818	35.26146	-77.87191	35.32636	13.405
zima4	19	100171344	-77.64657	35.26178	-77.64818	35.26146	0.094
zima4	20	100171344	-77.52239	35.22052	-77.64657	35.26178	7.574