The **texsort** package

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1 Introduction

Purpose: sort/compress numerical lists.

2 Usage

`\sortlist`

Sort list:
    `\sortlist{1,5,20,6,23,2,1,4000,4}\to{mylist}\sep{,}`

Result:
    `\mylist->`1,1,2,4,5,6,20,23,4000

`\compresslist`

Compress list:
    `\compresslist{\mylist}\to{clist}\sep{,}{-}`

Result:
    `\clist->`1,1,2,4-6,20,23,4000

3 Implementation

```
1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{texsort}[2012/05/29]

3 \newcount\t@mp@r@a
4 \newcount\t@mp@r@b
5 \newcount\t@mp@r@c
```

`\initarray` {⟨*list*⟩}{⟨*array*⟩}

    Converts ⟨*list*⟩ to ⟨*array*⟩.

```
6 \def\initarray#1#2{%
7   \bgroup
8     \@tempcnta=\z@
9     \@for\@@refb:=#2\do{%
10      \advance\@tempcnta by\@ne
11      \bgroup
12        \setbox\z@\hbox{%
```

```
13          \expandafter\global\expandafter\t@mp@r@a\expandafter\add@zero\@@refb\relax
14          }%
15        \ifdim\wd0>\z@\relax
16          \@latex@warning{Not number \@@refb!}%
17        \fi
18        \expandafter\edef\csname @a@\endcsname{\expandafter\xdef\expandafter
19          \noepand\csname#1@\the\@tempcnta\endcsname{\the\t@mp@r@a}}\@a@
20      \egroup
21    }%
22    \expandafter\xdef\csname #1@lenght\endcsname{\the\@tempcnta}%
23  \egroup
24  }
```

\outarray {⟨*array*⟩}{⟨*sep*⟩}

> Outputs ⟨*array*⟩ elements separated by ⟨*sep*⟩.

```
25 \def\outarray#1\sep#2{%
26  \bgroup
27    \@tempcnta=\z@\relax
28    \@tempcntb=\getarraylenght{#1}%
29    \loop
30    \ifnum\@tempcnta<\@tempcntb
31      \advance\@tempcnta by\@ne\relax
32      \ifnum\@tempcnta>\@ne\relax#2\fi
33      \csname#1@\the\@tempcnta\endcsname
34    \repeat
35  \egroup
36  }
```

\add@zero {⟨*arg*⟩}

> Adds 0 before ⟨*arg*⟩.

```
37 \def\add@zero#1{0#1}
```

\getarrayitem {⟨*array*⟩}{⟨*index*⟩}\to{⟨*command*⟩}

> Gets ⟨*array*⟩ element by ⟨*index*⟩ to \⟨*command*⟩.

```
38 \def\getarrayitem#1#2\to#3{\expandafter\xdef\csname#3\endcsname{\csname#1@#2\endcsname}}
```

\setarrayitem {⟨*array*⟩}{⟨*index*⟩}{⟨*value*⟩}

> Sets ⟨*array*⟩ element by ⟨*index*⟩ to ⟨*value*⟩.

```
39 \def\setarrayitem#1#2#3{%
40  \bgroup
41    \setbox0\hbox{%
42      \expandafter\global\expandafter\t@mp@r@a\expandafter\add@zero#3\relax
43      }%
44    \ifdim\wd0>\z@\relax
45      \@latex@warning{Not number #3!}%
46    \fi
47    \expandafter\xdef\csname#1@#2\endcsname{\the\t@mp@r@a}%
48  \egroup
49  }
```

\getarraylenght {⟨*array*⟩}

> Gets ⟨*array*⟩ elements count.

50 `\def\getarraylenght#1{\@ifundefined{#1@lenght}{0}{\csname #1@lenght\endcsname}}`

\setarraylenght {⟨*array*⟩}{⟨*value*⟩}

> Sets ⟨*array*⟩ elements count to ⟨*value*⟩.

51 `\def\setarraylenght#1#2{\expandafter\xdef\csname #1@lenght\endcsname{#2}}`

\upheap {⟨*array*⟩}{⟨*index*⟩}

> Internal macro of sort algorithm.

```
52 \def\upheap#1#2{%
53   \bgroup
54     \getarrayitem{#1}{#2}\to{vara}%
55     \@namedef{#1@0}{\maxdimen}%
56     \@tempcntb=#2\relax
57     \loop
58     \@tempcnta=\@tempcntb
59     \divide\@tempcnta by2\getarrayitem{#1}{\the\@tempcnta}\to{varb}%
60     \ifnum\varb>\vara\relax
61     \else
62       \getarrayitem{#1}{\the\@tempcnta}\to{varb}%
63       \setarrayitem{#1}{\the\@tempcntb}{\varb}%
64       \divide\@tempcntb by2\relax
65     \repeat
66     \setarrayitem{#1}{\the\@tempcntb}{\vara}%
67   \egroup
68   }
```

