Echoview Exports Data Merging

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Merge echoview exports from multiple EV files into one .csv file

This script will allow you to merge all .csv files stored in one folder based on the columns they have in common. This is useful in the case that the Echoview export properties were inconsistent across EV files from which you exported.

Before you begin, save all .csv exports from Echoview in one folder and set this folder as your working directory using the function setwd().

Create a list of the files in this folder.

```
file.list<-list.files(path =
"C:/Users/allwhite/Desktop/Autocorrelation/Manuscript/nasc5x5_2017/")
file.list
```

```
## [1] "MG111_8_22_2017_Night_NASC.csv" "MG111_8_23_2017_Day_NASC.csv"
## [3] "MG111_9_5_2017_Day_NASC.csv"    "MG111_9_5_2017_night_NASC.csv"
## [5] "WRT_8_22_2017_night_NASC.csv"   "WRT_8_23_2017_day_NASC.csv"
## [7] "WRT_9_5_2017_day_NASC.csv"      "WRT_9_5_2017_night_NASC.csv"
```

Now make some empty lists to store each file in. We'll make one to store the files as dataframes, one to store the column names of each file, and one to store the dataframe containing only the columns that they all have in common.

```
allfiles<-vector('list',length=length(file.list)) #will store each file as a
dataframe
columns<-vector('list',length=length(file.list)) #will store the column names
in each dataframe
mergedfiles<-vector('list',length=length(file.list)) #will store each
dataframe with only the columns that they all have in common
```

Next, make a loop where each iteration will store a file in your folder as a dataframe in the list "allfiles" and the column names of that file in the list "columns".

```
for(i in 1:length(file.list)){
  file.i<-read.csv(file.list[i]) #opens the ith .csv file
  file.i$file_name<-file.list[i] #adds a new column to each dataframe which
contains the name of the original file
  file.i$site<-i #adds a new column to each dataframe which assigns a number
to each file
  allfiles[[i]]<-file.i #stores the ith dataframe as the ith element in the
list "allfiles"
  columns[[i]]<-colnames(file.i) #stores the column names of the ith
```

```
dataframe as the ith element in the list "columns"

  #Print the number of column names in each file to see if they match
  print(length(colnames(file.i)))
}
```

```
## [1] 99
## [1] 99
## [1] 99
## [1] 99
## [1] 99
## [1] 99
## [1] 99
## [1] 100
```

By printing the number of column names in each file we can see that the 8th .csv file has one more column than the other 7 .csv files in this folder. As there are 99 columns in every other folder, it might take us some time to manually go through and find which column didn't match. Instead, we'll let R do it for us!

Find the column names that the 8 .csv files have in common and store these names as a list called "common.columns".

```
common.columns<-
Reduce(intersect,list(columns[[1]],columns[[2]],columns[[3]],columns[[4]],col
umns[[5]],columns[[6]],columns[[7]],columns[[8]])) #You will have to change
the number of columns[[]] here based on how many files you are merging.
```

