

xpinyin 宏包

李清

sobenlee@gmail.com

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1 简介

xpinyin 是一个 \LaTeX 宏包, 提供了为汉字自动注音的功能。

2 基本用法

xpinyin 支持采用 GBK 和 UTF-8 编码的 \TeX 源文件, 建议总是使用 UTF-8。如果使用 \LaTeX 或 $\pdf\LaTeX$ 的编译方式, 则根据编码的情况, xpinyin 依赖 **CJK** 或者 **CJKutf8** 宏包。如果使用 $X_{\text{E}}\LaTeX$, 则依赖 **xeCJK** 宏包。如果它们没有在 xpinyin 之前被载入, xpinyin 将根据编译方式自动选择, \LaTeX 或 $\pdf\LaTeX$ 将使用 CJKutf8。

xpinyin 还依赖 **l3kernel** 和 **l3packages**, 使用 (pdf) \LaTeX 下的 GBK 编码时, 还将依赖 **xCJK2uni**。

需要注意的是, xpinyin 缺省将拼音的字体设置为与文档的主字体 (`\normalfont`) 相同, 所以为了保证声调字母的正确输出, 应该选用合适的西文主字体。也可以通过将在下一节介绍的 `(font)` 选项来单独设置拼音的字体。

$X_{\text{E}}\LaTeX$ 下的简单示例:

```
\documentclass{article}
\usepackage{xeCJK}
\usepackage{xpinyin}
\setmainfont{CMU Serif}
\setCJKmainfont{SimSun}

\begin{document}
\xpinyin*{汉语拼音示例}
\end{document}
```

(pdf) \LaTeX 下的简单示例:

```
\documentclass{article}
\usepackage{CJKutf8}
\usepackage{xpinyin}
\usepackage[T1]{fontenc}
\usepackage{lmodern}

\begin{document}
\begin{CJK}{UTF8}{gbsn}
\xpinyin*{汉语拼音示例}
\end{CJK}
\end{document}
```

运行上述示例要求系统安装了设置的字体, 源文件用 UTF-8 编码保存, 使用相应的编译方式。xpinyin 可以与 **ctex** 宏包或文档类共同使用, 使用方式与上面类似。

* [ctex-kit rev. d4d7ebd](#).

3 用户手册

`\begin{pinyin}` [*options*]

.....

`\end{pinyin}`

为 `pinyin` 环境中的汉字自动注音。例如

```
1 \begin{pinyin}
2 列位看官：你道此书从何而来？说起根由，虽近荒唐，细按则深有趣味。
3 待在下将此来历注明，方使阅者\xpinyin{了}{liao3}然不惑。
4 \end{pinyin}
```

列位看官：你道此书从何而来？说起根由，虽近荒唐，细按则深有趣味。待在下将此来历注明，方使阅者了然不惑。

可选项 (*options*) 用于局部设置拼音的格式，将在下面说明。

`\xpinyin` [*options*] {<单个汉字>} {<拼音>}

`\xpinyin*` [*options*] {<文字>}

对于多音字，可以使用 `\xpinyin` 为其设置拼音；而 `\xpinyin*` 相当于 `pinyin` 环境的命令形式。`\xpinyin` 可以在 `pinyin` 环境和 `\xpinyin*` 中使用。例如，

```
1 \xpinyin{长}{chang2}
2 \xpinyin*{甄士隐梦幻识通灵}
3 \xpinyin*{\xpinyin{重}{zhong4}}{要}
```

长
甄士隐梦幻识通灵
重要

`\pinyin` [*options*] {<拼音>}

用于输出拼音，为了输入的方便 ü 可以用 v 代替。例如，

```
1 \pinyin{lv2zi}
2 \pinyin{nv3hai2zi}
```

lǔ zi
nǚ hái zi

`\setpinyin` {<汉字>} {<拼音>}

`xpinyin` 宏包的拼音数据 (`xpinyin-database.def`) 来源于 Unicode 的 UniHan 数据库¹中的 `UniHan_Readings.txt` 文件。对于多音字，一般来说这个文件选用的是常用读音。可以使用 `\setpinyin` 来设置多音字的首选读音。

`\xpinyinsetup` {<key₁>=<val₁>, <key₂>=<val₂>, ... }

用于在导言区或文档中，设置拼音的格式。目前可以设置的 (*key*) 如下介绍。

`ratio` = {<number>}

设置拼音字体大小与当前正文字体大小的比例，缺省值是 0.4。

`vsep` = {<dimen>}

设置拼音的基线与汉字基线的间距，缺省值是 1 em。

`hsep` = {<skip>}

设置注音汉字之间的间距，缺省值与 `\CJKglue` 的值相同。为了断行时行末的对齐，设置的 (*skip*) 最后有一定的弹性。例如

```
1 \xpinyin*[ratio={.7},hsep={.5em plus .1em},vsep={1.1em}]{贾雨村风尘怀闺秀}
```

jiǎ yǔ cūn fēng chén huái guī xiù
贾雨村风尘怀闺秀

¹<http://www.unicode.org/Public/UNIDATA/UniHan.zip>

`pysep` `pysep = {\glue}`

设置 `\pinyin` 输出的相邻两个汉语拼音的空白, 缺省值是一个空格。

`font` `font = {\font}`

设置拼音的字体, 缺省值是 `\normalfont`, 即以正文西文字体相同。为了保证拼音能正确输出, 最好选用收字量较大的西文字体。

`format` `format = {\format}`

设置拼音的其它格式, 例如颜色等, 缺省值为空。

`multiple` `multiple = {\format}`

设置多音字拼音的其它格式, 缺省值为空。可以通过这个选项来提醒校正多音字的拼音。例如本文档设置多音字拼音的颜色是红色(需要载入 `color` 宏包):

```
\xpinyinsetup{multiple={\color{red}}}
```

