

The LXGW Font Family* | 落霞与孤鹜齐飞 秋水共长天一色

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This package packs a selection of open-source CJK fonts from 霞鹜新繖宋, 霞鹜新晰黑, 霞鹜文楷, 霞鹜臻楷, which are released into public domain by LXGW and 朱雀仿宋 released into public domain by TrionesType since 2021. They are licensed under the SIL Open Font License (OFL).

Abstract

The LXGW Font Family provides an open-source CJK font family with a comprehensive character set for Chinese (Simplified/Traditional), Cantonese, and Japanese. A fontset configuration of this font family for the ctex-kit is also provided in this package.

1 Usage

Users are allowed to use the friendly interface: the fontset key in CT_εX kit

```
\documentclass[fontset = lxgw]{ctex<art|book|rep|beamer>}
\usepackage[fontset = lxgw]{ctex}
```

with Xe_εTeX, Lua_εTeX, L^AT_εX + DVIPDFMx, up_εTeX + DVIPDFMx, and Ap_εTeX supported. pdf_εTeX is not supported temporarily since the long mapping time of zhmap. Four commands are provided for loading the listed regular and **bold** font files

\songti	宋体 (CJKmainfont): LXGWNeoZhiSong.ttf, LXGWNeoZhiSongScreen.ttf
\heiti	黑体 (CJKsansfont): LXGWNeoXiHei.ttf, LXGWNeoXiHeiScreen.ttf
\fangsong	仿宋 (CJKmonofont): LXGWZhuqueFangsong-Regular.ttf (AutoFakeBold enabled)
\kaishu	楷书 (it.of CJKmainfont): LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

This user-friendly interface is implemented in A.1, A.2, and A.3.

The .ttf files are sourced from the following links

- <https://github.com/lxgw/LxgwNeoZhiSong/releases/latest/download/LXGWNeoZhiSong.ttf>
- <https://github.com/lxgw/LxgwNeoXiZhi-Screen/releases/latest/download/LXGWNeoZhiSongScreen.ttf>
- <https://github.com/lxgw/LxgwNeoXiHei/releases/latest/download/LXGWNeoXiHei.ttf>
- <https://github.com/lxgw/LxgwNeoXiZhi-Screen/releases/latest/download/LXGWNeoXiHeiScreen.ttf>
- <https://github.com/TrionesType/zhuque/releases/download/v0.212/ZhuqueFangsong-v0.212.zip>
- <https://github.com/lxgw/LxgwWenkaiGB-Lite/releases/latest/download/LXGWWenKaiGBLite-Regular.ttf>
- <https://github.com/lxgw/LxgwZhenKai/releases/latest/download/LXGWZhenKaiGB-Regular.ttf>

*<https://github.com/myhsia/LXGW-CTAN>

[†]<https://github.com/lxgw>, <https://github.com/TrionesType/zhuque>

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2 Font Demos

The following lists the Chinese/English name, filename, and demos of the fonts: Cantonese, Japanese, Chinese (Simplified/Traditional) versions of “I Can Eat Glass”, and missing character markers are provided with punctuation compression disabled.

霞鶯新繖宋 = `<LXGWNeoZhiSong.ttf, LXGWNeoZhiSongScreen.ttf>`

私	ガ	ラ	ス	を	食	べ	ら	れ	ま	す	。	☒	そ	れ	は	私	を	傷	つ	け	ま	せ	ん	。
我	能	吞	下	玻	璃	而	不	伤	身	体	。	☒	我	能	吞	下	玻	璃	而	不	伤	身	体	。
我	能	吞	下	玻	璃	而	不	傷	身	體	。	我	可	以	食	玻	璃	，	佢	傷	唔	到	我	。

霞鶯新晰黑 = `<LXGWNeoXiHei.ttf, LXGWNeoXiHeiScreen.ttf>`

私	ガ	ラ	ス	を	食	べ	ら	れ	ま	す	。	☒	そ	れ	は	私	を	傷	つ	け	ま	せ	ん	。
我	能	吞	下	玻	璃	而	不	伤	身	体	。	☒	我	能	吞	下	玻	璃	而	不	伤	身	体	。
我	能	吞	下	玻	璃	而	不	傷	身	體	。	我	可	以	食	玻	璃	，	佢	傷	唔	到	我	。

