ICA4 Module 4

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#Initializing  
rm(list=ls()) #Deleting all variables in the enviroment  
#install.packages("tidyr", lib="/home/leasanspy/DataScience\_NIU/Rpackages") #Installing the library  
library(tidyr,lib.loc="/home/leasanspy/DataScience\_NIU/Rpackages") #Calling the library

1. Using R functions, what are the header names?

The names are the ones listed below:

rev\_hist=read.csv("Revenue\_Historical\_2000.csv", header = TRUE)  
names(rev\_hist)

## [1] "Year" "Month.1" "Month.2" "Month.3" "Month.4" "Month.5"   
## [7] "Month.6" "Month.7" "Month.8" "Month.9" "Month.10" "Month.11"  
## [13] "Month.12"

1. Output a summary of the data structure. What is the mean of the values in Month 2?

The mean of the month two is: 5558

#str(rev\_hist)  
summary(rev\_hist)

## Year Month.1 Month.2 Month.3   
## Min. :2000 Min. :1008 Min. : 1119 Min. : 1204   
## 1st Qu.:2004 1st Qu.:3301 1st Qu.: 3504 1st Qu.: 3652   
## Median :2008 Median :5319 Median : 5476 Median : 5643   
## Mean :2008 Mean :5405 Mean : 5558 Mean : 5716   
## 3rd Qu.:2011 3rd Qu.:7516 3rd Qu.: 7628 3rd Qu.: 7844   
## Max. :2015 Max. :9950 Max. :10186 Max. :10361   
## Month.4 Month.5 Month.6 Month.7   
## Min. : 1292 Min. : 1560 Min. : 2007 Min. : 2496   
## 1st Qu.: 3795 1st Qu.: 4067 1st Qu.: 4451 1st Qu.: 4731   
## Median : 5800 Median : 6030 Median : 6252 Median : 6607   
## Mean : 5866 Mean : 6190 Mean : 6520 Mean : 6866   
## 3rd Qu.: 8032 3rd Qu.: 8346 3rd Qu.: 8781 3rd Qu.: 9032   
## Max. :10552 Max. :10863 Max. :11115 Max. :11545   
## Month.8 Month.9 Month.10 Month.11   
## Min. : 2696 Min. : 2255 Min. : 2022 Min. : 1817   
## 1st Qu.: 5134 1st Qu.: 4724 1st Qu.: 4516 1st Qu.: 4297   
## Median : 6856 Median : 6442 Median : 6228 Median : 6012   
## Mean : 7186 Mean : 6770 Mean : 6548 Mean : 6322   
## 3rd Qu.: 9334 3rd Qu.: 8842 3rd Qu.: 8622 3rd Qu.: 8386   
## Max. :11777 Max. :11405 Max. :11168 Max. :10922   
## Month.12   
## Min. : 1594   
## 1st Qu.: 4070   
## Median : 5774   
## Mean : 6094   
## 3rd Qu.: 8163   
## Max. :10721

1. Use the gather function to create a new table with the desire structure:

#gather(data,key: out\_name\_column, value: out\_data\_name, list\_of\_names\_with\_columns\_gathered)  
new\_table\_gather=gather(rev\_hist, Month, Revenue,Month.1:Month.12)   
#new\_table\_gather

1. Use the separate function to separate the values under the “Month” column in part 3.

#names(new\_table\_gather)  
#separate( data, col, into, sep = [regular expression], remove = TRUE, convert = FALSE)  
new\_table\_separate=separate(new\_table\_gather,Month,c("Time","Time\_Interval"),remove=TRUE,convert=FALSE)  
new\_table\_separate

