The resizegather package

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Abstract

Equations that are too large are resized to fit the available space. The environment gather of package amsmath is supported. Also the environments equation and displaymath are redefined using gather and its starred version.

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1 Documentation

Sometimes an equation is just a little to large to fit in the line. And breaking the equation across lines might be worse than downscaling the equation. This package implements this for the environments gather and gather* of package amsmath. That package already measures the equations and simplifies the implementation of resizegather that only needs to hook into amsmath's code to add the resizing feature.

*Please report any issues at https://github.com/ho-tex/oberdiek/issues

Resized equations are recorded in the .log file for small exceeds (default setting is smaller than five percent). Otherwise a warning is given.

Also environments equation and displaymath are supported by redefining them using gather and gather*.

\[and \] are not supported, because these macros are not in environment form that is required for amsmath. The environment body is collected first to be able to process the body twice for measuring first.

Also the environments using alignments are not supported. If a single equation line would be resized, the alignment would get lost. And resizing all equations of the alignment does not seem appropriate either.

1.1 Options

warningthreshold: Print a warning if the original equation line exceeds its available width by the given fraction. Default is 0.05: A warning is given if the equation is too large by five percent. Otherwise the exceed is recorded in the .log file only.

The next options are boolean options. They are enabled by value true or if no value is given. They are switched off by value false.

enable: The resize feature is active (default).

disable: The complementary option for enable, added for convenience: disable (or disable=true) is the same as enable=false.

equations: LaTeX environments equation and displaymath environments are redefined. These equations are now using environment gather and gather*. This is the default.

The following table shows additional options if you want to have finer control for the redefined environments:

	Environments	
Option	equation	displaymath
equations	gather	gather*
equation	gather	*unchanged*
displaymath	*unchanged*	gather*

If such an option is switched off, the original meaning of the affected environments is restored.

Options are evaluated in the following order:

1. Configuration file resizegather.cfg using \resizegathersetup if the file exists.
2. Package options given for \usepackage.
3. Later calls of \resizegathersetup.

\resizegathersetup{⟨*option list*⟩}

The options are key value options. Boolean options are enabled by default (without value) or by using the explicit value true. Value false disable the option.

1.2 Options for packages amsmath or graphics

The package loads the package amsmath because is internally measures the equations first. Thus this package hooks into this code in order to resize the equations if they are too large. The resizing itself is done by \resizebox of package graphics. If you need special options for these packages, just load them first or use global options when appropriate. Example:

```
\usepackage[dvipdfm]{graphicx}% or graphics
\usepackage[fleqn]{amsmath}
\usepackage{resizegather}
```

2 Implementation

```
1 ⟨*package⟩
```

Reload check, especially if the package is not used with LaTeX.

```
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3   \catcode13=5 % ^^M
4   \endlinechar=13 %
5   \catcode35=6 % #
6   \catcode39=12 % '
7   \catcode44=12 % ,
8   \catcode45=12 % -
9   \catcode46=12 % .
10  \catcode58=12 % :
11  \catcode64=11 % @
12  \catcode123=1 % {
13  \catcode125=2 % }
14  \expandafter\let\expandafter\x\csname ver@resizegather.sty\endcsname
15  \ifx\x\relax % plain-TeX, first loading
16  \else
17    \def\empty{}%
18    \ifx\x\empty % LaTeX, first loading,
19      % variable is initialized, but \ProvidesPackage not yet seen
20    \else
21      \expandafter\ifx\csname PackageInfo\endcsname\relax
22        \def\x#1#2{%
23          \immediate\write-1{Package #1 Info: #2.}%
24        }%
25      \else
26        \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
27      \fi
28      \x{resizegather}{The package is already loaded}%
29      \aftergroup\endinput
30    \fi
31  \fi
32 \endgroup%
```