This gives us a list of the column names that all files have in common.

```
common.columns
```

```
##  [1] "Interval"
##  [2] "Layer"
##  [3] "Sv_mean"
##  [4] "NASC"
##  [5] "Sv_max"
##  [6] "Sv_min"
##  [7] "Sv_noise"
##  [8] "NASC_noise"
##  [9] "Height_mean"
## [10] "Depth_mean"
## [11] "Good_samples"
## [12] "Layer_depth_min"
## [13] "Layer_depth_max"
## [14] "Ping_S"
## [15] "Ping_E"
## [16] "Ping_M"
## [17] "Dist_S"
## [18] "Dist_E"
## [19] "Dist_M"
```

```
## [20] "VL_start"
## [21] "VL_end"
## [22] "VL_mid"
## [23] "Date_S"
## [24] "Time_S"
## [25] "Date_E"
## [26] "Time_E"
## [27] "Date_M"
## [28] "Time_M"
## [29] "Lat_S"
## [30] "Lon_S"
## [31] "Lat_E"
## [32] "Lon_E"
## [33] "Lat_M"
## [34] "Lon_M"
## [35] "Exclude_below_line_depth_mean"
## [36] "Program_version"
## [37] "Processing_version"
## [38] "Processing_date"
## [39] "Processing_time"
## [40] "EV_filename"
## [41] "Alpha"
## [42] "Gain_constant"
## [43] "Noise_Sv_1m"
## [44] "Minimum_Sv_threshold_applied"
## [45] "Minimum_integration_threshold"
## [46] "Maximum_Sv_threshold_applied"
## [47] "Maximum_integration_threshold"
## [48] "Exclude_above_line_applied"
## [49] "Exclude_above_line_depth_mean"
## [50] "Exclude_below_line_applied"
## [51] "Bottom_offset"
## [52] "Standard_deviation"
## [53] "Skewness"
## [54] "Kurtosis"
## [55] "ABC"
## [56] "ABC_noise"
## [57] "Area_Backscatter_Strength"
## [58] "Thickness_mean"
## [59] "Range_mean"
## [60] "Exclude_below_line_range_mean"
## [61] "Exclude_above_line_range_mean"
## [62] "Bad_data_no_data_samples"
## [63] "Beam_volume_sum"
## [64] "No_data_samples"
## [65] "Frequency"
## [66] "Grid_reference_line"
## [67] "Layer_top_to_reference_line_depth"
## [68] "Layer_top_to_reference_line_range"
## [69] "Layer_bottom_to_reference_line_depth"
```

```
## [70] "Layer_bottom_to_reference_line_range"
## [71] "Exclude_below_line_depth_min"
## [72] "Exclude_below_line_range_min"
## [73] "Exclude_below_line_depth_max"
## [74] "Exclude_below_line_range_max"
## [75] "Samples_Below_Bottom_Exclusion"
## [76] "Samples_Above_Surface_Exclusion"
## [77] "Samples_In_Domain"
## [78] "Bad_data_empty_water_samples"
## [79] "Bottom_roughness_normalized"
## [80] "Bottom_hardness_normalized"
## [81] "First_bottom_length_normalized"
## [82] "Second_bottom_length_normalized"
## [83] "Bottom_rise_time_normalized"
## [84] "Heave_source"
## [85] "Heave_min"
## [86] "Heave_max"
## [87] "Bottom_line_depth_mean"
## [88] "Bottom_max_sv"
## [89] "Bottom_kurtosis"
## [90] "Bottom_skewness"
## [91] "Heave_mean"
## [92] "Center_of_mass"
## [93] "Inertia"
## [94] "Proportion_occupied"
## [95] "Equivalent_area"
## [96] "Aggregation_index"
## [97] "file_name"
## [98] "site"
```

Now we can write a loop to subset each dataframe by the common.columns list and store these dataframes containing only columns that all the files have in the list “mergedfiles” that we created earlier.

```
for(i in 1:length(file.list)){
  file.i<-allfiles[[i]]
  m.file.i<-file.i[,common.columns]
  print(length(colnames(m.file.i)))
  mergedfiles[[i]]<-m.file.i
}
```

```
## [1] 98
## [1] 98
## [1] 98
## [1] 98
## [1] 98
## [1] 98
## [1] 98
## [1] 98
```

The number of columns should now be the same for all files.

Bind the subsetted dataframes by row into one dataframe.

```
merged.data<-as.data.frame(do.call(rbind,mergedfiles))
```

