Arranging logger data from HoboLink

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Contents

Intro

The data exports for the temperature and humidity MX loggers from Hobo needs a bit of data wrangling before it can be used. The different data streams from each logger all get a separate column. Here we develop a script to turn this into a more usable long format.

Read in data

I have a single export with many loggers, as a csv file.

```
inputFile <- "../rawData/All_MX_2020_2020_06_26_09_20_43_UTC_1.csv"

rawDat <- read_csv(inputFile,col_types = cols(.default = "c"))

dat <- rawDat %>%
  select(-"Line#") %>%
  mutate(date = as.POSIXct(Date, format = "%m/%d/%y %H:%M:%S")) %>%
  mutate_if(is_character, as.double) %>%
  select(-Date)
```

```
## Warning: NAs introduced by coercion
```

```
dat
```

```
## # A tibble: 6,889 x 64
##    `Temperature (M~ `RH (MX-RH-2 20~ `Dew Point (MX-~ `Temperature (M~
##               <dbl>            <dbl>            <dbl>             <dbl>
##  1             NA               NA               NA                NA
```

```
##  2             NA              NA              NA                   NA
##  3             22.3            28.2             3.05                NA
##  4             NA              NA              NA                   NA
##  5             24.7            25.6             3.69                NA
##  6             NA              NA              NA                   NA
##  7             25.5            24.4             3.72                NA
##  8             NA              NA              NA                   NA
##  9             26.1            24.0             3.95                NA
## 10             NA              NA              NA                   NA
## # ... with 6,879 more rows, and 60 more variables: `RH (MX-RH-2
## #   20835815:20835815-2), %, 20835815` <dbl>, `Dew Point (MX-TEMP-2
## #   20835815:20835815-4), *C, 20835815` <dbl>, `Temperature (MX-TEMP-2
## #   20835816:20835816-1), *C, 20835816` <dbl>, `RH (MX-RH-2
## #   20835816:20835816-2), %, 20835816` <dbl>, `Dew Point (MX-TEMP-2
## #   20835816:20835816-4), *C, 20835816` <dbl>, `Temperature (MX-TEMP-2
## #   20835817:20835817-1), *C, 20835817` <dbl>, `RH (MX-RH-2
## #   20835817:20835817-2), %, 20835817` <dbl>, `Dew Point (MX-TEMP-2
## #   20835817:20835817-4), *C, 20835817` <dbl>, `Temperature (MX-TEMP-2
## #   20835818:20835818-1), *C, 20835818` <dbl>, `RH (MX-RH-2
## #   20835818:20835818-2), %, 20835818` <dbl>, `Dew Point (MX-TEMP-2
## #   20835818:20835818-4), *C, 20835818` <dbl>, `Temperature (MX-TEMP-2
## #   20835819:20835819-1), *C, 20835819` <dbl>, `RH (MX-RH-2
## #   20835819:20835819-2), %, 20835819` <dbl>, `Dew Point (MX-TEMP-2
## #   20835819:20835819-4), *C, 20835819` <dbl>, `Temperature (MX-TEMP-2
## #   20835820:20835820-1), *C, 20835820` <dbl>, `RH (MX-RH-2
## #   20835820:20835820-2), %, 20835820` <dbl>, `Dew Point (MX-TEMP-2
## #   20835820:20835820-4), *C, 20835820` <dbl>, `Temperature (MX-TEMP-2
## #   20835821:20835821-1), *C, 20835821` <dbl>, `RH (MX-RH-2
## #   20835821:20835821-2), %, 20835821` <dbl>, `Dew Point (MX-TEMP-2
## #   20835821:20835821-4), *C, 20835821` <dbl>, `Temperature (MX-TEMP-2
## #   20835822:20835822-1), *C, 20835822` <dbl>, `RH (MX-RH-2
## #   20835822:20835822-2), %, 20835822` <dbl>, `Dew Point (MX-TEMP-2
## #   20835822:20835822-4), *C, 20835822` <dbl>, `Temperature (MX-TEMP-2
## #   20835823:20835823-1), *C, 20835823` <dbl>, `RH (MX-RH-2
## #   20835823:20835823-2), %, 20835823` <dbl>, `Dew Point (MX-TEMP-2
## #   20835823:20835823-4), *C, 20835823` <dbl>, `Temperature (MX-TEMP-2
## #   20835824:20835824-1), *C, 20835824` <dbl>, `RH (MX-RH-2
## #   20835824:20835824-2), %, 20835824` <dbl>, `Dew Point (MX-TEMP-2
## #   20835824:20835824-4), *C, 20835824` <dbl>, `Temperature (MX-TEMP-2
## #   20835825:20835825-1), *C, 20835825` <dbl>, `RH (MX-RH-2
## #   20835825:20835825-2), %, 20835825` <dbl>, `Dew Point (MX-TEMP-2
## #   20835825:20835825-4), *C, 20835825` <dbl>, `Temperature (MX-TEMP-2
## #   20843228:20843228-1), *C, 20843228` <dbl>, `RH (MX-RH-2
## #   20843228:20843228-2), %, 20843228` <dbl>, `Dew Point (MX-TEMP-2
## #   20843228:20843228-4), *C, 20843228` <dbl>, `Temperature (MX-TEMP-2
## #   20843229:20843229-1), *C, 20843229` <dbl>, `RH (MX-RH-2
```

```
## #   20843229:20843229-2), %, 20843229` <dbl>, `Dew Point (MX-TEMP-2
## #   20843229:20843229-4), *C, 20843229` <dbl>, `Temperature (MX-TEMP-2
## #   20843230:20843230-1), *C, 20843230` <dbl>, `RH (MX-RH-2
## #   20843230:20843230-2), %, 20843230` <dbl>, `Dew Point (MX-TEMP-2
## #   20843230:20843230-4), *C, 20843230` <dbl>, `Temperature (MX-TEMP-2
## #   20843231:20843231-1), *C, 20843231` <dbl>, `RH (MX-RH-2
## #   20843231:20843231-2), %, 20843231` <dbl>, `Dew Point (MX-TEMP-2
## #   20843231:20843231-4), *C, 20843231` <dbl>, `Temperature (MX-TEMP-2
## #   20843233:20843233-1), *C, 20843233` <dbl>, `RH (MX-RH-2
## #   20843233:20843233-2), %, 20843233` <dbl>, `Dew Point (MX-TEMP-2
## #   20843233:20843233-4), *C, 20843233` <dbl>, `Temperature (MX-TEMP-2
## #   20843235:20843235-1), *C, 20843235` <dbl>, `RH (MX-RH-2
## #   20843235:20843235-2), %, 20843235` <dbl>, `Dew Point (MX-TEMP-2
## #   20843235:20843235-4), *C, 20843235` <dbl>, `Temperature (MX-TEMP-2
## #   20843236:20843236-1), *C, 20843236` <dbl>, `RH (MX-RH-2
## #   20843236:20843236-2), %, 20843236` <dbl>, `Dew Point (MX-TEMP-2
## #   20843236:20843236-4), *C, 20843236` <dbl>, `Temperature (MX-TEMP-2
## #   20843238:20843238-1), *C, 20843238` <dbl>, `RH (MX-RH-2
## #   20843238:20843238-2), %, 20843238` <dbl>, `Dew Point (MX-TEMP-2
## #   20843238:20843238-4), *C, 20843238` <dbl>, `Temperature (MX-TEMP-2
## #   20843239:20843239-1), *C, 20843239` <dbl>, `RH (MX-RH-2
## #   20843239:20843239-2), %, 20843239` <dbl>, `Dew Point (MX-TEMP-2
## #   20843239:20843239-4), *C, 20843239` <dbl>, date <dttm>
```