`footnote` `footnote = <true|false>`

New: 2014/01/12

是否对拼音环境中的脚注 (`\footnote`) 汉字加上拼音。缺省值为 `false`。更一般的情况, 请使用 `\disablepinyin`。

`\disablepinyin`
`\enablepinyin`

New: 2014/01/12

`\disablepinyin` 用于在拼音环境 (`pinyinscope`) 中临时取消对汉字的注音, 而 `\enablepinyin` 用于其后的恢复。

4 代码实现

```
1 (*package)
2 (@@=xpinyin)
3 \msg_new:nnn { xpinyin } { l3-too-old }
4 {
5   Support~package~'expl3'~too~old. \\\
6   Please~update~an~up~to~date~version~of~the~bundles\\\
7   'l3kernel'~and~'l3packages'\\\
8   using~your~TeX~package~manager~or~from~CTAN.
9 }
10 \ifpackagelater { expl3 } { 2015/09/24 } { }
11 { \msg_error:nn { xpinyin } { l3-too-old } }
12 \msg_new:nnn { xpinyin } { engine-not-supported }
13 { Engine~\c_sys_engine_str'~is~not~yet~supported,~xpinyin~will~abort! }
14 \bool_if:nF
15 {
16   \sys_if_engine_xetex_p: ||
17   \sys_if_engine_pdftex_p:
18 }
19 { \msg_critical:nn { xpinyin } { engine-not-supported } }
20 \RequirePackage { xparse }
21 \RequirePackage { l3keys2e }
```

`\c__xpinyin_tone_prop`

重音标记 `\``、`\'` 和 `\=` 在 `tabbing` 环境中被移作他用, 为避免错误, 我们使用内部命令 `\@tabacckludge` 或 `\a` 来定义。

```
22 \prop_new:N \c__xpinyin_tone_prop
23 \clist_map_inline:nn
24 {
25   { ā }{ \@tabacckludge= a } ,           { á }{ \@tabacckludge' a } ,
26   { ä }{ \@tabacckludge v a } ,         { à }{ \@tabacckludge` a } ,
27   { ö }{ \@tabacckludge= o } ,         { ó }{ \@tabacckludge' o } ,
28   { õ }{ \@tabacckludge v o } ,         { ò }{ \@tabacckludge` o } ,
29   { ē }{ \@tabacckludge= e } ,         { é }{ \@tabacckludge' e } ,
```

```

30 { ẽ }{ \v e } , { è }{ \@tabacckludge` e } ,
31 { ū }{ \@tabacckludge= u } , { ú }{ \@tabacckludge' u } ,
32 { ũ }{ \v u } , { ù }{ \@tabacckludge` u } ,
33 { ṁ }{ \@tabacckludge' m } , { ṅ }{ \@tabacckludge' n } ,
34 { ñ }{ \v n } , { ñ }{ \@tabacckludge` n } ,
35 { ī }{ \@tabacckludge= { \i } } , { í }{ \@tabacckludge' { \i } } ,
36 { ĩ }{ \v { \i } } , { ï }{ \@tabacckludge` { \i } } ,
37 { ü }{ \" u } ,
38 { ũ }{ \@tabacckludge= { \" u } } , { ú }{ \@tabacckludge' { \" u } } ,
39 { ũ }{ \v { \" u } } , { ù }{ \@tabacckludge` { \" u } }
40 }
41 { \prop_gput:Nnn \c__xpinyin_tone_prop #1 }

```

(End definition for \c__xpinyin_tone_prop.)

__xpinyin_UTF_char:nn

```

42 \cs_new_protected_nopar:Npn \__xpinyin_UTF_char:nn #1#2
43 {
44   \cs_if_exist:cF { u8:#1 }
45     { \tl_const:cn { u8:#1 } {#2} }
46 }

```

(End definition for __xpinyin_UTF_char:nn.)

__xpinyin_GBK_char:nn

```

47 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char:nn #1#2
48 {
49   \__xpinyin_UTF_char:nn {#1} {#2}
50   \exp_args:Nx \__xpinyin_GBK_char_aux:nn { \tl_head:n {#1} } {#1}
51 }
52 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nn #1#2
53 { \exp_args:Nf \__xpinyin_GBK_char_aux:nnn { \int_eval:n { `#1 } } {#1} {#2} }
54 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nnn #1#2#3
55 {
56   \cs_if_exist:cF { __xpinyin_UTF_ #1 :w }
57     {
58       \exp_args:Nf \__xpinyin_GBK_char_def:nnn
59         {
60           \int_case:nn { \tl_count:n {#3} }
61             {
62               { \c_two } { ##1 }
63               { \c_three } { ##1##2 }
64               { \c_four } { ##1##2##3 }
65             }
66           }
67         {#1} {#2}
68         \exp_args:Nc \__xpinyin_save_UTF_cs:Nn { __xpinyin_UTF_ #1 :w } {#1}
69         \tl_gput_right:Nx \c__xpinyin_reset_UTF_catcode_tl
70           { \char_set_catcode:nn {#1} { \char_value_catcode:n {#1} } }
71         \char_set_catcode_active:n {#1}
72       }
73 }
74 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_def:nnn #1#2#3
75 {
76   \cs_new_protected_nopar:cpn { __xpinyin_UTF_ #2 :w } #1
77     { \use:c { u8: \tl_to_str:n { #3#1 } } }
78 }
79 \tl_new:N \c__xpinyin_reset_UTF_catcode_tl

```

(End definition for __xpinyin_GBK_char:nn.)