\insertheapelem {⟨*array*⟩}{⟨*value*⟩}

> Internal macro of sort algorithm.

```
69 \def\insertheapelem#1#2{%
70   \bgroup
71     \@tempcnta=\getarraylenght{#1}\relax
72     \advance\@tempcnta by1\relax
73     \setarraylenght{#1}{\the\@tempcnta}\relax
74     \setarrayitem{#1}{\the\@tempcnta}{#2}%
75     \upheap{#1}{\the\@tempcnta}%
76   \egroup
77   }
```

78 `\newcount\@tempcntd`

\downheap {⟨*array*⟩}{⟨*index*⟩}

> Internal macro of sort algorithm.

```
79 \def\downheap#1#2{%
80   \bgroup
81     \getarrayitem{#1}{#2}\to{vara}%
82     \@tempcntb=\getarraylenght{#1}%
```

```
83      \t@mp@r@c=\@tempcntb\relax
84      \divide\@tempcntb by2\relax
85      \t@mp@r@b=\@tempcntb\relax
86      \@tempcntb=#2\relax
87      \ifnum\@tempcntb>\t@mp@r@b\relax
88      \else
89        \loop
90        \@tempcnta=\@tempcntb \advance\@tempcnta by\@tempcntb\relax
91        \@tempcntd=\@tempcnta \advance\@tempcntd by1\relax
92        \ifnum\@tempcnta<\t@mp@r@c\relax
93          \getarrayitem{#1}{\the\@tempcnta}\to{temp@@a}%
94          \getarrayitem{#1}{\the\@tempcntd}\to{temp@@b}%
95          \ifnum\temp@@a<\temp@@b\relax
96            \@tempcnta=\@tempcntd
97          \fi
98        \fi
99        \getarrayitem{#1}{\the\@tempcnta}\to{temp@@a}%
100       \ifnum\vara>\temp@@a\relax
101         \t@mp@r@b=-1\relax
102       \else
103         \getarrayitem{#1}{\the\@tempcnta}\to{temp@@a}%
104         \setarrayitem{#1}{\the\@tempcntb}{\temp@@a}%
105         \@tempcntb=\@tempcnta
106       \fi
107       \ifnum\@tempcntb>\t@mp@r@b\relax
108       \else
109       \repeat
110     \fi
111     \setarrayitem{#1}{\the\@tempcntb}{\vara}%
112   \egroup
113   }

114
```

\removetop {⟨array⟩}\to{⟨command⟩}

        Internal macro of sort algorithm.

```
115 \def\removetop#1\to#2{%
116   \bgroup
117     \getarrayitem{#1}{1}\to{temp@@c}%
118     \expandafter\xdef\csname #2\endcsname{\temp@@c}%
119     \@tempcnta=\getarraylenght{#1}%
120     \getarrayitem{#1}{\the\@tempcnta}\to{temp@@a}%
121     \setarrayitem{#1}{1}{\temp@@a}%
122     \setarrayitem{#1}{\the\@tempcnta}{}%
123     \advance\@tempcnta by-1\relax
124     \setarraylenght{#1}{\the\@tempcnta}%
125     \downheap{#1}{1}%
126   \egroup
127   }
```

\g@addto@macrobeg {⟨macro⟩}{⟨definition⟩}

        Adds some more ⟨definition⟩ to ⟨macro⟩ begining.

```
128 \long\def\g@addto@macrobeg#1#2{%
129   \begingroup
130     \def\@a@{#2}%
131     \toks@\expandafter\expandafter\expandafter{\expandafter\@a@#1}%
132     \xdef#1{\the\toks@}%
133   \endgroup
134   }
```

\sortlistarray {⟨*array*⟩}{⟨*sorted array*⟩}

> Sorts ⟨*array*⟩ and puts result to ⟨*sorted array*⟩.

```
135 \def\sortlistarray#1\to#2{%
136   \bgroup
137     \@for\@@refb:=#1\do{%
138       \insertheapelem{@tempa@}{\@@refb}%
139       }%
140     \@tempcntb=\getarraylenght{@tempa@}%
141     \setarraylenght{#2}{\the\@tempcntb}%
142     \@for\@@refb:=#1\do{%
143       \removetop{@tempa@}\to{aka}%
144       \setarrayitem{#2}{\the\@tempcntb}{\aka}%
145       \advance\@tempcntb by-1\relax
146       }%
147   \egroup
148   }
```