That's quite the number of columns...

We have to pivot this data set to a longer format. We also get rid of the rows with no data.

```
temp <- dat %>%
  pivot_longer(cols = starts_with("Temperature"),
               names_to = "logger",
               values_to = "temperature") %>%
  select(date,
         logger,
         temperature) %>%
  filter(!is.na(temperature))

rh <- dat %>%
  pivot_longer(cols = starts_with("RH"),
               names_to = "logger",
               values_to = "rh") %>%
  select(date,
         logger,
         rh)%>%
  filter(!is.na(rh))
```

```
dew  <- dat %>%
  pivot_longer(cols = starts_with("Dew"),
               names_to = "logger",
               values_to = "dew") %>%
  select(date,
         logger,
         dew) %>%
  filter(!is.na(dew))
```

The data now looks like this

```
temp
```

```
## # A tibble: 6,889 x 3
##    date                logger                                    temperature
##    <dttm>              <chr>                                           <dbl>
##  1 2020-05-14 08:21:51 Temperature (MX-TEMP-2 20843236:2084323~         20.8
##  2 2020-05-14 08:41:51 Temperature (MX-TEMP-2 20843236:2084323~         22.2
##  3 2020-05-14 08:54:29 Temperature (MX-TEMP-2 20835814:2083581~         22.3
##  4 2020-05-14 09:01:51 Temperature (MX-TEMP-2 20843236:2084323~         24.9
##  5 2020-05-14 09:14:29 Temperature (MX-TEMP-2 20835814:2083581~         24.7
##  6 2020-05-14 09:21:51 Temperature (MX-TEMP-2 20843236:2084323~         26.2
##  7 2020-05-14 09:34:29 Temperature (MX-TEMP-2 20835814:2083581~         25.5
##  8 2020-05-14 09:41:51 Temperature (MX-TEMP-2 20843236:2084323~         26.6
##  9 2020-05-14 09:54:29 Temperature (MX-TEMP-2 20835814:2083581~         26.1
## 10 2020-05-14 10:01:51 Temperature (MX-TEMP-2 20843236:2084323~         27.2
## # ... with 6,879 more rows
```