## Year Time Time\_Interval Revenue  
## 1 2000 Month 1 1008  
## 2 2001 Month 1 1472  
## 3 2002 Month 1 2133  
## 4 2003 Month 1 2844  
## 5 2004 Month 1 3453  
## 6 2005 Month 1 4034  
## 7 2006 Month 1 4548  
## 8 2007 Month 1 5039  
## 9 2008 Month 1 5599  
## 10 2009 Month 1 6217  
## 11 2010 Month 1 6834  
## 12 2011 Month 1 7357  
## 13 2012 Month 1 7991  
## 14 2013 Month 1 8695  
## 15 2014 Month 1 9305  
## 16 2015 Month 1 9950  
## 17 2000 Month 2 1119  
## 18 2001 Month 2 1657  
## 19 2002 Month 2 2307  
## 20 2003 Month 2 3011  
## 21 2004 Month 2 3668  
## 22 2005 Month 2 4201  
## 23 2006 Month 2 4646  
## 24 2007 Month 2 5165  
## 25 2008 Month 2 5788  
## 26 2009 Month 2 6372  
## 27 2010 Month 2 6965  
## 28 2011 Month 2 7464  
## 29 2012 Month 2 8119  
## 30 2013 Month 2 8816  
## 31 2014 Month 2 9437  
## 32 2015 Month 2 10186  
## 33 2000 Month 3 1204  
## 34 2001 Month 3 1844  
## 35 2002 Month 3 2510  
## 36 2003 Month 3 3155  
## 37 2004 Month 3 3817  
## 38 2005 Month 3 4276  
## 39 2006 Month 3 4733  
## 40 2007 Month 3 5367  
## 41 2008 Month 3 5919  
## 42 2009 Month 3 6596  
## 43 2010 Month 3 7054  
## 44 2011 Month 3 7695  
## 45 2012 Month 3 8291  
## 46 2013 Month 3 9027  
## 47 2014 Month 3 9604  
## 48 2015 Month 3 10361  
## 49 2000 Month 4 1292  
## 50 2001 Month 4 1962  
## 51 2002 Month 4 2668  
## 52 2003 Month 4 3286  
## 53 2004 Month 4 3965  
## 54 2005 Month 4 4392  
## 55 2006 Month 4 4817  
## 56 2007 Month 4 5494  
## 57 2008 Month 4 6107  
## 58 2009 Month 4 6702  
## 59 2010 Month 4 7263  
## 60 2011 Month 4 7874  
## 61 2012 Month 4 8506  
## 62 2013 Month 4 9140  
## 63 2014 Month 4 9829  
## 64 2015 Month 4 10552  
## 65 2000 Month 5 1560  
## 66 2001 Month 5 2347  
## 67 2002 Month 5 2909  
## 68 2003 Month 5 3739  
## 69 2004 Month 5 4176  
## 70 2005 Month 5 4743  
## 71 2006 Month 5 5163  
## 72 2007 Month 5 5701  
## 73 2008 Month 5 6360  
## 74 2009 Month 5 7077  
## 75 2010 Month 5 7721  
## 76 2011 Month 5 8155  
## 77 2012 Month 5 8919  
## 78 2013 Month 5 9343  
## 79 2014 Month 5 10259  
## 80 2015 Month 5 10863  
## 81 2000 Month 6 2007  
## 82 2001 Month 6 2640  
## 83 2002 Month 6 3279  
## 84 2003 Month 6 4024  
## 85 2004 Month 6 4593  
## 86 2005 Month 6 5186  
## 87 2006 Month 6 5635  
## 88 2007 Month 6 5925  
## 89 2008 Month 6 6579  
## 90 2009 Month 6 7305  
## 91 2010 Month 6 7989  
## 92 2011 Month 6 8634  
## 93 2012 Month 6 9222  
## 94 2013 Month 6 9550  
## 95 2014 Month 6 10638  
## 96 2015 Month 6 11115  
## 97 2000 Month 7 2496  
## 98 2001 Month 7 3020  
## 99 2002 Month 7 3669  
## 100 2003 Month 7 4431  
## 101 2004 Month 7 4831  
## 102 2005 Month 7 5597  
## 103 2006 Month 7 5974  
## 104 2007 Month 7 6155  
## 105 2008 Month 7 7059  
## 106 2009 Month 7 7752  
## 107 2010 Month 7 8202  
## 108 2011 Month 7 8844  
## 109 2012 Month 7 9596  
## 110 2013 Month 7 9846  
## 111 2014 Month 7 10843  
## 112 2015 Month 7 11545  
## 113 2000 Month 8 2696  
## 114 2001 Month 8 3432  
## 115 2002 Month 8 3998  
## 116 2003 Month 8 4877  
## 117 2004 Month 8 5220  
## 118 2005 Month 8 5943  
## 119 2006 Month 8 6260  
## 120 2007 Month 8 6444  
## 121 2008 Month 8 7267  
## 122 2009 Month 8 8186  
## 123 2010 Month 8 8482  
## 124 2011 Month 8 9103  
## 125 2012 Month 8 10028  
## 126 2013 Month 8 10202  
## 127 2014 Month 8 11062  
## 128 2015 Month 8 11777  
## 129 2000 Month 9 2255  
## 130 2001 Month 9 3042  
## 131 2002 Month 9 3574  
## 132 2003 Month 9 4390  
## 133 2004 Month 9 4836  
## 134 2005 Month 9 5628  
## 135 2006 Month 9 5774  
## 136 2007 Month 9 6022  
## 137 2008 Month 9 6862  
## 138 2009 Month 9 7844  
## 139 2010 Month 9 8122  
## 140 2011 Month 9 8606  
## 141 2012 Month 9 9549  
## 142 2013 Month 9 9764  
## 143 2014 Month 9 10653  
## 144 2015 Month 9 11405  
## 145 2000 Month 10 2022  
## 146 2001 Month 10 2825  
## 147 2002 Month 10 3344  
## 148 2003 Month 10 4181  
## 149 2004 Month 10 4627  
## 150 2005 Month 10 5419  
## 151 2006 Month 10 5542  
## 152 2007 Month 10 5813  
## 153 2008 Month 10 6643  
## 154 2009 Month 10 7596  
## 155 2010 Month 10 7891  
## 156 2011 Month 10 8392  
## 157 2012 Month 10 9313  
## 158 2013 Month 10 9538  
## 159 2014 Month 10 10452  
## 160 2015 Month 10 11168  
## 161 2000 Month 11 1817  
## 162 2001 Month 11 2598  
## 163 2002 Month 11 3112  
## 164 2003 Month 11 3946  
## 165 2004 Month 11 4414  
## 166 2005 Month 11 5209  
## 167 2006 Month 11 5309  
## 168 2007 Month 11 5582  
## 169 2008 Month 11 6441  
## 170 2009 Month 11 7351  
## 171 2010 Month 11 7677  
## 172 2011 Month 11 8151  
## 173 2012 Month 11 9091  
## 174 2013 Month 11 9306  
## 175 2014 Month 11 10224  
## 176 2015 Month 11 10922  
## 177 2000 Month 12 1594  
## 178 2001 Month 12 2368  
## 179 2002 Month 12 2908  
## 180 2003 Month 12 3706  
## 181 2004 Month 12 4191  
## 182 2005 Month 12 4984  
## 183 2006 Month 12 5073  
## 184 2007 Month 12 5342  
## 185 2008 Month 12 6205  
## 186 2009 Month 12 7121  
## 187 2010 Month 12 7435  
## 188 2011 Month 12 7929  
## 189 2012 Month 12 8865  
## 190 2013 Month 12 9058  
## 191 2014 Month 12 10011  
## 192 2015 Month 12 10721