Check to make sure that this worked by printing the last 6 rows of your combined data.

```
tail(merged.data)
```

```
##        Interval Layer   Sv_mean      NASC    Sv_max    Sv_min  Sv_noise
## 922205    13038    18 -61.48385 30.354546 -56.13503 -74.14312 -973.9750
## 922206    13038    19 -64.38472 15.564547 -56.66190 -83.22583 -973.4822
## 922207    13038    20 -67.96291  6.828366 -62.69842 -83.94245 -973.0145
## 922208    13038    21 -62.17048 25.915533 -57.16562 -79.09296 -972.6832
## 922209    13038    22 -67.59994  7.423595 -59.97008 -83.44826 -972.2564
## 922210    13038    23 -77.51140  0.795532 -72.77773 -84.12834 -971.8546
##        NASC_noise Height_mean Depth_mean Good_samples Layer_depth_min
## 922205          0    0.991098   17.51765           40              17
## 922206          0    0.991098   18.50875           40              18
## 922207          0    0.991098   19.49985           40              19
## 922208          0    0.991098   20.49094           40              20
## 922209          0    0.991098   21.48204           40              21
## 922210          0    1.040652   22.49792           17              22
##        Layer_depth_max Ping_S Ping_E Ping_M   Dist_S   Dist_E   Dist_M
VL_start
## 922205              18  38019  38020  38019 13037.39 13037.95 13037.39
1511763
## 922206              19  38019  38020  38019 13037.39 13037.95 13037.39
1511763
## 922207              20  38019  38020  38019 13037.39 13037.95 13037.39
1511763
## 922208              21  38019  38020  38019 13037.39 13037.95 13037.39
1511763
## 922209              22  38019  38020  38019 13037.39 13037.95 13037.39
1511763
## 922210              23  38019  38020  38019 13037.39 13037.95 13037.39
1511763
##         VL_end  VL_mid   Date_S         Time_S   Date_E         Time_E
Date_M
## 922205 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
20170906
## 922206 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
20170906
## 922207 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
20170906
## 922208 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
20170906
## 922209 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
20170906
## 922210 1511764 1511763 20170906  04:12:24.1240 20170906  04:12:24.2250
```

```
20170906
##                Time_M Lat_S Lon_S Lat_E Lon_E Lat_M Lon_M
## 922205  04:12:24.1240   999   999   999   999   999   999
## 922206  04:12:24.1240   999   999   999   999   999   999
## 922207  04:12:24.1240   999   999   999   999   999   999
## 922208  04:12:24.1240   999   999   999   999   999   999
## 922209  04:12:24.1240   999   999   999   999   999   999
## 922210  04:12:24.1240   999   999   999   999   999   999
##        Exclude_below_line_depth_mean   Program_version Processing_version
## 922205                         -9999  "10.0.298.38422"                  3
## 922206                         -9999  "10.0.298.38422"                  3
## 922207                         -9999  "10.0.298.38422"                  3
## 922208                         -9999  "10.0.298.38422"                  3
## 922209                         -9999  "10.0.298.38422"                  3
## 922210                         -9999  "10.0.298.38422"                  3
##        Processing_date Processing_time
## 922205        20200223   14:10:15.0860
## 922206        20200223   14:10:15.0860
## 922207        20200223   14:10:15.0860
## 922208        20200223   14:10:15.0860
## 922209        20200223   14:10:15.0860
## 922210        20200223   14:10:15.0860
##                                            EV_filename    Alpha
Gain_constant
## 922205  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
## 922206  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
## 922207  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
## 922208  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
## 922209  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
## 922210  "D:\\Echoview Files 2017\\WRT_9_5_2017_night.EV" 0.006197
-9999
##        Noise_Sv_1m Minimum_Sv_threshold_applied
Minimum_integration_threshold
## 922205        -999                            0
-70
## 922206        -999                            0
-70
## 922207        -999                            0
-70
## 922208        -999                            0
-70
## 922209        -999                            0
-70
## 922210        -999                            0
-70
```

```
##        Maximum_Sv_threshold_applied Maximum_integration_threshold
## 922205                            0                            99
## 922206                            0                            99
## 922207                            0                            99
## 922208                            0                            99
## 922209                            0                            99
## 922210                            0                            99
##        Exclude_above_line_applied Exclude_above_line_depth_mean
## 922205                          0                         -9999
## 922206                          0                         -9999
## 922207                          0                         -9999
## 922208                          0                         -9999
## 922209                          0                         -9999
## 922210                          0                         -9999
##        Exclude_below_line_applied Bottom_offset Standard_deviation
Skewness
## 922205                          0             0           5.62e-07
1.228141
## 922206                          0             0           4.59e-07
2.186993
## 922207                          0             0           1.28e-07
0.940798
## 922208                          0             0           5.98e-07
1.057672
## 922209                          0             0           2.39e-07
2.397048
## 922210                          0             0           1.30e-08
1.658084
##         Kurtosis      ABC ABC_noise Area_Backscatter_Strength
Thickness_mean
## 922205  1.566133 7.04e-07         0                -61.52268
0.991098
## 922206  5.861273 3.61e-07         0                -64.42355
0.991098
## 922207  0.507681 1.58e-07         0                -68.00175
0.991098
## 922208 -0.191099 6.01e-07         0                -62.20932
0.991098
## 922209  5.609874 1.72e-07         0                -67.63878
0.991098
## 922210  2.517204 1.85e-08         0                -77.33834
1.040652
##        Range_mean Exclude_below_line_range_mean
Exclude_above_line_range_mean
## 922205   17.51765                         -9999                         -
9999
## 922206   18.50875                         -9999                         -
9999
## 922207   19.49985                         -9999                         -
9999
```

```
## 922208   20.49094                          -9999                          -
9999
## 922209   21.48204                          -9999                          -
9999