__xpinyin_save_UTF_cs:Nn

```

80 \group_begin:
81 \char_set_catcode_active:n { 126 }
82 \cs_new_protected_nopar:Npn \__xpinyin_save_UTF_cs:Nn #1#2
83 {
84   \group_begin:
85   \char_set_lcode:nn { 126 } {#2}
86   \tex_lowercase:D

```

```

87     {
88     \group_end:
89     \tl_gput_right:Nn \c__xpinyin_reset_UTF_cs_tl { \cs_set_eq:NN ~ #1 }
90     }
91   }
92 \group_end:
93 \tl_new:N \c__xpinyin_reset_UTF_cs_tl

(End definition for \__xpinyin_save_UTF_cs:Nn.)

94 \bool_new:N \g__xpinyin_GBK_bool
95 \@ifpackageloaded { xeCJK }
96   { \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: } }
97   {
98     \@ifpackageloaded { CJKutf8 }
99     {
100     \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
101     \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
102     }
103     {
104     \@ifpackageloaded { CJK }
105     {
106     \RequirePackage { xCJK2uni }
107     \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_GBK_char:nn
108     \AtEndOfPackage
109     {
110     \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
111     { \c__xpinyin_reset_UTF_cs_tl }
112     \__xpinyin_adjust_CJK_hook:
113     \tl_use:N \c__xpinyin_reset_UTF_catcode_tl
114     }
115     \bool_gset_true:N \g__xpinyin_GBK_bool
116     }
117     {
118     \sys_if_engine_xetex:TF
119     {
120     \RequirePackage { xeCJK }
121     \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: }
122     }
123     {
124     \RequirePackage { CJKutf8 }
125     \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
126     \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
127     }
128     }
129   }
130 }

```

\l__xpinyin_tmpa_box

```

\l__xpinyin_tmpb_box 131 \box_new:N \l__xpinyin_tmpa_box
132 \box_new:N \l__xpinyin_tmpb_box

```

(End definition for \l__xpinyin_tmpa_box and \l__xpinyin_tmpb_box.)

__xpinyin_width:Nn

```

133 \cs_new_protected:Npn \__xpinyin_width:Nn #1#2
134   {
135     \hbox_set:Nn \l__xpinyin_tmpa_box {#2}
136     #1 = \box_wd:N \l__xpinyin_tmpa_box
137   }

```

(End definition for __xpinyin_width:Nn.)

__xpinyin_leave_vmode:

```

138 \cs_if_exist:NTF \pdfTeX_quitvmode:D
139   { \cs_new_eq:NN \__xpinyin_quit_vmode: \pdfTeX_quitvmode:D }
140   {
141     \cs_new_protected_nopar:Npn \__xpinyin_quit_vmode:
142     {

```

```

143     \if_mode_vertical:
144     \exp_after:wN \tex_indent:D
145     \fi:
146   }
147 }

```

(End definition for _xpinyin_leave_vmode:.)

_xpinyin_make_pinyin_box:nnn

```

148 \cs_new_protected_nopar:Npn \_xpinyin_make_pinyin_box:nnn #1#2#3
149 {
150   \_xpinyin_leavevmode:
151   \hbox_overlap_right:n
152   {
153     \hbox_set:Nn \l__xpinyin_tmpa_box
154     { \_xpinyin_CJKsymbol_hook: \_xpinyin_save_CJKsymbol:n {#2} }
155     \hbox_set:Nn \l__xpinyin_tmpb_box
156     {
157       \color_group_begin: \color_ensure_current:
158       \l__xpinyin_pinyin_box_hook_tl
159       \_xpinyin_select_font:
160       \clist_if_exist:cTF { c__xpinyin_multiple_ #1 _clist }
161       { \l__xpinyin_multiple_tl \l__xpinyin_format_tl }
162       { \l__xpinyin_format_tl }
163       {#3}
164       \color_group_end:
165     }
166     \dim_compare:nNnT
167     { \box_wd:N \l__xpinyin_tmpb_box } >
168     { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
169     {
170       \box_resize:Nnn \l__xpinyin_tmpb_box
171       { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
172       { \box_ht:N \l__xpinyin_tmpb_box + \box_dp:N \l__xpinyin_tmpb_box }
173     }
174     \box_move_up:nn { \l__xpinyin_vsep_tl }
175     {
176       \hbox_to_wd:nn { \box_wd:N \l__xpinyin_tmpa_box }
177       { \tex_hss:D \box_use_clear:N \l__xpinyin_tmpb_box \tex_hss:D }
178     }
179   }
180 }
181 \tl_new:N \l__xpinyin_pinyin_box_hook_tl
182 \sys_if_engine_pdftex:T
183 {
184   \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
185   { \cs_set_eq:NN \CJK@plane \tex_undefined:D }
186 }
187 \cs_generate_variant:Nn \_xpinyin_make_pinyin_box:nnn { x }

```

(End definition for _xpinyin_make_pinyin_box:nnn.)

_xpinyin_CJKsymbol:n

```

188 \cs_new_protected_nopar:Npn \_xpinyin_CJKsymbol:n #1
189 { \_xpinyin_CJKsymbol:xn { \_xpinyin_to_unicode:n {#1} } {#1} }
190 \cs_new_protected_nopar:Npn \_xpinyin_CJKsymbol:nn #1#2
191 {
192   \_xpinyin_make_pinyin_box:nnn {#1} {#2} { \use:c { c__xpinyin_ #1 _tl } }
193   \_xpinyin_save_CJKsymbol:n {#2}
194 }
195 \cs_generate_variant:Nn \_xpinyin_CJKsymbol:nn { x }

```

(End definition for _xpinyin_CJKsymbol:n.)

pinyinscope

```

196 \NewDocumentEnvironment { pinyinscope } { 0 { } }
197 {
198   \keys_set:nn { xpinyin } {#1}
199   \enablepinyin

```

```

200 }
201 { }

```

(End definition for pinyinscope. This function is documented on page 2.)

\xpinyin

```

202 \NewDocumentCommand \xpinyin { s O { } m }
203 {
204   \IfBooleanTF {#1}
205   {
206     \group_begin:
207     \keys_set:nn { xpinyin } {#2}
208     \enablepinyin
209     #3
210     \group_end:
211   }
212   {
213     \group_begin:
214     \keys_set:nn { xpinyin } {#2}
215     \bool_if:NF \l__xpinyin_enable_bool
216     { \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue } }
217     \__xpinyin_quit_vmode:
218     \__xpinyin_single_aux:nn {#3}
219   }
220 }

```

(End definition for \xpinyin. This function is documented on page 2.)