Time to strip the logger names and merge the tables

```
temp <- temp %>%
  mutate(logger = str_extract(logger,
                              "[^, ]+$"))

rh <- rh %>%
  mutate(logger = str_extract(logger,
                              "[^, ]+$"))
dew <- dew %>%
  mutate(logger = str_extract(logger,
                              "[^, ]+$"))
```

Check to see that the dates are the same for the datasets

```
all(all(temp$date == rh$date),
all(rh$date == dew$date))
```

```
## [1] TRUE
```

```
combDat <- temp %>%
  full_join(rh,
            by = c("date" = "date",
                   "logger" = "logger")) %>%
  full_join(dew,
            by = c("date" = "date",
                   "logger" = "logger")) %>%
  arrange(logger,
          date)
```

```
combDat
```

```
## # A tibble: 6,889 x 5
##    date                logger   temperature    rh   dew
##    <dttm>              <chr>          <dbl> <dbl> <dbl>
##  1 2020-05-14 08:54:29 20835814        22.3   28.2  3.05
##  2 2020-05-14 09:14:29 20835814        24.7   25.6  3.69
##  3 2020-05-14 09:34:29 20835814        25.5   24.4  3.72
##  4 2020-05-14 09:54:29 20835814        26.1   24.0  3.95
##  5 2020-05-14 10:14:29 20835814        26.5   23.2  3.83
##  6 2020-05-14 10:34:29 20835814        26.5   23.3  3.91
##  7 2020-05-14 10:54:29 20835814        20.6   19.5 -3.47
##  8 2020-05-14 11:14:29 20835814         5.32  47.9 -4.83
##  9 2020-05-14 11:34:29 20835814         4.53  53.3 -4.13
## 10 2020-05-14 14:39:05 20835814         1.88  79.3 -1.32
## # ... with 6,879 more rows
```

Package this into a function

```
longerHobo <- function(inputFile){

  rawDat <- read_csv(inputFile,col_types = cols(.default = "c"))

  dat <- rawDat %>%
    select(-"Line#") %>%
    mutate(date = as.POSIXct(Date, format = "%m/%d/%y %H:%M:%S")) %>%
    mutate_if(is_character, as.double) %>%
    select(-Date)

    dat <- rawDat %>%
  select(-"Line#") %>%
  mutate(date = as.POSIXct(Date, format = "%m/%d/%y %H:%M:%S")) %>%
  mutate_if(is_character, as.double) %>%
  select(-Date)
```

```r
temp <- dat %>%
  pivot_longer(cols = starts_with("Temperature"),
               names_to = "logger",
               values_to = "temperature") %>%
  select(date,
       logger,
       temperature) %>%
  filter(!is.na(temperature))

rh <- dat %>%
  pivot_longer(cols = starts_with("RH"),
                names_to = "logger",
                values_to = "rh") %>%
  select(date,
         logger,
         rh)%>%
  filter(!is.na(rh))

dew  <- dat %>%
  pivot_longer(cols = starts_with("Dew"),
                names_to = "logger",
                values_to = "dew") %>%
  select(date,
         logger,
         dew) %>%
  filter(!is.na(dew))


temp <- temp %>%
  mutate(logger = str_extract(logger,
                              "[^, ]+$"))
rh <- rh %>%
  mutate(logger = str_extract(logger,
                                "[^, ]+$"))
dew <- dew %>%
  mutate(logger = str_extract(logger,
                                "[^, ]+$"))

if(!all(all(temp$date == rh$date),
all(rh$date == dew$date))) stop("Tables datetimes doesn't match")

combDat <- temp %>%
full_join(rh,
           by = c("date" = "date",
                  "logger" = "logger")) %>%
```

```
  full_join(dew,
            by = c("date" = "date",
                   "logger" = "logger")) %>%
  arrange(logger,
          date)

  return(combDat)
}
```

We can check that it produces the same results as the script.

```
combDat2 <- longerHobo("../rawData/All_MX_2020_2020_06_26_09_20_43_UTC_1.csv")
```

```
## Warning: NAs introduced by coercion
```