1. Use the unite function on the data from part 4 to merge “Time” and “Time\_Inverval” create a new column to read as “1\_Month”

#unite( data, name\_of\_new\_column, names\_of\_col\_merging\_[LIST] , sep = “ “, remove = TRUE)  
new\_table\_unite=unite(new\_table\_separate, "New\_Time\_Month", c("Time\_Interval","Time"), sep = "\_",remove=TRUE)  
new\_table\_unite

## Year New\_Time\_Month Revenue  
## 1 2000 1\_Month 1008  
## 2 2001 1\_Month 1472  
## 3 2002 1\_Month 2133  
## 4 2003 1\_Month 2844  
## 5 2004 1\_Month 3453  
## 6 2005 1\_Month 4034  
## 7 2006 1\_Month 4548  
## 8 2007 1\_Month 5039  
## 9 2008 1\_Month 5599  
## 10 2009 1\_Month 6217  
## 11 2010 1\_Month 6834  
## 12 2011 1\_Month 7357  
## 13 2012 1\_Month 7991  
## 14 2013 1\_Month 8695  
## 15 2014 1\_Month 9305  
## 16 2015 1\_Month 9950  
## 17 2000 2\_Month 1119  
## 18 2001 2\_Month 1657  
## 19 2002 2\_Month 2307  
## 20 2003 2\_Month 3011  
## 21 2004 2\_Month 3668  
## 22 2005 2\_Month 4201  
## 23 2006 2\_Month 4646  
## 24 2007 2\_Month 5165  
## 25 2008 2\_Month 5788  
## 26 2009 2\_Month 6372  
## 27 2010 2\_Month 6965  
## 28 2011 2\_Month 7464  
## 29 2012 2\_Month 8119  
## 30 2013 2\_Month 8816  
## 31 2014 2\_Month 9437  
## 32 2015 2\_Month 10186  
## 33 2000 3\_Month 1204  
## 34 2001 3\_Month 1844  
## 35 2002 3\_Month 2510  
## 36 2003 3\_Month 3155  
## 37 2004 3\_Month 3817  
## 38 2005 3\_Month 4276  
## 39 2006 3\_Month 4733  
## 40 2007 3\_Month 5367  
## 41 2008 3\_Month 5919  
## 42 2009 3\_Month 6596  
## 43 2010 3\_Month 7054  
## 44 2011 3\_Month 7695  
## 45 2012 3\_Month 8291  
## 46 2013 3\_Month 9027  
## 47 2014 3\_Month 9604  
## 48 2015 3\_Month 10361  
## 49 2000 4\_Month 1292  
## 50 2001 4\_Month 1962  
## 51 2002 4\_Month 2668  
## 52 2003 4\_Month 3286  
## 53 2004 4\_Month 3965  
## 54 2005 4\_Month 4392  
## 55 2006 4\_Month 4817  
## 56 2007 4\_Month 5494  
## 57 2008 4\_Month 6107  
## 58 2009 4\_Month 6702  
## 59 2010 4\_Month 7263  
## 60 2011 4\_Month 7874  
## 61 2012 4\_Month 8506  
## 62 2013 4\_Month 9140  
## 63 2014 4\_Month 9829  
## 64 2015 4\_Month 10552  
## 65 2000 5\_Month 1560  
## 66 2001 5\_Month 2347  
## 67 2002 5\_Month 2909  
## 68 2003 5\_Month 3739  
## 69 2004 5\_Month 4176  
## 70 2005 5\_Month 4743  
## 71 2006 5\_Month 5163  
## 72 2007 5\_Month 5701  
## 73 2008 5\_Month 6360  
## 74 2009 5\_Month 7077  
## 75 2010 5\_Month 7721  
## 76 2011 5\_Month 8155  
## 77 2012 5\_Month 8919  
## 78 2013 5\_Month 9343  
## 79 2014 5\_Month 10259  
## 80 2015 5\_Month 10863  
## 81 2000 6\_Month 2007  
## 82 2001 6\_Month 2640  
## 83 2002 6\_Month 3279  
## 84 2003 6\_Month 4024  
## 85 2004 6\_Month 4593  
## 86 2005 6\_Month 5186  
## 87 2006 6\_Month 5635  
## 88 2007 6\_Month 5925  
## 89 2008 6\_Month 6579  
## 90 2009 6\_Month 7305  
## 91 2010 6\_Month 7989  
## 92 2011 