朱雀仿宋 = `<LXGWZhuqueFangsong-Regular.ttf>`

私	ガ	ラ	ス	を	食	べ	ら	れ	ま	す	。	■	そ	れ	は	私	を	傷	つ	け	ま	せ	ん	。
我	能	吞	下	玻	璃	而	不	伤	身	体	。	■	我	能	吞	下	玻	璃	而	不	伤	身	体	。
我	能	吞	下	玻	璃	而	不	傷	身	體	。	我	可	以	食	玻	璃	，	佢	傷	唔	到	我	。

霞鶯文楷, 霞鶯臻楷 = `<LXGWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf>`

私	ガ	ラ	ス	を	食	べ	ら	れ	ま	す	。	Ⓢ	そ	れ	は	私	を	傷	つ	け	ま	せ	ん	。
我	能	吞	下	玻	璃	而	不	伤	身	体	。	Ⓢ	我	能	吞	下	玻	璃	而	不	伤	身	体	。
我	能	吞	下	玻	璃	而	不	傷	身	體	。	我	可	以	食	玻	璃	，	佢	傷	唔	到	我	。

A The Source Code

A.1 The ctex-fontset-lxgw.def file

Start the optionlist fontset for l3docstrip.

```
1 <*fontset>
```

Load CJK font family, interface, accepts the following 4 branches, provided by ctex-kit.

```
2 \ctex_fontset_case:nnnn
```

pdf_{TeX} (generate PDF) This branch is no longer supported here, and a `fontset-unavailable` error will raise.

```
3 { \ctex_fontset_error:n { lxgw } }
```

TeXhackers note: For some fontset that supports this branch, line 4 – 5 should be replaced as a line

```
\ctex_fontset_case:nnn
```

pdf_{TeX} (generate DVI) For those use \TeX + DVIPDFMx.

```
4 {
```

Load the .spa file for the CJKpunct package.

```
5 \ctex_file_input:n { ctexpunct-lxgw.spa }
```

Case choice controlled by the zhmap key of ctex-kit.

```
6 \ctex_zhmap_case:nnn
```

#1: Content of this argument will be outputted to the input stream when zhmap = zhmCJK

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_i:nnn
```

The LXGW font family uses the UniGB-UTF16-H cmap (Character To Glyph Index Mapping Table).

```
7 {
8   \setCJKmainfont { LXGWNeoZhiSong.ttf }
9   [
10      cmap          = UniGB-UTF16-H, AutoFakeBold,
11      ItalicFont    = LXGWWenKaiGBLite-Regular.ttf,
12      BoldItalicFont = LXGWZhenKaiGB-Regular.ttf
13   ]
14   \setCJKsansfont { LXGWNeoXiHei.ttf }
15   [ cmap = UniGB-UTF16-H, AutoFakeBold, AutoFakeSlant ]
16   \setCJKmonofont { LXGWZhuqueFangsong-Regular.ttf }
17   [ cmap = UniGB-UTF16-H, AutoFakeBold, AutoFakeSlant ]
18   \setCJKfamilyfont { zhsong } { LXGWNeoZhiSong.ttf }
19   [ cmap = UniGB-UTF16-H, AutoFakeBold, AutoFakeSlant ]
20   \setCJKfamilyfont { zhhei } { LXGWNeoXiHei.ttf }
21   [ cmap = UniGB-UTF16-H, AutoFakeBold, AutoFakeSlant ]
22   \setCJKfamilyfont { zhfs } { LXGWZhuqueFangsong-Regular.ttf }
23   [ cmap = UniGB-UTF16-H, AutoFakeBold, AutoFakeSlant ]
24   \setCJKfamilyfont { zhkai } { LXGWWenKaiGBLite-Regular.ttf }
25   [ cmap = UniGB-UTF16-H, AutoFakeSlant,
26      BoldFont      = LXGWZhenKaiGB-Regular.ttf,
27      SlantedFont   = LXGWWenKaiGBLite-Regular.ttf,
28      ItalicFont    = LXGWWenKaiGBLite-Regular.ttf,
29      BoldSlantedFont = LXGWZhenKaiGB-Regular.ttf,
30      BoldItalicFont = LXGWZhenKaiGB-Regular.ttf ]
```

Configure the usages of the edge information of the defined CJK families.