## 922210   22.49792                          -9999                          -
9999
##        Bad_data_no_data_samples Beam_volume_sum No_data_samples Frequency
## 922205                        0        9.643039               0        38
## 922206                        0       10.764757               0        38
## 922207                        0       11.948193               0        38
## 922208                        0       13.193346               0        38
## 922209                        0       14.500217               0        38
## 922210                        0       16.699279              25        38
##              Grid_reference_line Layer_top_to_reference_line_depth
## 922205  "Surface (depth of zero)"                                17
## 922206  "Surface (depth of zero)"                                18
## 922207  "Surface (depth of zero)"                                19
## 922208  "Surface (depth of zero)"                                20
## 922209  "Surface (depth of zero)"                                21
## 922210  "Surface (depth of zero)"                                22
##        Layer_top_to_reference_line_range
Layer_bottom_to_reference_line_depth
## 922205                                17
18
## 922206                                18
19
## 922207                                19
20
## 922208                                20
21
## 922209                                21
22
## 922210                                22
23
##        Layer_bottom_to_reference_line_range Exclude_below_line_depth_min
## 922205                                   18                        -9999
## 922206                                   19                        -9999
## 922207                                   20                        -9999
## 922208                                   21                        -9999
## 922209                                   22                        -9999
## 922210                                   23                        -9999
##        Exclude_below_line_range_min Exclude_below_line_depth_max
## 922205                        -9999                        -9999
## 922206                        -9999                        -9999
## 922207                        -9999                        -9999
## 922208                        -9999                        -9999
## 922209                        -9999                        -9999
## 922210                        -9999                        -9999
##        Exclude_below_line_range_max Samples_Below_Bottom_Exclusion
## 922205                        -9999                             0
```

```
## 922206                         -9999                                  0
## 922207                         -9999                                  0
## 922208                         -9999                                  0
## 922209                         -9999                                  0
## 922210                         -9999                                  0
##        Samples_Above_Surface_Exclusion Samples_In_Domain
## 922205                               0                40
## 922206                               0                40
## 922207                               0                40
## 922208                               0                40
## 922209                               0                40
## 922210                               0                42
##        Bad_data_empty_water_samples Bottom_roughness_normalized
## 922205                            0                    -9.9e+37
## 922206                            0                    -9.9e+37
## 922207                            0                    -9.9e+37
## 922208                            0                    -9.9e+37
## 922209                            0                    -9.9e+37
## 922210                            0                    -9.9e+37
##        Bottom_hardness_normalized First_bottom_length_normalized
## 922205                  -9.9e+37                       -9.9e+37
## 922206                  -9.9e+37                       -9.9e+37
## 922207                  -9.9e+37                       -9.9e+37
## 922208                  -9.9e+37                       -9.9e+37
## 922209                  -9.9e+37                       -9.9e+37
## 922210                  -9.9e+37                       -9.9e+37
##        Second_bottom_length_normalized Bottom_rise_time_normalized
Heave_source
## 922205                       -9.9e+37                    -9.9e+37
""
## 922206                       -9.9e+37                    -9.9e+37
""
## 922207                       -9.9e+37                    -9.9e+37
""
## 922208                       -9.9e+37                    -9.9e+37
""
## 922209                       -9.9e+37                    -9.9e+37
""
## 922210                       -9.9e+37                    -9.9e+37
""
##        Heave_min Heave_max Bottom_line_depth_mean Bottom_max_sv
Bottom_kurtosis
## 922205         0         0              -10000.99      -9.9e+37        -
9.9e+37
## 922206         0         0              -10000.99      -9.9e+37        -
9.9e+37
## 922207         0         0              -10000.99      -9.9e+37        -
9.9e+37
## 922208         0         0              -10000.99      -9.9e+37        -
9.9e+37
```

```
## 922209         0         0              -10000.99      -9.9e+37        -
9.9e+37
## 922210         0         0              -10000.99      -9.9e+37        -
9.9e+37
##        Bottom_skewness Heave_mean Center_of_mass  Inertia
Proportion_occupied
## 922205        -9.9e+37          0       17.55764 0.123671
1.000000
## 922206        -9.9e+37          0       18.43586 0.125497
1.000000
## 922207        -9.9e+37          0       19.53989 0.088841
1.000000
## 922208        -9.9e+37          0       20.50660 0.069504
0.975000
## 922209        -9.9e+37          0       21.46099 0.036548
0.975000
## 922210        -9.9e+37          0       22.19753 0.018039
0.404762
##        Equivalent_area Aggregation_index                   file_name site
## 922205        24.84058          0.040257 WRT_9_5_2017_night_NASC.csv    8
## 922206        15.70667          0.063667 WRT_9_5_2017_night_NASC.csv    8
## 922207        24.54505          0.040741 WRT_9_5_2017_night_NASC.csv    8
## 922208        20.55056          0.048660 WRT_9_5_2017_night_NASC.csv    8
## 922209        14.04870          0.071181 WRT_9_5_2017_night_NASC.csv    8
## 922210        11.29825          0.088509 WRT_9_5_2017_night_NASC.csv    8
```

Scroll to the last few columns in your datframe. You'll know that the merging worked if the values in the last four or so columns look reasonable for the variables they represent.

Finally, save your merged dataframe as a .csv file. In this example, the data has been saved in the folder "Manuscript" as "5x5nasc_2017".

```
write.csv(merged.data,'C:/Users/allwhite/Desktop/Autocorrelation/Manuscript/5
x5nasc_2017.csv')
```