6\_Month 8634  
## 93 2012 6\_Month 9222  
## 94 2013 6\_Month 9550  
## 95 2014 6\_Month 10638  
## 96 2015 6\_Month 11115  
## 97 2000 7\_Month 2496  
## 98 2001 7\_Month 3020  
## 99 2002 7\_Month 3669  
## 100 2003 7\_Month 4431  
## 101 2004 7\_Month 4831  
## 102 2005 7\_Month 5597  
## 103 2006 7\_Month 5974  
## 104 2007 7\_Month 6155  
## 105 2008 7\_Month 7059  
## 106 2009 7\_Month 7752  
## 107 2010 7\_Month 8202  
## 108 2011 7\_Month 8844  
## 109 2012 7\_Month 9596  
## 110 2013 7\_Month 9846  
## 111 2014 7\_Month 10843  
## 112 2015 7\_Month 11545  
## 113 2000 8\_Month 2696  
## 114 2001 8\_Month 3432  
## 115 2002 8\_Month 3998  
## 116 2003 8\_Month 4877  
## 117 2004 8\_Month 5220  
## 118 2005 8\_Month 5943  
## 119 2006 8\_Month 6260  
## 120 2007 8\_Month 6444  
## 121 2008 8\_Month 7267  
## 122 2009 8\_Month 8186  
## 123 2010 8\_Month 8482  
## 124 2011 8\_Month 9103  
## 125 2012 8\_Month 10028  
## 126 2013 8\_Month 10202  
## 127 2014 8\_Month 11062  
## 128 2015 8\_Month 11777  
## 129 2000 9\_Month 2255  
## 130 2001 9\_Month 3042  
## 131 2002 9\_Month 3574  
## 132 2003 9\_Month 4390  
## 133 2004 9\_Month 4836  
## 134 2005 9\_Month 5628  
## 135 2006 9\_Month 5774  
## 136 2007 9\_Month 6022  
## 137 2008 9\_Month 6862  
## 138 2009 9\_Month 7844  
## 139 2010 9\_Month 8122  
## 140 2011 9\_Month 8606  
## 141 2012 9\_Month 9549  
## 142 2013 9\_Month 9764  
## 143 2014 9\_Month 10653  
## 144 2015 9\_Month 11405  
## 145 2000 10\_Month 2022  
## 146 2001 10\_Month 2825  
## 147 2002 10\_Month 3344  
## 148 2003 10\_Month 4181  
## 149 2004 10\_Month 4627  
## 150 2005 10\_Month 5419  
## 151 2006 10\_Month 5542  
## 152 2007 10\_Month 5813  
## 153 2008 10\_Month 6643  
## 154 2009 10\_Month 7596  
## 155 2010 10\_Month 7891  
## 156 2011 10\_Month 8392  
## 157 2012 10\_Month 9313  
## 158 2013 10\_Month 9538  
## 159 2014 10\_Month 10452  
## 160 2015 10\_Month 11168  
## 161 2000 11\_Month 1817  
## 162 2001 11\_Month 2598  
## 163 2002 11\_Month 3112  
## 164 2003 11\_Month 3946  
## 165 2004 11\_Month 4414  
## 166 2005 11\_Month 5209  
## 167 2006 11\_Month 5309  
## 168 2007 11\_Month 5582  
## 169 2008 11\_Month 6441  
## 170 2009 11\_Month 7351  
## 171 2010 11\_Month 7677  
## 172 2011 11\_Month 8151  
## 173 2012 11\_Month 9091  
## 174 2013 11\_Month 9306  
## 175 2014 11\_Month 10224  
## 176 2015 11\_Month 10922  
## 177 2000 12\_Month 1594  
## 178 2001 12\_Month 2368  
## 179 2002 12\_Month 2908  
## 180 2003 12\_Month 3706  
## 181 2004 12\_Month 4191  
## 182 2005 12\_Month 4984  
## 183 2006 12\_Month 5073  
## 184 2007 12\_Month 5342  
## 185 2008 12\_Month 6205  
## 186 2009 12\_Month 7121  
## 187 2010 12\_Month 7435  
## 188 2011 12\_Month 7929  
## 189 2012 12\_Month 8865  
## 190 2013 12\_Month 9058  
## 191 2014 12\_Month 10011  
## 192 2015 12\_Month 10721