\l__xpinyin_enable_bool

```

221 \bool_new:N \l__xpinyin_enable_bool

```

(End definition for \l__xpinyin_enable_bool.)

__xpinyin_CJKglue:

```

222 \cs_new_protected_nopar:Npn \__xpinyin_CJKglue:
223 { \skip_horizontal:n { \l__xpinyin_hsep_tl } }

```

(End definition for __xpinyin_CJKglue:.)

\enablepinyin

```

224 \NewDocumentCommand \enablepinyin { }
225 {
226   \bool_if:NF \l__xpinyin_enable_bool
227   {
228     \tl_if_empty:NF \l__xpinyin_hsep_tl
229     {
230       \cs_set_eq:NN \__xpinyin_save_CJKglue: \CJKglue
231       \cs_set_eq:NN \CJKglue \__xpinyin_CJKglue:
232     }
233     \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue }
234     \__xpinyin_replace_CJKsymbol:
235     \__xpinyin_restore_footnote:
236     \bool_set_true:N \l__xpinyin_enable_bool
237   }
238 }

```

(End definition for \enablepinyin. This function is documented on page 3.)

\disablepinyin

```

239 \NewDocumentCommand \disablepinyin { }
240 {
241   \bool_if:NT \l__xpinyin_enable_bool
242   {
243     \cs_if_eq:NNT \CJKglue \__xpinyin_CJKglue:
244     { \cs_set_eq:NN \CJKglue \__xpinyin_save_CJKglue: }
245     \__xpinyin_restore_CJKsymbol:
246     \bool_set_false:N \l__xpinyin_enable_bool
247   }
248 }

```

(End definition for \disablepinyin. This function is documented on page 3.)

__xpinyin_restore_footnote:

```
249 \cs_new_protected_nopar:Npn __xpinyin_restore_footnote:
250 {
251   \bool_if:NF \l__xpinyin_footnote_bool
252   { \tl_put_left:Nn \@parboxrestore { \l__xpinyin_restore_footnote_tl } }
253 }
```

(End definition for __xpinyin_restore_footnote:.)

\l__xpinyin_restore_footnote_tl

```
254 \tl_new:N \l__xpinyin_restore_footnote_tl
255 \tl_set:Nn \l__xpinyin_restore_footnote_tl
256 {
257   \int_compare:nNnT \etex_currentgrouptype:D = \c_eleven
258   { \disablepinyin }
259 }
```

(End definition for \l__xpinyin_restore_footnote_tl.)

\l__xpinyin_CJKglue_dim

```
260 \dim_new:N \l__xpinyin_CJKglue_dim
```

(End definition for \l__xpinyin_CJKglue_dim.)

__xpinyin_single_aux:nn

```
261 \cs_new_protected_nopar:Npn __xpinyin_single_aux:nn #1#2
262 {
263   __xpinyin_replace_CJKsymbol_single:n {#2}
264   #1
265   \group_end:
266 }
267 \cs_new_protected_nopar:Npn __xpinyin_replace_CJKsymbol_single_aux:n #1
268 {
269   \bool_if:NF \l__xpinyin_enable_bool { __xpinyin_replace_CJKsymbol: }
270   \cs_set_protected_nopar:Npn \CJKsymbol ##1
271   { __xpinyin_single_CJKsymbol:nn {##1} {#1} }
272 }
273 \cs_new_protected_nopar:Npn __xpinyin_single_CJKsymbol:nn #1#2
274 {
275   __xpinyin_make_pinyin_box:xnn
276   { __xpinyin_to_unicode:n {#1} } {#1} { __xpinyin_pinyin:n {#2} }
277   __xpinyin_save_CJKsymbol:n {#1}
278 }
```

(End definition for __xpinyin_single_aux:nn.)

__xpinyin_replace_CJKsymbol_aux:

```
279 \cs_new_protected_nopar:Npn __xpinyin_replace_CJKsymbol_aux:
280 {
281   \cs_set_eq:NN __xpinyin_save_CJKsymbol:n \CJKsymbol
282   \cs_set_eq:NN \CJKsymbol __xpinyin_CJKsymbol:n
283 }
```

(End definition for __xpinyin_replace_CJKsymbol_aux:.)

__xpinyin_restore_CJKsymbol_aux:

```
284 \cs_new_protected_nopar:Npn __xpinyin_restore_CJKsymbol_aux:
285 { \cs_set_eq:NN \CJKsymbol __xpinyin_save_CJKsymbol:n }
```

(End definition for __xpinyin_restore_CJKsymbol_aux:.)

_xpinyin_select_font_xetex:

```
286 \cs_new_protected_nopar:Npn \__xpinyin_select_font_xetex:
287 {
288   \cs_if_exist_use:cF { \l__xpinyin_coor_tl }
289   {
290     \tl_set:Nx \l__xpinyin_current_coor_tl { \l__xpinyin_coor_tl }
291     \__xpinyin_select_font_aux:
292     \int_compare:nNnF { \xetex_fonttype:D \tex_font:D } = \c_zero
293     {
294       \exp_last_unbraced:NNV
295       \cs_gset_eq:cN \l__xpinyin_current_coor_tl \tex_font:D
296     }
297   }
298 }
```

(End definition for __xpinyin_select_font_xetex:.)

_xpinyin_select_font_aux:

```
299 \cs_new_protected_nopar:Npn \__xpinyin_select_font_aux:
300 {
301   \fontsize
302   { \l__xpinyin_ratio_tl \etex_dimexpr:D \f@size pt \scan_stop: }
303   { \f@baselineskip }
304   \normalfont
305   \l__xpinyin_font_tl
306   \selectfont
307 }
```

(End definition for __xpinyin_select_font_aux:.)

_xpinyin_to_unicode_xetex:n

```
308 \cs_new_nopar:Npn \__xpinyin_to_unicode_xetex:n #1
309 { \int_to_arabic:n { `#1 } }
```

(End definition for __xpinyin_to_unicode_xetex:n.)