```

31      \ctex_punct_set:n { lrgw }
32      \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
33      \ctex_punct_map_family:nn { \CJKsfdefault } { zhhei }
34      \ctex_punct_map_family:nn { \CJKttdefault } { zhfs }
35      \ctex_punct_map_bfseries:nn { \CJKrmdefault, zhsong } { zhsongb }
36      \ctex_punct_map_bfseries:nn { \CJKsfdefault, zhhei } { zhheib }
37      \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
38  }

```

#2: Content of this argument will be outputted to the input stream when `zhmap = true`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_ii:nnn
```

Load the mapping file `ctex-zhmap-lrgw.tex` (see A.3) for `zhmatrices` and set `\CJKrmdefault`, `\CJKsfdefault`, `\CJKttdefault`, respectively.

```

39  {
40      \ctex_load_zhmap:nnnn { rm } { zhhei } { zhfs } { lrgw }

```

Configure the usages of the edge information of `\CJKrmdefault`.

```

41      \ctex_punct_set:n { lrgw }
42      \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
43      \ctex_punct_map_bfseries:nn { \CJKrmdefault } { zhhei }
44      \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
45  }

```

#3: Content of this argument will be outputted to the input stream when `zhmap = false`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_iii:nnn
```

Here will raise a `fontset-unavailable` error.

```

46      { \ctex_fontset_error:n { lrgw } }
47  }

```

upTeX, ApTeX For those use upTeX + DVIPDFMx. Configure the basic font mapping for upTeX. Due to the definition in `zhmetrics-uptex`, configure

1. upshape of serif font.
2. bfseries of serif font.
3. itshape of serif font.
4. upshape of sans font.
5. bfseries of sans font.
6. upshape of mono font.

```

48  {
49      \ctex_set_upfonts:nnnnnn
50      { LXGWNNeoZhiSong.ttf }
51      { LXGWNNeoZhiSongScreen.ttf }
52      { LXGWWenKaiGBLite-Regular.ttf }
53      { LXGWNNeoXiHei.ttf }
54      { LXGWNNeoXiHeiScreen.ttf }
55      { LXGWZhuqueFangsong-Regular.ttf }

```

Config the NFSS font families `zhsong`, `zhhei`, `zhfs`, and `zhkai` to the JFM name in normal type and bold type. Leave empty for those font families with no bold version.

```

56      \ctex_set_upfamily:nnn { zhsong } { upzhserif } { upzhserifb }
57      \ctex_set_upfamily:nnn { zhhei } { upzhsans } { upzhsans }
58      \ctex_set_upfamily:nnn { zhfs } { upzhmono } { }
59      \ctex_set_upfamily:nnn { zhkai } { upzhserifit } { }
60  }

```

X₃TeX, LuaTeX For those use X₃TeX or LuaTeX.

```

61 {
62   \setCJKmainfont { LXGWNeoZhiSong }
63   [
64     Extension      = .ttf, AutoFakeBold,
65     ItalicFont     = LXGWWenKaiGBLite-Regular,
66     BoldItalicFont = LXGWZhenKaiGB-Regular.ttf,
67   ]
68   \setCJKsansfont { LXGWNeoXiHei }
69   [ Extension = .ttf, AutoFakeBold, AutoFakeSlant ]
70   \setCJKmonofont { LXGWZhuqueFangsong-Regular }
71   [ Extension = .ttf, AutoFakeBold, AutoFakeSlant ]
72   \setCJKfamilyfont { zhsong } { LXGWNeoZhiSong }
73   [ Extension = .ttf, AutoFakeBold, AutoFakeSlant ]
74   \setCJKfamilyfont { zhhei } { LXGWNeoXiHei }
75   [ Extension = .ttf, AutoFakeBold, AutoFakeSlant ]
76   \setCJKfamilyfont { zhfs } { LXGWZhuqueFangsong-Regular }
77   [ Extension = .ttf, AutoFakeBold, AutoFakeSlant ]
78   \setCJKfamilyfont { zhkai } { LXGWWenKaiGBLite-Regular }
79   [ Extension = .ttf, BoldFont      = LXGWZhenKaiGB-Regular,
80     SlantedFont    = LXGWWenKaiGBLite-Regular,
81     ItalicFont     = LXGWWenKaiGBLite-Regular,
82     BoldSlantedFont = LXGWZhenKaiGB-Regular,
83     BoldItalicFont = LXGWZhenKaiGB-Regular ]
84 }

```

\songti Shortcuts that same as those in the ctex-kit.
\heiti
\fangsong
\kaishu