Package identification:

```
33 \begingroup\catcode61\catcode48\catcode32=10\relax%
34   \catcode13=5 % ^^M
35   \endlinechar=13 %
36   \catcode35=6 % #
37   \catcode39=12 % '
38   \catcode40=12 % (
39   \catcode41=12 % )
40   \catcode44=12 % ,
41   \catcode45=12 % -
42   \catcode46=12 % .
43   \catcode47=12 % /
44   \catcode58=12 % :
45   \catcode64=11 % @
46   \catcode91=12 % [
47   \catcode93=12 % ]
48   \catcode123=1 % {
49   \catcode125=2 % }
50   \expandafter\ifx\csname ProvidesPackage\endcsname\relax
51     \def\x#1#2#3[#4]{\endgroup
52       \immediate\write-1{Package: #3 #4}%
53       \xdef#1{#4}%
```

```
  }%
 \else
  \def\x#1#2[#3]{\endgroup
    #2[{#3}]%
    \ifx#1\@undefined
      \xdef#1{#3}%
    \fi
    \ifx#1\relax
      \xdef#1{#3}%
    \fi
  }%
 \fi
\expandafter\x\csname ver@resizegather.sty\endcsname
\ProvidesPackage{resizegather}%
 [2016/05/16 v1.3 Resize overly large equations (HO)]%
\begingroup\catcode61\catcode48\catcode32=10\relax%
 \catcode13=5 % ^^M
 \endlinechar=13 %
 \catcode123=1 % {
 \catcode125=2 % }
 \catcode64=11 % @
 \def\x{\endgroup
  \expandafter\edef\csname ResizeGather@AtEnd\endcsname{%
    \endlinechar=\the\endlinechar\relax
    \catcode13=\the\catcode13\relax
    \catcode32=\the\catcode32\relax
    \catcode35=\the\catcode35\relax
    \catcode61=\the\catcode61\relax
    \catcode64=\the\catcode64\relax
    \catcode123=\the\catcode123\relax
    \catcode125=\the\catcode125\relax
  }%
 }%
\x\catcode61\catcode48\catcode32=10\relax%
\catcode13=5 % ^^M
\endlinechar=13 %
\catcode35=6 % #
\catcode64=11 % @
\catcode123=1 % {
\catcode125=2 % }
\def\TMP@EnsureCode#1#2{%
 \edef\ResizeGather@AtEnd{%
  \ResizeGather@AtEnd
  \catcode#1=\the\catcode#1\relax
 }%
 \catcode#1=#2\relax
}
\TMP@EnsureCode{10}{12}% ^^J
\TMP@EnsureCode{33}{12}% !
\TMP@EnsureCode{36}{3}% $
\TMP@EnsureCode{38}{4}% &
\TMP@EnsureCode{39}{12}% '
\TMP@EnsureCode{40}{12}% (
\TMP@EnsureCode{41}{12}% )
\TMP@EnsureCode{42}{12}% *
\TMP@EnsureCode{43}{12}% +
\TMP@EnsureCode{44}{12}% ,
\TMP@EnsureCode{45}{12}% -
\TMP@EnsureCode{46}{12}% .
\TMP@EnsureCode{47}{12}% /
\TMP@EnsureCode{58}{12}% :
\TMP@EnsureCode{59}{12}% ;
```

```
\TMP@EnsureCode{60}{12}% <
\TMP@EnsureCode{62}{12}% >
\TMP@EnsureCode{63}{12}% ?
\TMP@EnsureCode{91}{12}% [
\TMP@EnsureCode{93}{12}% ]
\TMP@EnsureCode{94}{7}% ^ (superscript)
\TMP@EnsureCode{96}{12}% ‘
\edef\ResizeGather@AtEnd{\ResizeGather@AtEnd\noexpand\endinput}
\RequirePackage{kvoptions}[2009/12/04]
\SetupKeyvalOptions{%
  family=resizegather,%
  prefix=ResizeGather@,%
}
\@for\ResizeGather@option:=%
  centertags,%
  tbtags,%
  sumlimits,%
  nosumlimits,%
  intlimits,%
  nointlimits,%
  nonamelimits,%
  leqno,%
  reqno,%
  fleqn%
\do{%
  \edef\ResizeGather@temp{%
    \noexpand\DeclareVoidOption{\ResizeGather@option}{%
      \noexpand\PassOptionsToPackage{amsmath}{\ResizeGather@option}%
    }%
    \noexpand\AtEndOfPackage{%
      \noexpand\DisableKeyvalOption[%
        action=error,%
        package=resizegather,%
      ]{resizegather}{\ResizeGather@option}%
    }%
  }%
  \ResizeGather@temp
}
\@for\ResizeGather@option:=%
  draft,%
  final,%
  hiderotate,%
  hidescale,%
  hiresbb,%
  demo,%
  dvips,xdvi,dvipdf,dvipdfm,dvipdfmx,pdftex,dvipsone,%
  dviwindo,emtex,dviwin,pctexps,pctexwin,pctexhp,pctex32,%
  truetex,tcidvi,vtex,oztex,textures,xetex%
\do{%
  \edef\ResizeGather@temp{%
    \noexpand\DeclareVoidOption{\ResizeGather@option}{%
      \noexpand\PassOptionsToPackage{graphics}{\ResizeGather@option}%
    }%
    \noexpand\AtEndOfPackage{%
      \noexpand\DisableKeyvalOption[%
        action=error,%
        package=resizegather,%
      ]{resizegather}{\ResizeGather@option}%
    }%
  }%
  \ResizeGather@temp
}
```

```
\DeclareBoolOption[true]{enable}
\DeclareComplementaryOption{disable}{enable}
\DeclareStringOption[.05]{warningthreshold}
\newif\ifResizeGather@NeedInit
\DeclareBoolOption[true]{equations}
\DeclareBoolOption[true]{equation}
\DeclareBoolOption[true]{displaymath}
\AddToKeyvalOption*{equations}{%
  \ResizeGather@NeedInittrue
  \ifResizeGather@equations
    \ResizeGather@equationtrue
    \ResizeGather@displaymathtrue
  \else
    \ResizeGather@equationfalse
    \ResizeGather@displaymathfalse
  \fi
}
\AddToKeyvalOption*{equation}{%
  \ResizeGather@NeedInittrue
}
\AddToKeyvalOption*{displaymath}{%
  \ResizeGather@NeedInittrue
}
```