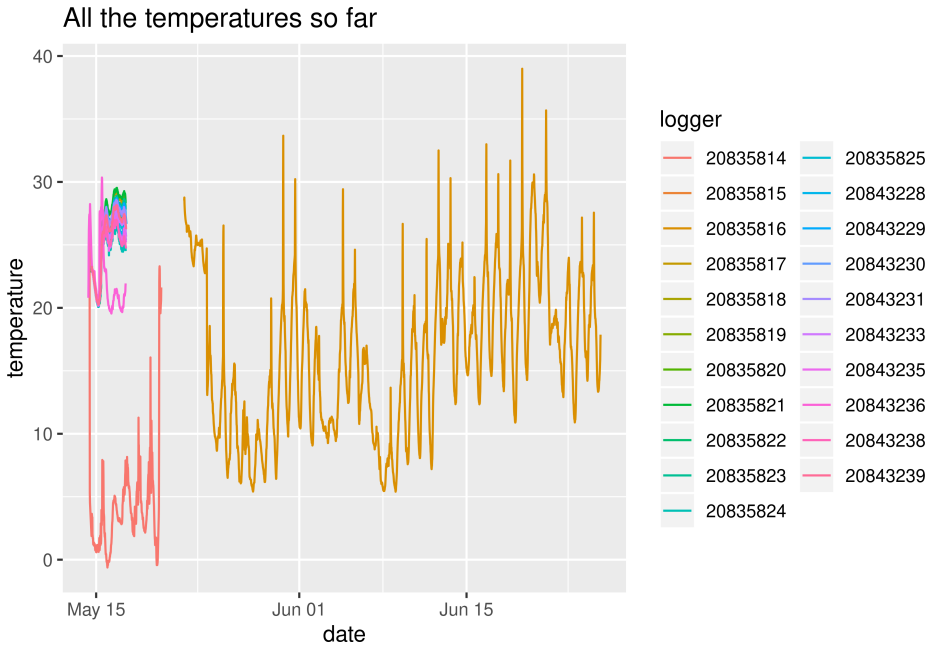
```
## Warning: NAs introduced by coercion
```

```
all(combDat == combDat2)
```

```
## [1] TRUE
```

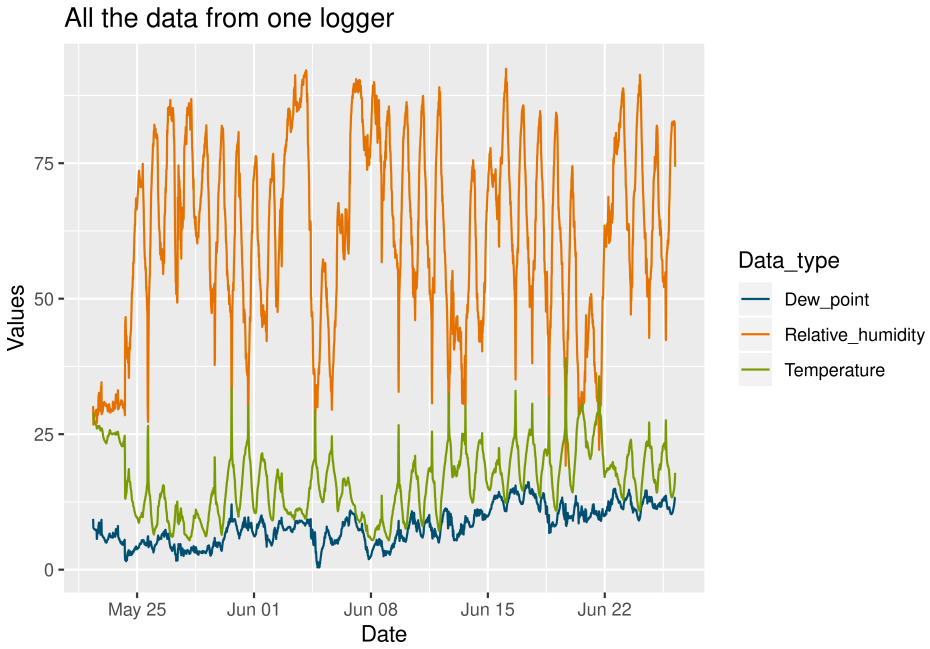
Check the data out

```
ggplot(combDat) +
  geom_line(aes(x = date, y = temperature, color = logger)) +
  ggtitle("All the temperatures so far")
```




```
oneLogger <- combDat %>%
  filter(logger == "20835816") %>%
  select(Date = date,
         logger,
         Temperature = temperature,
         Relative_humidity = rh,
         Dew_point = dew) %>%
  pivot_longer(-c(Date, logger),
               names_to = "Data_type",
               values_to = "Values")

ggplot(oneLogger) +
  geom_line(aes(x = Date, y = Values, color = Data_type)) +
  scale_color_nina() +
  ggtitle("All the data from one logger")
```


All the data from one logger
Values
75
50
25
0
May 25
Jun 01
Jun 08
Jun 15
Jun 22
Date
Data_type
Dew_point
Relative_humidity
Temperature