_xpinyin_UTF_to_unicode:n

_xpinyin_UTFchar_to_unicode:n

```
310 \cs_new_nopar:Npn \__xpinyin_UTF_to_unicode:n #1
311 {
312   \int_to_arabic:n
313   { \exp_args:No \int_from_hex:n { \CJK@plane } * "100 + #1 }
314 }
315 \cs_new_nopar:Npn \__xpinyin_UTFchar_to_unicode:n #1
316 { \int_to_arabic:n { \__xpinyin_UTF_viii_to_unicode:NNW #1 \q_stop } }
317 \cs_new_nopar:Npn \__xpinyin_UTF_viii_to_unicode:NNW #1#2#3#4 \q_stop
318 {
319   \tl_if_empty:nTF {#4}
320   { ( `#1 - "E0 ) * "1000 + ( `#2 - "80 ) * "40 + ( `#3 - "80 ) }
321   { ( `#1 - "F0 ) * "4000 + ( `#2 - "80 ) * "1000 + ( `#3 - "80 ) * "40 + ( `#4 - "80 ) }
322 }
```

(End definition for __xpinyin_UTF_to_unicode:n and __xpinyin_UTFchar_to_unicode:n.)

_xpinyin_GBK_to_unicode:n

_xpinyin_GBKchar_to_unicode:n

```
323 \cs_new_nopar:Npn \__xpinyin_GBK_to_unicode:n #1
324 { \int_to_arabic:n { " \CJKtu_sfd_map:nn { \CJK@plane } {#1} } }
325 \cs_new_nopar:Npn \__xpinyin_GBKchar_to_unicode:n #1
326 { \int_to_arabic:n { " \CJKchartouni {#1} } }
```

(End definition for __xpinyin_GBK_to_unicode:n and __xpinyin_GBKchar_to_unicode:n.)

_xpinyin_adjust_xeCJK_hook:

```
327 \cs_new_protected_nopar:Npn \__xpinyin_adjust_xeCJK_hook:
328 {
329   \cs_new_eq:NN \__xpinyin_select_font: \__xpinyin_select_font_xetex:
330   \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_to_unicode_xetex:n
331   \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_to_unicode:n
332   \cs_new_eq:NN \__xpinyin_restore_CJKsymbol: \__xpinyin_restore_CJKsymbol_aux:
333   \cs_new_eq:NN \__xpinyin_replace_CJKsymbol: \__xpinyin_replace_CJKsymbol_aux:
```

```

334 \cs_new_eq:NN \__xpinyin_replace_CJKsymbol_single:n
335 \__xpinyin_replace_CJKsymbol_single_aux:n
336 \tl_if_exist:NTF \l_xeCJK_current_font_tl
337 {
338   \tl_set:Nn \l__xpinyin_coor_tl
339   {
340     ( \tl_to_str:N \l__xpinyin_font_tl ) /
341     \l_xeCJK_current_font_tl/\l__xpinyin_ratio_tl
342   }
343 }
344 {
345   \tl_set:Nn \l__xpinyin_coor_tl
346   {
347     ( \tl_to_str:N \l__xpinyin_font_tl ) /
348     \xeCJK@family/\f@series/\f@shape/\f@size/\l__xpinyin_ratio_tl
349   }
350 }
351 \cs_new_eq:NN \__xpinyin_leavevmode: \prg_do_nothing:
352 \cs_new_protected_nopar:Npx \__xpinyin_CJKsymbol_hook:
353 {
354   \exp_not:N \makeXeCJKinactive
355   \cs_if_exist_use:NF \xeCJK_select_font:
356   { \exp_not:N \xeCJK@setfont }
357 }
358 }

```

(End definition for __xpinyin_adjust_xeCJK_hook:.)

__xpinyin_adjust_CJK_hook:

```

359 \cs_new_protected_nopar:Npn \__xpinyin_adjust_CJK_hook:
360 {
361   \bool_if:NTF \g__xpinyin_GBK_bool
362   {
363     \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_GBK_to_unicode:n
364     \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_GBKchar_to_unicode:n
365   }
366   {
367     \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_UTF_to_unicode:n
368     \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_UTFchar_to_unicode:n
369   }
370 \cs_new_eq:NN \__xpinyin_select_font: \__xpinyin_select_font_aux:
371 \cs_new_eq:NN \__xpinyin_leavevmode: \__xpinyin_quit_vmode:
372 \cs_new_eq:NN \__xpinyin_CJKsymbol_hook: \prg_do_nothing:
373 \@ifpackageloaded { CJKpunct }
374 { \__xpinyin_adjust_CJKpunct_hook: }
375 {
376   \cs_new_eq:NN \__xpinyin_restore_CJKsymbol: \__xpinyin_restore_CJKsymbol_aux:
377   \cs_new_eq:NN \__xpinyin_replace_CJKsymbol: \__xpinyin_replace_CJKsymbol_aux:
378   \cs_new_eq:NN \__xpinyin_replace_CJKsymbol_single:n
379   \__xpinyin_replace_CJKsymbol_single_aux:n
380 \AtBeginDocument
381 {
382   \@ifpackageloaded { CJKpunct }
383   {
384     \cs_undefine:N \__xpinyin_restore_CJKsymbol:
385     \cs_undefine:N \__xpinyin_replace_CJKsymbol:
386     \cs_undefine:N \__xpinyin_replace_CJKsymbol_single:n
387     \__xpinyin_adjust_CJKpunct_hook:
388   } { }
389 }
390 }
391 }

```

(End definition for __xpinyin_adjust_CJK_hook:.)