\resizegathersetup

```
\newcommand*{\resizegathersetup}[1]{%
  \ResizeGather@NeedInitfalse
  \setkeys{resizegather}{#1}%
  \ifResizeGather@NeedInit
    \ResizeGather@init
  \fi
}
\let\ResizeGather@init\relax

\InputIfFileExists{resizegather.cfg}{}{}%
\ProcessKeyvalOptions*\relax

\RequirePackage{amsmath}
\RequirePackage{graphics}
```

\ResizeGather@redefine

```
\def\ResizeGather@redefine#1#2#3#4#5{%
  \csname ifResizeGather@#1\endcsname
    \@ifundefined{ResizeGather@org@#2}{%
      \expandafter\let\csname ResizeGather@org@#2\expandafter\endcsname
                  \csname #2\endcsname
    }{}%
    \@ifundefined{ResizeGather@org@#3}{%
      \expandafter\let\csname ResizeGather@org@#3\expandafter\endcsname
                  \csname #3\endcsname
    }{}%
    \expandafter\edef\csname #2\endcsname{%
      \expandafter\noexpand\csname#4\endcsname
    }%
    \expandafter\edef\csname #3\endcsname{%
      \expandafter\noexpand\csname#5\endcsname
    }%
  \else
    \@ifundefined{ResizeGather@org@#2}{}{%
      \expandafter\let\csname #2\expandafter\endcsname
                  \csname ResizeGather@org@#2\endcsname
      \expandafter\let\csname #3\expandafter\endcsname
                  \csname ResizeGather@org@#3\endcsname
    }%
```

```
  \fi
}
```

\ResizeGather@init

```
\def\ResizeGather@init{%
  \ResizeGather@redefine{equation}{equation}{endequation}%
    {gather}{endgather}%
  \ResizeGather@redefine{displaymath}{displaymath}{enddisplaymath}%
    {gather*}{endgather*}%
}
\ResizeGather@init
```

\ResizeGather@ResizeGather

```
\def\ResizeGather@ResizeGather{%
  \ifResizeGather@enable
    \dimen@\displaywidth
    \if@fleqn
      \advance\dimen@-\@mathmargin
    \fi
    \ifdim\wdz@>\dimen@
      \begingroup
        \advance\dimen@ -\wdz@
        \dimen@ -\dimen@
        \ifdim\ResizeGather@warningthreshold\wdz@>\dimen@
          \expandafter\PackageInfo
        \else
          \expandafter\PackageWarning
        \fi
        {resizegather}{%
          Equation line \the\row@\space is too large %
          by \the\dimen@\MessageBreak
          in environment `\@currenvir'%
        }%
      \endgroup
      \setboxz@h to\dimen@{%
        \resizebox{\dimen@}{!}{\boxz@}%
        \hss
      }%
    \fi
  \fi
}
```

