Stem_and_Leaf

The stem method in PACKAGE:graphics produces a basic stem and leaf plot. THe method works best on un-skewwed, outlier-free, shorter datasets.

```
?stem
```

```
## starting httpd help server ... done
```

```
# "ideal" Example (n = 100) ---------------------------------
stem(Nile)
```

```
##
##   The decimal point is 2 digit(s) to the right of the |
##
##    4 | 6
##    5 |
##    6 | 5899
##    7 | 000123444455667778
##    8 | 000011222233344555556667779
##    9 | 0011222244466678899
##   10 | 0122234455
##   11 | 00012244566678
##   12 | 112356
##   13 | 7
```

The "scale" argument adjusts the bin size.

```
# bins Example ------------------------------------------------
# scale = 1
stem(faithful$eruptions)
```

```
##
##   The decimal point is 1 digit(s) to the left of the |
##
##   16 | 070355555588
##   18 | 000022233333335577777777888822335777888
##   20 | 00002223378800035778
##   22 | 0002335578023578
##   24 | 00228
##   26 | 23
##   28 | 080
##   30 | 7
##   32 | 2337
##   34 | 250077
##   36 | 0000823577
##   38 | 2333335582225577
##   40 | 000000335778888800233555577778
##   42 | 033355557788002333333555577778
##   44 | 022223355577800000000233333577788888
##   46 | 0000233357700000023578
```

```
##   48 | 00000022335800333
##   50 | 0370
```

```
# decreasing the scale decreases the number of bins
stem(faithful$eruptions, scale = 0.5)
```

```
##
##   The decimal point is at the |
##
##   1 | 677788888888888888888888899999999999999999
##   2 | 000000000000000011111112222222222333333344444444
##   2 | 566899
##   3 | 133344
##   3 | 55566666677788888888999999
##   4 | 000000000001111111111111222222222222333333333333333334444444444444
##   4 | 55555555555555555556666666666666666677777777777888888888888899999999
##   5 | 0011
```

```
# increasing the scale increases the number of bins
stem(faithful$eruptions, scale = 2)
```

```
##
##   The decimal point is 1 digit(s) to the left of the |
##
##   16 | 07
##   17 | 0355555588
##   18 | 000022233333335577777777888888
##   19 | 22335777888
##   20 | 000022233788
##   21 | 00035778
##   22 | 0002335578
##   23 | 023578
##   24 | 00228
##   25 |
##   26 | 23
##   27 |
##   28 | 08
##   29 | 0
##   30 | 7
##   31 |
##   32 |
##   33 | 2337
##   34 | 25
##   35 | 0077
##   36 | 00008
##   37 | 23577
##   38 | 233333558
##   39 | 2225577
##   40 | 0000003357788888
##   41 | 002233555577778
##   42 | 033355557788
##   43 | 00233333555577778
##   44 | 0222233555778
##   45 | 0000000023333357778888
##   46 | 00002333577
##   47 | 00000023578
```

```
##   48 | 000000223358
##   49 | 00333
##   50 | 037
##   51 | 0
```

Transformations can be employed to help with skew, but be aware that transformations hinder interpretation.

```
# Skew Example -------------------------------------------
# Heavy skew
stem(islands)
```

```
##
##   The decimal point is 3 digit(s) to the right of the |
##
##    0 | 000000000000000000000000000000111111222338
##    2 | 07
##    4 | 5
##    6 | 8
##    8 | 4
##   10 | 5
##   12 |
##   14 |
##   16 | 0
```

```
# Better.
stem(log(islands))
```

```
##
##   The decimal point is at the |
##
##   2 | 566666778889
##   3 | 01234444556778889
##   4 | 134445
##   5 | 22467
##   6 | 7
##   7 |
##   8 | 0268
##   9 | 147
```

The method is not appropriate for very large datasets. Try to summarize the data in some way to reduce the number of entries (e.g., monthly data –> annual data)

```
# Too many entries Example ---------------------------------
# (n = 3177)
stem(sunspot.month)
```

```
##
##   The decimal point is 1 digit(s) to the right of the |
##
##    0 | 00000000000000000000000000000000000000000000000000000000000000000000000000000+835
##    2 | 00000000000000000000000000011111111111111111111111111111111111122222222+516
##    4 | 00000000000000000000000000000000000011111111111111111111111111111112+460
##    6 | 00000000000000000000000111111111111111111111111111111111122222222+301
##    8 | 00000000000000111111111111111111222222222223333333333344444444444+188
##   10 | 00000000111111111112222222223333333344444444555556666666666666666777+102
##   12 | 00000000111112222222233344444445555555555566666677777778888889999999+50
##   14 | 00000111122222233333334444555555666667888990000001233444555566777777
```

```
##   16 | 000111223344445555556677889990002222334444556666677779
##   18 | 002236678889011266
##   20 | 00011113617
##   22 | 699
##   24 | 4
```

```
# (n = 289)
stem(sunspot.year)
```

```
##
##   The decimal point is 1 digit(s) to the right of the |
##
##    0 | 000112233334444455555666666777777788999
##    1 | 000000000111111111222233334445556666666677789
##    2 | 000111112233344445666778888899
##    3 | 011112223445555666666778888889999
##    4 | 00001122234445556677777788888889
##    5 | 024444457789
##    6 | 000012233444444455677777788999
##    7 | 00133347888
##    8 | 0111233455669
##    9 | 033344669
##   10 | 01123345666
##   11 | 0112468
##   12 | 2256
##   13 | 125689
##   14 | 12
##   15 | 24559
##   16 |
##   17 |
##   18 | 5
##   19 | 0
```

Additional control is possible with stem.leaf and stem.leaf.backback in the PACKAGE:aplpack

```
require(aplpack)
```

```
## Loading required package: aplpack
```

```
## Warning: package 'aplpack' was built under R version 4.0.3
```

```
stem.leaf(Nile)
```

```
## 1 | 2: represents 120
##  leaf unit: 10
##             n: 100
##    1     4. | 5
##          5* |
##          5. |
##    2     6* | 4
##    6     6. | 7999
##   17     7* | 00112444444
##   26     7. | 566778999
##   43     8* | 01112223333444444
##   (8)    8. | 66667799
##   49     9* | 0011112344
##   39     9. | 566678899
```

```
##   30    10* | 1222344
##   23    10. | 55
##   21    11* | 00012244
##   13    11. | 566678
##    7    12* | 1123
##    3    12. | 56
##         13* |
##    1    13. | 7
```