__xpinyin_adjust_CJKpunct_hook:

```

392 \cs_new_protected_nopar:Npn \__xpinyin_adjust_CJKpunct_hook:
393 {
394   \cs_new_protected_nopar:Npn \__xpinyin_restore_CJKsymbol:

```

```

395     {
396       \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
397       { \__xpinyin_restore_CJKsymbol_aux: }
398       { \cs_set_eq:NN \CJKosymbol \__xpinyin_save_CJKsymbol:n }
399     }
400 \cs_new_protected_nopar:Npn \__xpinyin_replace_CJKsymbol:
401   {
402     \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
403     { \__xpinyin_replace_CJKsymbol_aux: }
404     {
405       \cs_set_eq:NN \__xpinyin_save_CJKsymbol:n \CJKosymbol
406       \cs_set_eq:NN \CJKosymbol \__xpinyin_CJKsymbol:n
407     }
408   }
409 \cs_new_protected_nopar:Npn \__xpinyin_replace_CJKsymbol_single:n ##1
410   {
411     \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
412     { \__xpinyin_replace_CJKsymbol_single_aux:n { ##1 } }
413     {
414       \bool_if:NF \l__xpinyin_enable_bool
415       { \cs_set_eq:NN \__xpinyin_save_CJKsymbol:n \CJKosymbol }
416       \cs_set_protected_nopar:Npn \CJKosymbol #####1
417       { \__xpinyin_single_CJKsymbol:nn { #####1 } { ##1 } }
418     }
419   }
420 }

```

(End definition for `__xpinyin_adjust_CJKpunct_hook:`)

`\pinyin`

```

421 \NewDocumentCommand \pinyin { 0 { } m }
422   {
423     \group_begin:
424     \keys_set:nn { xpinyin } {#1}
425     \l__xpinyin_font_tl
426     \l__xpinyin_format_tl { }
427     \selectfont
428     \c__xpinyin_reset_UTF_cs_tl
429     \__xpinyin_pinyin:n {#2}
430     \group_end:
431   }

```

(End definition for `\pinyin`. This function is documented on page 2.)

`__xpinyin_pinyin:n`

```

432 \cs_new_protected_nopar:Npn \__xpinyin_pinyin:n #1
433   {
434     \__xpinyin_pinyin_init:
435     \bool_set_true:N \l__xpinyin_first_bool
436     \tl_set:Nn \l__xpinyin_save_tl {#1}
437     \__xpinyin_pinyin_aux:n #1 \q_recursion_tail \q_recursion_stop
438   }

```

(End definition for `__xpinyin_pinyin:n`)

`__xpinyin_pinyin_aux:n`

```

439 \cs_new_protected_nopar:Npn \__xpinyin_pinyin_aux:n #1
440   {
441     \quark_if_recursion_tail_stop_do:nn {#1}
442     {
443       \bool_if:NTF \l__xpinyin_first_bool { \l__xpinyin_save_tl }
444       { \tl_if_empty:NF \l__xpinyin_item_tl { \l__xpinyin_pysep_tl \l__xpinyin_item_tl } }
445     }
446     \__xpinyin_if_number:nTF {#1}
447     {
448       \bool_if:NTF \l__xpinyin_first_bool
449       { \bool_set_false:N \l__xpinyin_first_bool }
450       { \l__xpinyin_pysep_tl }
451     }
452     \l__xpinyin_pre_tl

```

```

452     \l__xpinyin_tone:Nn \l__xpinyin_tone_tl {#1}
453     \l__xpinyin_post_tl
454     \l__xpinyin_pinyin_init:
455   }
456   {
457     \int_compare:nNnTF
458     { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:N \l__xpinyin_tone_tl _tl } } >
459     { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:n {#1} _tl } }
460     { \tl_put_right:Nn \l__xpinyin_post_tl {#1} }
461     {
462       \tl_set:Nn \l__xpinyin_tone_tl {#1}
463       \tl_set_eq:NN \l__xpinyin_pre_tl \l__xpinyin_item_tl
464       \tl_clear:N \l__xpinyin_post_tl
465     }
466     \tl_put_right:Nx \l__xpinyin_item_tl { \l__xpinyin_replace_v:n {#1} }
467   }
468   \l__xpinyin_pinyin_aux:n
469 }

```

(End definition for \l__xpinyin_pinyin_aux:n)

\l__xpinyin_tone:Nn

```

470 \cs_new_protected_nopar:Npn \l__xpinyin_tone:Nn #1#2
471 { \use:c { \l__xpinyin_num_to_tone_ #1 :Nn } {#1} {#2} }
472 \cs_generate_variant:Nn \l__xpinyin_tone:Nn { V }

```

(End definition for \l__xpinyin_tone:Nn)

\l__xpinyin_replace_v:n

```

473 \cs_new_nopar:Npn \l__xpinyin_replace_v:n #1
474 {
475   \str_if_eq:mnTF {#1} { v }
476   {
477     \str_case:onTF { \l__xpinyin_item_tl }
478     { { l } { } { n } { } { L } { } { N } { } }
479     { \exp_not:n { ü } } { u }
480   }
481   { \exp_not:n {#1} }
482 }

```

(End definition for \l__xpinyin_replace_v:n)

\l__xpinyin_pinyin_init:

```

483 \cs_new_nopar:Npn \l__xpinyin_pinyin_init:
484 {
485   \tl_clear:N \l__xpinyin_pre_tl \tl_clear:N \l__xpinyin_post_tl
486   \tl_clear:N \l__xpinyin_item_tl \tl_clear:N \l__xpinyin_tone_tl
487 }

```

(End definition for \l__xpinyin_pinyin_init:)

\l__xpinyin_if_number:nTF

```

488 \prg_new_conditional:Npnn \l__xpinyin_if_number:n #1 { TF }
489 {
490   \if_int_compare:w \c_one < 1 \tl_to_str:n {#1} \exp_stop_f:
491   \prg_return_true: \else: \prg_return_false: \fi:
492 }

```

(End definition for \l__xpinyin_if_number:nTF)

\l__xpinyin_first_bool

```

493 \bool_new:N \l__xpinyin_first_bool

```

(End definition for \l__xpinyin_first_bool)

```

\c__xpinyin_a_tl
\c__xpinyin_o_tl 494 \tl_const:Nn \c__xpinyin_a_tl { 3 }
\c__xpinyin_e_tl 495 \tl_const:Nn \c__xpinyin_o_tl { 2 }
\c__xpinyin_i_tl 496 \tl_const:Nn \c__xpinyin_e_tl { 2 }
\c__xpinyin_u_tl 497 \tl_const:Nn \c__xpinyin_i_tl { 1 }
\c__xpinyin_u_tl 498 \tl_const:Nn \c__xpinyin_u_tl { 1 }
\c__xpinyin_v_tl 499 \tl_const:Nn \c__xpinyin_v_tl { 1 }

```

(End definition for \c__xpinyin_a_tl and others.)