```

85 \NewDocumentCommand \songti { } { \CJKfamily { zhsong } }
86 \NewDocumentCommand \heiti { } { \CJKfamily { zhhei } }
87 \NewDocumentCommand \fangsong { } { \CJKfamily { zhfs } }
88 \NewDocumentCommand \kaishu { } { \CJKfamily { zhkai } }

```

(End of definition for `\songti` and others. These functions are documented on page 1.)

End the optionlist fontset for l3docstrip.

```

89 \fontset

```

A.2 The ctex-spa-make-lxgw.tex and the ctex-spa-lxgw.def file

The .spa file of the corresponding font will be used for the CJKpunct package to achieve the punctuation compression, which can ensure the best typeset effect (under the pdfTeX engine). Run the following script, ctex-spa-make.tex, by executing

```
xetex ctex-spa-make-lxgw
```

in the terminal. Then, one can obtain the ctexpunct-lxgw.spa file.

Implementation of the script Start the optionlist makespa for l3docstrip.

```

90 \*makespa

```

Loading the macro file ctex-spa-macro.tex provided by ctex-kit.

```

91 \input ctex-spa-macro %

```

```

92 \MAKESPA {ctexpunct-lxgw.spa}
93 {
94     {lxgwzhsong}           {LXGWNeoZhiSong} ,
95     {lxgwzhsongb}         {LXGWNeoZhiSongScreen} ,
96     {lxgwzhhei}           {LXGWNeoXiHei} ,
97     {lxgwzhheib}          {LXGWNeoXiHeiScreen} ,
98     {lxgwzhfs}             {LXGWZhuqueFangsong-Regular} ,
99     {lxgwzhkai}            {LXGWWenKaiGBLite-Regular} ,
100    {lxgwzhkaib}           {LXGWZhenKaiGB-Regular} ,
101 }

```

```
102 \primitive\end
```

103 $\langle / \text{makespa} \rangle$

104 〈*lxgw-spa〉

```

105 \ctexspadef{lxgwzhsong}{10,8,9,8,67,8,58,8,71,8,65,9,67,8,65,10,55,5,54,4,64,9,71,9,0,0,10,10
106 \ctexspadef{lxgwzhsongb}{9,7,8,7,67,8,58,8,70,8,65,8,67,8,65,9,55,5,53,3,63,8,70,8,-0,-0,10,10
107 \ctexspadef{lxgwzhhei}{9,5,10,5,65,8,58,5,68,8,66,8,61,8,67,8,53,5,52,3,60,7,71,7,0,0,11,11,4
108 \ctexspadef{lxgwzhheib}{9,5,9,5,64,8,57,5,68,8,65,7,61,8,67,8,53,5,52,3,60,6,70,6,0,0,11,11,4
109 \ctexspadef{lxgwzhfs}{3,2,3,2,60,8,60,5,65,16,62,17,63,18,59,17,60,13,49,12,60,6,69,8,0,0,11,
110 \ctexspadef{lxgwzhkai}{12,11,6,4,72,6,68,5,72,6,71,7,72,6,68,7,66,5,52,5,70,-1,72,4,0,0,12,12
111 \ctexspadef{lxgwzhkaib}{6,8,6,8,71,4,64,5,71,5,70,6,71,5,67,6,65,4,47,4,62,3,66,3,-1,-1,10,10
112 \
```

Start the optionlist `zhmap-1xgw` for `l3docstrip`.

113 **zhmap-lxgw*

Forked from the zhmap optionlist of ctex.dtx¹.