\sortlist {⟨*list*⟩}\to{⟨*macro*⟩}\sep{⟨*sep*⟩}

> Sorts ⟨*list*⟩ and puts elements separated by ⟨*sep*⟩ to ⟨*macro*⟩.

```
149 \def\sortlist#1\to#2\sep#3{%
150   \bgroup
151     \@for\@@refb:=#1\do{%
152       \insertheapelem{@tempa@}{\@@refb}%
153       }%
154     \@tempcntb=\getarraylenght{@tempa@}%
155     \expandafter\def\csname#2\endcsname{}%
156     \expandafter\def\expandafter\@a@\expandafter{\csname#2\endcsname}%
157     \@for\@@refb:=#1\do{%
158       \removetop{@tempa@}\to{aka}%
159       \advance\@tempcntb by-1\relax
160       \expandafter\expandafter\expandafter
161         \g@addto@macrobeg\expandafter\@a@\expandafter{\aka}%
162       \ifnum\@tempcntb>0\relax
163         \expandafter\expandafter\expandafter
164           \g@addto@macrobeg\expandafter\@a@\expandafter{#3}%
165       \fi
166       }%
167   \egroup
168   }
```

\compresslist {⟨*list*⟩}\to{⟨*macro*⟩}\sep{⟨*single*⟩}{⟨*multi*⟩}

> Compress ⟨*list*⟩ and puts result to {⟨*macro*⟩}; single elements separated by ⟨*single*⟩, multi by ⟨*multi*⟩.

```
169 \def\compresslist#1\to#2\sep#3#4{%
170   \bgroup
171     \expandafter\def\csname#2\endcsname{}%
172     \expandafter\def\expandafter\@a@\expandafter{\csname#2\endcsname}%
173     \t@mp@r@a=-1\relax
174     \@tempcnta=-2\relax
175     \expandafter\@for\expandafter\@@refb\expandafter:\expandafter=#1\do{%
176       \ifnum\t@mp@r@a=-1\relax
177         \t@mp@r@a=\@@refb\relax
178         \t@mp@r@b=\@@refb\relax
179         \t@mp@r@c=\@@refb\relax
180         \expandafter\expandafter\expandafter
181           \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@a}%
182       \else
183         \t@mp@r@c=\@@refb\relax
184         \ifnum\t@mp@r@c=\t@mp@r@a\relax
185           \expandafter\expandafter\expandafter
186             \g@addto@macro\expandafter\@a@\expandafter{#3}%
187           \expandafter\expandafter\expandafter
188             \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@c}%
189           \t@mp@r@b=\t@mp@r@c\relax
190         \else
191           \@tempcnta=\t@mp@r@b\relax
192           \advance\@tempcnta by1\relax
193           \ifnum\@tempcnta=\t@mp@r@c\relax
194             \t@mp@r@b=\t@mp@r@c\relax
195           \else
196             \@tempcnta=\t@mp@r@a\relax
197             \advance\@tempcnta by-\t@mp@r@b\relax
198             \ifnum\@tempcnta<-1\relax
199               \expandafter\expandafter\expandafter
200                 \g@addto@macro\expandafter\@a@\expandafter{#4}%
201               \expandafter\expandafter\expandafter
202                 \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@b}%
203               \expandafter\expandafter\expandafter
204                 \g@addto@macro\expandafter\@a@\expandafter{#3}%
205               \expandafter\expandafter\expandafter
206                 \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@c}%
207             \else
208               \ifnum\t@mp@r@a<\t@mp@r@b
209                 \expandafter\expandafter\expandafter
210                   \g@addto@macro\expandafter\@a@\expandafter{#3}%
211                 \expandafter\expandafter\expandafter
212                   \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@b}%
213               \fi
214               \expandafter\expandafter\expandafter
215                 \g@addto@macro\expandafter\@a@\expandafter{#3}%
216               \expandafter\expandafter\expandafter
217                 \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@c}%
218             \fi
219             \t@mp@r@a=\t@mp@r@c\relax
220             \t@mp@r@b=\t@mp@r@c\relax
221           \fi
222         \fi
```

```
223        \fi
224        }%
225    \ifnum\t@mp@r@a<\t@mp@r@c\relax
226      \advance\t@mp@r@a by-\t@mp@r@c\relax
227      \ifnum\t@mp@r@a<-1\relax
228        \expandafter\expandafter\expandafter
229          \g@addto@macro\expandafter\@a@\expandafter{#4}%
230      \else
231        \expandafter\expandafter\expandafter
232          \g@addto@macro\expandafter\@a@\expandafter{#3}%
233      \fi
234      \expandafter\expandafter\expandafter
235        \g@addto@macro\expandafter\@a@\expandafter{\the\t@mp@r@c}%
236    \fi
237  \egroup
238  }

239 %\endinput
```