__xpinyin_num_to_tone:Nn

```

500 \cs_new_protected_nopar:Npn \__xpinyin_num_to_tone:Nn #1#2
501 {
502   \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
503     = {#1} \or: \'{#1} \or: \v {#1} \or: \` {#1} \else: #1 \fi:
504 }
505 \tl_map_inline:nn { a o e u }
506 { \cs_new_eq:cN { __xpinyin_num_to_tone_ #1 :Nn } \__xpinyin_num_to_tone:Nn }
507 \cs_new_nopar:Npn \__xpinyin_num_to_tone_i:Nn #1#2
508 {
509   \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
510     ī \or: í \or: ĩ \or: ï \else: i \fi:
511 }
512 \cs_new_protected_nopar:Npn \__xpinyin_num_to_tone_v:Nn #1#2
513 {
514   \str_case:onTF { \l__xpinyin_pre_tl }
515     { { l } { } { n } { } { L } { } { N } { } }
516     {
517       \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
518         ū \or: ú \or: ũ \or: ù \else: ü \fi:
519     }
520     { \__xpinyin_num_to_tone:Nn u {#2} }
521 }

```

(End definition for __xpinyin_num_to_tone:Nn.)

\xpinyinsetup

```

522 \NewDocumentCommand \xpinyinsetup { m } { \keys_set:nn { xpinyin } {#1} }

```

(End definition for \xpinyinsetup. This function is documented on page 2.)

```

ratio
vsep 523 \clist_map_inline:nn
hsep 524 { ratio , vsep , hsep , pysep , font , format , multiple }
pysep 525 { \keys_define:nn { xpinyin } { #1 .tl_set:c = { l__xpinyin_ #1 _tl } } }
font 526 \keys_define:nn { xpinyin }
format 527 { footnote .bool_set:N = \l__xpinyin_footnote_bool }
multiple 528 \keys_set:nn { xpinyin }
footnote 529 {
530   ratio = .4 ,
531   vsep = 1 em ,
532   pysep = \c_space_tl ,
533   font = \normalfont ,
534 }

```

(End definition for ratio and others. These functions are documented on page 2.)

\xpinyin_customary:nnn

\xpinyin_multiple:nnn

```

535 \cs_new_protected_nopar:Npn \xpinyin_customary:nnn #1#2#3
536 { \cs_gset_nopar:cpn { c__xpinyin_ #2 _tl } {#3} }
537 \cs_new_protected_nopar:Npn \xpinyin_multiple:nnn #1#2#3
538 { \cs_gset_nopar:cpn { c__xpinyin_multiple_ #2 _clist } {#3} }

```

(End definition for \xpinyin_customary:nnn and \xpinyin_multiple:nnn.)

```

539 \group_begin:
540 \cs_set_eq:NN \XPYU \xpinyin_customary:nnn
541 \cs_set_eq:NN \XPYUM \xpinyin_multiple:nnn
542 \file_input:n { xpinyin-database.def }
543 \group_end:

```

`\setpinyin`

```
544 \NewDocumentCommand \setpinyin { m m }
545 {
546   \tl_set:cn
547     { c__xpinyin_ \__xpinyin_char_to_unicode:n {#1} _tl }
548     { \__xpinyin_pinyin:n {#2} }
549 }
```

(End definition for `\setpinyin`. This function is documented on page 2.)

```
550 \ProcessKeysOptions { xpinyin }
551 <package>
```

5 xpinyin.lua

```
552 (*lua)
553 xpinyin      = xpinyin or { }
554 local xpinyin = xpinyin
555
556   计算时区2。
557 xpinyin.tzoffset = "+0000"
558 do
559   -- Compute the difference in seconds between local time and UTC.
560   local function get_timezone()
561     local now = os.time()
562     return os.difftime(now, os.time(os.date("!*t", now)))
563   end
564   -- Return a timezone string in ISO 8601:2000 standard form (+hhmm or -hhmm)
565   local function get_tzoffset(timezone)
566     local h, m = math.modf(timezone / 3600)
567     return string.format("%+.4d", 100 * h + 60 * m)
568   end
569   xpinyin.tzoffset = get_tzoffset(get_timezone())
570 end
571
572 xpinyin = {
573   uchar      = unicode.utf8.char,
574   readings   = { },
575   fixreadings = {
576     {"U+3007", "Mandarin", "líng"}
577   },
578   database = {
579     source = "http://www.unicode.org/Public/UNIDATA/UniHan.zip",
580     file   = "UniHan_Readings.txt",
581     date   = "Date: 2014-05-09 18:17:02 GMT [JHJ]",
582     version = "Unicode version: 7.0.0",
583     dbfile = "xpinyin.db"
584   },
585   preamble = [[
586 %<<COMMENT
587 %%
588 %% Do not edit this file!
589 %% Created from UniHan database:
590 %%
591 %%   $file
592 %%   $date
593 %%   $version
594 %% by "texlua xpinyin.lua" on ]]
595     .. os.date("%Y-%m-%d %X ") .. xpinyin.tzoffset
596     .. "\n%"
597 %COMMENT
598 }
599
600 local http_request = require("socket.http").request
```

