Ordered Waterfall Plots

Summary

Ordered Waterfall Plots are widely used to illustrate how a variable of interest increases or decreases amongst a sample of individuals. Data values are sorted and plotted as a barchart, usually with respect to a baseline equal to 0. A reference line may be added to the plot to display a target value.

One common application in oncology shows the changes in tumor size in response to a drug.

Sample StatFolio: Waterfall1.sgp
Sample Data

Pandya (2012) presents a dataset showing the maximum change in tumor size when 54 patients were given a particular drug. A portion of that data, contained in the data file named Oncology trials.sgd, is shown below:

<table>
<thead>
<tr>
<th>Patient</th>
<th>Change</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>10</td>
<td>PD</td>
</tr>
<tr>
<td>1002</td>
<td>12</td>
<td>PD</td>
</tr>
<tr>
<td>1003</td>
<td>-60</td>
<td>PR</td>
</tr>
<tr>
<td>1004</td>
<td>-20</td>
<td>SD</td>
</tr>
<tr>
<td>1005</td>
<td>-72</td>
<td>PR</td>
</tr>
<tr>
<td>1006</td>
<td>-42</td>
<td>PR</td>
</tr>
<tr>
<td>1007</td>
<td>-22</td>
<td>PR</td>
</tr>
<tr>
<td>1008</td>
<td>-66</td>
<td>CR</td>
</tr>
<tr>
<td>1009</td>
<td>-12</td>
<td>PR</td>
</tr>
<tr>
<td>1010</td>
<td>-14</td>
<td>SD</td>
</tr>
</tbody>
</table>

Patients are divided into 5 categories based on their response and status:

CR – Complete Response
PR – Partial Response
PD – Progressive Disease
SD – Stable Disease
ED – Early Death
Data Input

When the procedure is first selected, a data input dialog box is displayed requesting the name of the column containing the data to be plotted and other supporting information:

- **Data:** the name of a numeric column containing the data values to be plotted.

- **(Labels:)** optional character or numeric column identifying each data value. If supplied, these labels will identify each bar on the waterfall plot. If not supplied, row numbers will be used for the labels.

- **(Codes:)** optional character or numeric column identifying which group each data value belongs to. If supplied, these codes will be used to determine the color of each bar.

- **(Select:)** optional subset selection.
Analysis Options

The *Analysis Options* dialog box sets various options for the plot:

- **Ordering**: whether the data values should be plotted in decreasing or increasing order.
- **Direction**: whether the bars should be vertical or horizontal.
- **Baseline**: the location from which the bars extend.
- **Reference line**: an optional location at which a reference line will be drawn.

**Tables and Graphs**

The following tables and graphs may be created:

- **Analysis Summary**
- **Waterfall Plot**
Analysis Summary

The Analysis Summary displays the values in sorted order:

<table>
<thead>
<tr>
<th>Patient</th>
<th>Change</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1018</td>
<td>53.0</td>
<td>PD</td>
</tr>
<tr>
<td>1023</td>
<td>50.0</td>
<td>PD</td>
</tr>
<tr>
<td>1014</td>
<td>44.0</td>
<td>SD</td>
</tr>
<tr>
<td>1019</td>
<td>25.0</td>
<td>ED</td>
</tr>
<tr>
<td>1043</td>
<td>16.0</td>
<td>PD</td>
</tr>
<tr>
<td>1036</td>
<td>13.0</td>
<td>SD</td>
</tr>
<tr>
<td>1002</td>
<td>12.0</td>
<td>PD</td>
</tr>
<tr>
<td>1001</td>
<td>10.0</td>
<td>PD</td>
</tr>
<tr>
<td>1051</td>
<td>6.0</td>
<td>PR</td>
</tr>
<tr>
<td>1052</td>
<td>0.0</td>
<td>SD</td>
</tr>
<tr>
<td>1053</td>
<td>-2.0</td>
<td>PR</td>
</tr>
<tr>
<td>1054</td>
<td>-9.0</td>
<td>PR</td>
</tr>
<tr>
<td>1009</td>
<td>-12.0</td>
<td>PR</td>
</tr>
<tr>
<td>1041</td>
<td>-13.0</td>
<td>PR</td>
</tr>
<tr>
<td>1034</td>
<td>-13.0</td>
<td>SD</td>
</tr>
<tr>
<td>1030</td>
<td>-14.0</td>
<td>SD</td>
</tr>
<tr>
<td>1010</td>
<td>-14.0</td>
<td>SD</td>
</tr>
<tr>
<td>1031</td>
<td>-16.0</td>
<td>SD</td>
</tr>
<tr>
<td>1040</td>
<td>-20.0</td>
<td>SD</td>
</tr>
<tr>
<td>1004</td>
<td>-20.0</td>
<td>SD</td>
</tr>
<tr>
<td>1007</td>
<td>-22.0</td>
<td>PR</td>
</tr>
<tr>
<td>1035</td>
<td>-24.0</td>
<td>PR</td>
</tr>
<tr>
<td>1020</td>
<td>-24.0</td>
<td>PR</td>
</tr>
<tr>
<td>1044</td>
<td>-26.0</td>
<td>PR</td>
</tr>
<tr>
<td>1042</td>
<td>-27.0</td>
<td>PR</td>
</tr>
<tr>
<td>1039</td>
<td>-27.0</td>
<td>SD</td>
</tr>
<tr>
<td>1015</td>
<td>-27.0</td>
<td>PR</td>
</tr>
<tr>
<td>1016</td>
<td>-29.0</td>
<td>PR</td>
</tr>
<tr>
<td>1026</td>
<td>-33.0</td>
<td>PR</td>
</tr>
<tr>
<td>1028</td>
<td>-34.0</td>
<td>PR</td>
</tr>
<tr>
<td>1013</td>
<td>-36.0</td>
<td>PR</td>
</tr>
<tr>
<td>1021</td>
<td>-37.0</td>
<td>PR</td>
</tr>
<tr>
<td>1048</td>
<td>-41.0</td>
<td>PR</td>
</tr>
<tr>
<td>1006</td>
<td>-42.0</td>
<td>PR</td>
</tr>
<tr>
<td>1022</td>
<td>-43.0</td>
<td>PR</td>
</tr>
<tr>
<td>1025</td>
<td>-44.0</td>
<td>CR</td>
</tr>
<tr>
<td>1049</td>
<td>-47.0</td>
<td>PR</td>
</tr>
<tr>
<td>1012</td>
<td>-48.0</td>
<td>PR</td>
</tr>
<tr>
<td>1050</td>
<td>-50.0</td>
<td>CR</td>
</tr>
<tr>
<td>1037</td>
<td>-55.0</td>
<td>PR</td>
</tr>
<tr>
<td>1003</td>
<td>-60.0</td>
<td>PR</td>
</tr>
<tr>
<td>1017</td>
<td>-61.0</td>
<td>CR</td>
</tr>
<tr>
<td>1008</td>
<td>-66.0</td>
<td>CR</td>
</tr>
<tr>
<td>1005</td>
<td>-72.0</td>
<td>PR</td>
</tr>
<tr>
<td>1045</td>
<td>-76.0</td>
<td>CR</td>
</tr>
<tr>
<td>1024</td>
<td>-81.0</td>
<td>PR</td>
</tr>
<tr>
<td>1046</td>
<td>-82.0</td>
<td>ED</td>
</tr>
<tr>
<td>1047</td>
<td>-83.0</td>
<td>PR</td>
</tr>
<tr>
<td>1027</td>
<td>-83.0</td>
<td>PR</td>
</tr>
<tr>
<td>1011</td>
<td>-84.0</td>
<td>CR</td>
</tr>
<tr>
<td>1038</td>
<td>-86.0</td>
<td>CR</td>
</tr>
<tr>
<td>1032</td>
<td>-86.0</td>
<td>PR</td>
</tr>
<tr>
<td>1033</td>
<td>-89.0</td>
<td>PR</td>
</tr>
<tr>
<td>1029</td>
<td>-94.0</td>
<td>PR</td>
</tr>
</tbody>
</table>
**Waterfall Plot**

This pane shows the waterfall plot:

![Waterfall Plot](image)

By default, the values are plotted from largest to smallest. Horizontal lines are drawn at the baseline value and at the reference value (if entered). If a coding variable is supplied, the color of the bars indicates the category that each data value belongs to.

**Pane Options**

This dialog box may be used to reorder the categories.
References