\calc@shift@gather

```
\expandafter\def\expandafter\calc@shift@gather\expandafter{%
  \expandafter\ResizeGather@ResizeGather
  \calc@shift@gather
}
```

\ResizeGather@org@gmeasure@

```
\let\ResizeGather@org@gmeasure@\gmeasure@
```

\gmeasure@

```
\def\gmeasure@#1{%
  \ResizeGather@org@gmeasure@{#1}%
  \ifResizeGather@enable
    \ifdim\totwidth@>\displaywidth
      \totwidth@=\displaywidth
    \fi
  \fi
}

\ResizeGather@AtEnd%
⟨/package⟩
```

3 Test

3.1 Catcode checks for loading

```
⟨*test1⟩
\catcode`\{=1 %
\catcode`\}=2 %
\catcode`\#=6 %
\catcode`\@=11 %
\expandafter\ifx\csname count@\endcsname\relax
  \countdef\count@=255 %
\fi
\expandafter\ifx\csname @gobble\endcsname\relax
  \long\def\@gobble#1{}%
\fi
\expandafter\ifx\csname @firstofone\endcsname\relax
  \long\def\@firstofone#1{#1}%
\fi
\expandafter\ifx\csname loop\endcsname\relax
  \expandafter\@firstofone
\else
  \expandafter\@gobble
\fi
{%
  \def\loop#1\repeat{%
    \def\body{#1}%
    \iterate
  }%
  \def\iterate{%
    \body
      \let\next\iterate
    \else
      \let\next\relax
    \fi
    \next
  }%
  \let\repeat=\fi
}%
\def\RestoreCatcodes{}
\count@=0 %
\loop
  \edef\RestoreCatcodes{%
    \RestoreCatcodes
    \catcode\the\count@=\the\catcode\count@\relax
  }%
\ifnum\count@<255 %
  \advance\count@ 1 %
\repeat

\def\RangeCatcodeInvalid#1#2{%
  \count@=#1\relax
  \loop
    \catcode\count@=15 %
  \ifnum\count@<#2\relax
    \advance\count@ 1 %
  \repeat
}
\def\RangeCatcodeCheck#1#2#3{%
  \count@=#1\relax
  \loop
    \ifnum#3=\catcode\count@
    \else
```

```
      \errmessage{%
        Character \the\count@\space
        with wrong catcode \the\catcode\count@\space
        instead of \number#3%
      }%
    \fi
  \ifnum\count@<#2\relax
    \advance\count@ 1 %
  \repeat
}
\def\space{ }
\expandafter\ifx\csname LoadCommand\endcsname\relax
  \def\LoadCommand{\input resizegather.sty\relax}%
\fi
\def\Test{%
  \RangeCatcodeInvalid{0}{47}%
  \RangeCatcodeInvalid{58}{64}%
  \RangeCatcodeInvalid{91}{96}%
  \RangeCatcodeInvalid{123}{255}%
  \catcode`\@=12 %
  \catcode`\\=0 %
  \catcode`\%=14 %
  \LoadCommand
  \RangeCatcodeCheck{0}{36}{15}%
  \RangeCatcodeCheck{37}{37}{14}%
  \RangeCatcodeCheck{38}{47}{15}%
  \RangeCatcodeCheck{48}{57}{12}%
  \RangeCatcodeCheck{58}{63}{15}%
  \RangeCatcodeCheck{64}{64}{12}%
  \RangeCatcodeCheck{65}{90}{11}%
  \RangeCatcodeCheck{91}{91}{15}%
  \RangeCatcodeCheck{92}{92}{0}%
  \RangeCatcodeCheck{93}{96}{15}%
  \RangeCatcodeCheck{97}{122}{11}%
  \RangeCatcodeCheck{123}{255}{15}%
  \RestoreCatcodes
}
\Test
\csname @@end\endcsname
\end
```

⟨/test1⟩

4 Installation

4.1 Download

Package. This package is available on CTAN[1]:

CTAN:macros/latex/contrib/oberdiek/resizegather.dtx The source file.

