Lagunita is retiring and will shut down at 12 noon Pacific Time on March 31, 2020. A few courses may be open for self-enrollment for a limited time. We will continue to offer courses on other online learning platforms; visit http://online.stanford.edu.



# Stemplot

**Learning Objective: Summarize and describe the distribution of a quantitative variable in context: a) describe the overall pattern, b) describe striking deviations from the pattern.**

The stemplot (also called stem and leaf plot) is another graphical display of the distribution of quantitative data.

## Idea

Separate each data point into a stem and leaf, as follows:

- The leaf is the right-most digit.
- The stem is everything except the right-most digit.
- So, if the data point is 34, then 3 is the stem and 4 is the leaf.
- If the data point is 3.41, then 3.4 is the stem and 1 is the leaf.

### Example: Best Actress Oscar Winners

We will continue with the Best Actress Oscar winners example (To see the full dataset, click here.)

34 34 27 37 42 41 36 32 41 33 31 74 33 49 38 61 21 41 26 80 42 29 33 36 45 49 39 34 26 25 33 35 35 28 30 29 61 32 33 45 29 62 22 44

**To make a stemplot:**

1. Separate each observation into a stem and a leaf.

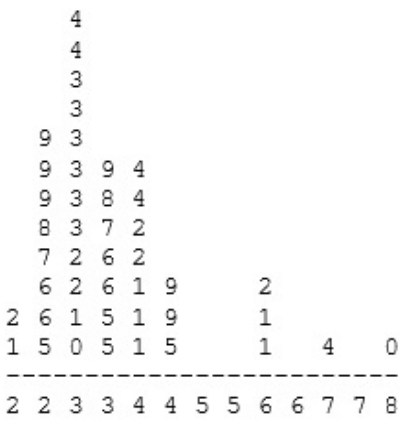
2. Write the stems in a vertical column with the smallest at the top, and draw a vertical line at the right of this column.
3. Go through the data points, and write each leaf in the row to the right of its stem.
4. Rearrange the leaves in an increasing order.

```
Steps 1, 2, and 3                Step 4

2|7169658992                    2|1256678999                    2|12
3|33762313836943550 23           3|01223333334455667 89          2|56678999
4|2119124954                     4|1112244599                    3|012233333344
5|                          ➔   5|                          ➔   3|5566789
6|112                            6|112                           4|1112244
7|4                              7|4                             4|599
8|0                              8|0                             5|
                                                                 5|
                                                                 6|112
                                                                 6|
                                                                 7|4
                                                                 7|
                                                                 8|0
```

* When some of the stems hold a large number of leaves, we can split each stem into two: one holding the leaves 0-4, and the other holding the leaves 5-9. A statistical software package will often do the splitting for you, when appropriate.

**Note** that when rotated 90 degrees counterclockwise, the stemplot visually resembles a histogram:




This orientation makes the right-skewedness of the distribution clearly visible.

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The stemplot has additional unique features:

- It preserves the original data.
- It sorts the data (which will become very useful in the next section).

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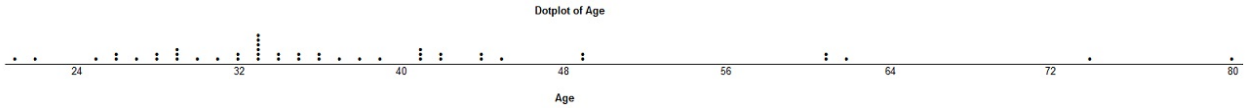
## Dotplot

There is another type of display that we can use to summarize a quantitative variable graphically—the **dotplot**. The dotplot, like the stemplot, shows each observation, but displays it with a dot rather than with its actual value. Here is the dotplot for the ages of Best Actress Oscar winners.




## Let's Summarize

The stemplot is a simple but useful visual display of quantitative data. Its principal virtues are:

- Easy and quick to construct for small, simple datasets.
- Retains the actual data.
- Sorts (ranks) the data.

## Many Students Wonder ...

**Question:** How do we know which graph to use: the histogram, stemplot, or dotplot?

**Answer:** Since for the most part we are not going to deal with very small data sets in this course, we will generally display the distribution of a quantitative variable using a histogram generated by a statistical software package.

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