```

114 \begingroup\catcode61\catcode48\catcode32=10\relax%
115 \catcode 35=6 % #
116 \catcode 45=12 % -
117 \catcode123=1 % {
118 \catcode125=2 % }
119 \toks0{\endlinechar=\the\endlinechar\relax}%
120 \toks2{\endlinechar=-1 }%
121 \def\x#1 #2 {%
122 \toks0\expandafter{\the\toks0 \catcode#1=\the\catcode#1\relax}%
123 \toks2\expandafter{\the\toks2 \catcode#1=#2 }}%
124 \x 13 5 % carriage return
125 \x 32 10 % space
126 \x 35 6 % #
127 \x 40 12 % (
128 \x 41 12 % )
129 \x 45 12 % -
130 \x 46 12 % .
131 \x 47 12 % /

```

6

```

132 \x 58 12 % :
133 \x 60 12 % <
134 \x 61 12 % =
135 \x 64 11 % @
136 \x 91 12 % [
137 \x 93 12 % ]
138 \x 123 1 % {
139 \x 125 2 % }
140 \edef\x#1{\endgroup%
141 \edef\noexpand#1{%
142 \the\toks0 %
143 \let\noexpand\noexpand\noexpand#1%
144 \noexpand\noexpand\noexpand\noexpand\undefined%
145 \noexpand\noexpand\noexpand\noexpand\endinput}%
146 \the\toks2}%
147 \expandafter\x\csname ctex@zhmap@endinput\endcsname
148 \begingroup\expandafter\endgroup
149 \expandafter\let\csname ifzhmappdf\expandafter\endcsname\csname
150 \expandafter\ifx\csname ifctexpdf\endcsname\relax
151 \expandafter\ifx\csname pdfoutput\endcsname\relax
152 iffalse\else\ifnum\pdfoutput < 1 iffalse\else iftrue\fi\fi
153 \else ifctexpdf\fi
154 \endcsname
155 \begingroup
156 \expandafter\ifx\csname ProvidesFile\endcsname\relax
157 \long\def\x#1\ProvidesFile#2[#3]{%
158 #1%
159 \immediate\write-1{File: #2 #3}%
160 \expandafter\xdef\csname ver@#2\endcsname{#3}}
161 \expandafter\x%
162 \fi
163 \endgroup

```

Provides the identification information of the font map loader.

```

164 \ProvidesFile{ctex-zhmap-lxgw.tex}%
165 [\LXGWFileDate\ \LXGWFileVersion\ lxgw font map loader for DVIPDFMx (CTEX)]

```

Font map loader for pdf_T_EX (generate PDF) is disabled since pdf_T_EX maps too slowly.

```

166 \ifzhmappdf

```

Configuration for pdf_T_EX (generate DVI).

```

167 \else

```

Configure the upright shape of `\songti`, `\kaishu`, `\heiti`, and `\fangsong` mapping for GBK encoding and UTF8 encoding.

```

168 \special{pdf:mapline gbk@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
169 \special{pdf:mapline gbksong@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
170 \special{pdf:mapline gbkkai@UGBK@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf}
171 \special{pdf:mapline gbkhei@UGBK@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
172 \special{pdf:mapline gbkfs@UGBK@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf}
173 \special{pdf:mapline cyberb@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
174 \special{pdf:mapline unisong@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
175 \special{pdf:mapline unikai@Unicode@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf}
176 \special{pdf:mapline unihei@Unicode@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
177 \special{pdf:mapline unifs@Unicode@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf}

```

Similar for the (fake) slant shape, set the *Afine Transformation coefficient* to 0.167, which is the same as the default value of AutoFakeSlant in the xeCJK package.

```

178 \special{pdf:mapline gbksongsl@UGBK@      UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
179 \special{pdf:mapline gbkkaisl@UGBK@      UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf -s .167}
180 \special{pdf:mapline gbkheisl@UGBK@      UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
181 \special{pdf:mapline gbkfssl@UGBK@      UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
182 \special{pdf:mapline unisongsl@Unicode@    UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
183 \special{pdf:mapline unikaisl@Unicode@    UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf -s .167}
184 \special{pdf:mapline uniheisl@Unicode@    UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
185 \special{pdf:mapline unifssl@Unicode@    UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
186 \fi

```

End the optionlist zhmap-lxgw for l3docstrip.

```

187 </zhmap-lxgw>

```


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