CTAN:macros/latex/contrib/oberdiek/resizegather.pdf Documentation.

Bundle. All the packages of the bundle 'oberdiek' are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

CTAN:install/macros/latex/contrib/oberdiek.tds.zip

TDS refers to the standard "A Directory Structure for TEX Files" (CTAN:tds/tds.pdf). Directories with `texmf` in their name are usually organized this way.

[1] http://ctan.org/pkg/resizegather

4.2 Bundle installation

Unpacking. Unpack the oberdiek.tds.zip in the TDS tree (also known as texmf tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

Script installation. Check the directory TDS:scripts/oberdiek/ for scripts that need further installation steps. Package attachfile2 comes with the Perl script pdfatfi.pl that should be installed in such a way that it can be called as pdfatfi. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The .dtx file is a self-extracting docstrip archive. The files are extracted by running the .dtx through plain TEX:

```
tex resizegather.dtx
```

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as texmf tree):

```
resizegather.sty             → tex/latex/oberdiek/resizegather.sty
resizegather.pdf             → doc/latex/oberdiek/resizegather.pdf
test/resizegather-test1.tex → doc/latex/oberdiek/test/resizegather-test1.tex
resizegather.dtx             → source/latex/oberdiek/resizegather.dtx
```

If you have a docstrip.cfg that configures and enables docstrip's TDS installing feature, then some files can already be in the right place, see the documentation of docstrip.

4.4 Refresh file name databases

If your TEX distribution (teTEX, mikTEX, ...) relies on file name databases, you must refresh these. For example, teTEX users run texhash or mktexlsr.

4.5 Some details for the interested

Unpacking with LATEX. The .dtx chooses its action depending on the format:

plain TEX: Run docstrip and extract the files.

LATEX: Generate the documentation.

If you insist on using LATEX for docstrip (really, docstrip does not need LATEX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{resizegather.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the .dtx or the .drv to generate the documentation. The process can be configured by the configuration file ltxdoc.cfg. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfLATEX:

```
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
```

5 Catalogue

The following XML file can be used as source for the TEX Catalogue. The elements caption and description are imported from the original XML file from the Catalogue. The name of the XML file in the Catalogue is resizegather.xml.

```
⟨*catalogue⟩
<?xml version='1.0' encoding='us-ascii'?>
<!DOCTYPE entry SYSTEM 'catalogue.dtd'>
<entry datestamp='$Date$' modifier='$Author$' id='resizegather'>
  <name>resizegather</name>
  <caption>Automatically resize overly large equations.</caption>
  <authorref id='auth:oberdiek'/>
  <copyright owner='Heiko Oberdiek' year='2009,2010'/>
  <license type='lppl1.3'/>
  <version number='1.3'/>
  <description>
    Equations that are too large are resized to fit the available
    space. The environment &amp;#x2018;gather&amp;#x2019; of package
    <xref refid='amsmath'>amsmath</xref> is supported.  Also the
    environments &amp;#x2018;equation&amp;#x2019; and
    &amp;#x2018;displaymath&amp;#x2019; are redefined using
    &amp;#x2018;gather&amp;#x2019; and its starred version.
    <p/>
    The package is part of the <xref refid='oberdiek'>oberdiek</xref> bundle.
  </description>
  <documentation details='Package documentation'
      href='ctan:/macros/latex/contrib/oberdiek/resizegather.pdf'/>
  <ctan file='true' path='/macros/latex/contrib/oberdiek/resizegather.dtx'/>
  <miktex location='oberdiek'/>
  <texlive location='oberdiek'/>
  <install path='/macros/latex/contrib/oberdiek/oberdiek.tds.zip'/>
</entry>
⟨/catalogue⟩
```

6 Acknowledgement

Dieter Jurzitza: He wanted the resizing feature at the TEX table in Karlsruhe of December 2009. Thus this package is a kind of Christmas present.

7 History

[2009/12/04 v1.0]

- The first version.

[2009/12/05 v1.1]

- Options enable and disable added.

[2010/03/01 v1.2]

- TDS location moved from 'generic' to 'latex'.

[2016/05/16 v1.3]

- Documentation updates.

8 Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

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