1. Use the spread function on the data from part 5 such that the columns are the years and keep the month in a column.

#spread( data, key: columns\_to\_spread, value: values\_of\_spreadColumns, fill= NA, convert = FALSE)  
spread(new\_table\_unite,Year,Revenue)

## New\_Time\_Month 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010  
## 1 10\_Month 2022 2825 3344 4181 4627 5419 5542 5813 6643 7596 7891  
## 2 11\_Month 1817 2598 3112 3946 4414 5209 5309 5582 6441 7351 7677  
## 3 12\_Month 1594 2368 2908 3706 4191 4984 5073 5342 6205 7121 7435  
## 4 1\_Month 1008 1472 2133 2844 3453 4034 4548 5039 5599 6217 6834  
## 5 2\_Month 1119 1657 2307 3011 3668 4201 4646 5165 5788 6372 6965  
## 6 3\_Month 1204 1844 2510 3155 3817 4276 4733 5367 5919 6596 7054  
## 7 4\_Month 1292 1962 2668 3286 3965 4392 4817 5494 6107 6702 7263  
## 8 5\_Month 1560 2347 2909 3739 4176 4743 5163 5701 6360 7077 7721  
## 9 6\_Month 2007 2640 3279 4024 4593 5186 5635 5925 6579 7305 7989  
## 10 7\_Month 2496 3020 3669 4431 4831 5597 5974 6155 7059 7752 8202  
## 11 8\_Month 2696 3432 3998 4877 5220 5943 6260 6444 7267 8186 8482  
## 12 9\_Month 2255 3042 3574 4390 4836 5628 5774 6022 6862 7844 8122  
## 2011 2012 2013 2014 2015  
## 1 8392 9313 9538 10452 11168  
## 2 8151 9091 9306 10224 10922  
## 3 7929 8865 9058 10011 10721  
## 4 7357 7991 8695 9305 9950  
## 5 7464 8119 8816 9437 10186  
## 6 7695 8291 9027 9604 10361  
## 7 7874 8506 9140 9829 10552  
## 8 8155 8919 9343 10259 10863  
## 9 8634 9222 9550 10638 11115  
## 10 8844 9596 9846 10843 11545  
## 11 9103 10028 10202 11062 11777  
## 12 8606 9549 9764 10653 11405