²<http://lua-users.org/wiki/TimeZone>

```

598 local ltn12_sink_file = require("ltn12").sink.file
599 local zip_open = require("zip").open

    将 Unihan_Readings.txt3 保存到一张表里面。
600 function xpinyin.maketable (txt)
601     local f = io.open(txt or xpinyin.database.file, "r")
602     if not f then
603         local source = xpinyin.database.source
604         local zfilename = source:match("[~/]+.$")
605         local zfile = zip_open(zfilename)
606         if not zfile then
607             xpinyin.download(source, zfilename)
608             zfile = assert(zip_open(zfilename))
609         end
610         f = assert(zfile:open(xpinyin.database.file))
611         zfile:close()
612     end
613     local s, prop
614     for line in f:lines() do
615         s = line:explode("\t")
616         if #s == 3 then
617             prop = s[2]:sub(2)
618             if prop == "Mandarin" or
619                prop == "HanyuPinyin" or
620                prop == "XHC1983" or
621                prop == "HanyuPinlu" then
622                 xpinyin.insert(s[1], prop, s[3])
623             end
624         elseif line:find("Date") then
625             xpinyin.database.date = line:match("^[#%s]*(.*)")
626         elseif line:find("Unicode version:") then
627             xpinyin.database.version = line:match("^[#%s]*(.*)")
628         end
629     end
630     f:close()
631     if xpinyin.fixreadings then
632         for _, s in pairs(xpinyin.fixreadings) do
633             xpinyin.insert(s[1], s[2], s[3])
634         end
635     end
636 end

    下载 Unihan.zip。
637 function xpinyin.download (source, zip)
638     print("\nRetrieving Unihan Database from\n", source)
639     local status, err = http_request{
640         url = source,
641         sink = ltn12_sink_file(io.open(zip, "wb")) }
642     if not status then
643         error([[Download ']] .. zip .. [[ failed because of ]] .. err .. ".")
644     end
645 end

    往拼音表中加入项目。
646 function xpinyin.insert (unicode, prop, value)
647     local index = tonumber(unicode:match("%x+$"), 16)
648     if not xpinyin.readings[index] then
649         xpinyin.readings[index] = { }
650     end
651     xpinyin.readings[index][prop] = value
652 end

    输出需要的格式文件。
653 function xpinyin.output (db)
654     local f = assert(io.open(db or xpinyin.database.dbfile, "w"))
655     local preamble = xpinyin.preamble:gsub("%$(%w+)", xpinyin.database)
656     f:write(preamble, "\n")
657     local hanzi, pinyin
658     local mt = { }

```

³<http://http://www.unicode.org/reports/tr38/>。

```

659 for index, pyt in xpinyin.pairsByKeys(xpinyin.readings) do
660     pinyin = assert(xpinyin.grep(pyt))
661     hanzi = xpinyin.uchar(index)
662     f:write("\\XPLYU{" .. hanzi, "}" .. index, "}" .. pinyin, "}" .. "\n")
663     pinyin = xpinyin.multiple(pyt)
664     if pinyin then
665         mt[#mt + 1] = "\\XPLYUM{" .. hanzi .. "}" .. index .. "}" .. pinyin .. "}"
666     end
667 end
668 f:write(table.concat(mt, "\n"), "\n")
669 f:close()
670 end

```

将表按照索引排序,代码来源于 *Programming in Lua*。

```

671 function xpinyin.pairsByKeys (t, f)
672     local a = { }
673     for n in pairs(t) do a[#a + 1] = n end
674     table.sort(a, f)
675     local i = 0 -- iterator variable
676     return function () -- iterator function
677         i = i + 1
678         return a[i], t[a[i]]
679     end
680 end

```

按照 Mandarin、XHC1983、HanyuPinyin 的顺序选择最常用的拼音。HanyuPinlu 的质量较差,不采用。

```

681 function xpinyin.grep (pyt)
682     if pyt.Mandarin then
683         return pyt.Mandarin:match("%S+"), "Mandarin"
684     elseif pyt.XHC1983 then
685         return pyt.XHC1983:match(":(%S+)"), "XHC1983"
686     elseif pyt.HanyuPinyin then
687         return pyt.HanyuPinyin:match(":([^,%s]+)"), "HanyuPinyin"
688     end
689 end

```

根据 XHC1983 和 HanyuPinyin 选出多音字。

```

690 function xpinyin.multiple (pyt)
691     if pyt.XHC1983 then
692         local s = pyt.XHC1983:explode()
693         if s[2] then
694             local t = { }
695             for i, v in ipairs(s) do
696                 t[#t + 1] = v:explode(":")[2]
697             end
698             return xpinyin.unique(t), "XHC1983"
699         end
700     elseif pyt.HanyuPinyin and pyt.HanyuPinyin:find("%D,") then
701         local t = { }
702         for _, v in ipairs(pyt.HanyuPinyin:explode()) do
703             for _, py in ipairs(v:explode(":")[2]:explode(",")) do
704                 t[#t + 1] = py
705             end
706         end
707         return xpinyin.unique(t), "HanyuPinyin"
708     end
709 end

```

删除掉数组中的重复元素。

```

710 function xpinyin.unique (t)
711     local rt = xpinyin.remove_duplicate(t)
712     if #rt > 1 then
713         return table.concat(rt, ",")
714     end
715 end
716 function xpinyin.remove_duplicate (t)
717     local ht = { }
718     local nt = { }
719     for i, v in ipairs(t) do
720         if not ht[v] then

```



```
721     nt[#nt + 1] = v
722     ht[v] = true
723   end
724 end
725 return nt
726 end
727 xpinyin.maketable()
728 xpinyin.output()
729 <lua>
```

6 代码索引

斜体的数字表示对应项说明所在的页码,下划线的数字表示定义所在的代码行号,而直立的数字表示对应项使用时所在的行号。

Symbols	
<code>\"</code>	37, 38, 39
<code>\'</code>	503
<code>\\</code>	5, 6, 7, 662, 665
<code>\`</code>	503
A	
<code>\AtBeginDocument</code>	380
<code>\AtEndOfPackage</code>	96, 101, 108, 121, 126
B	
bool commands:	
<code>\bool_gset_true:N</code>	115
<code>\bool_if:NF</code>	215, 226, 251, 269, 414
<code>\bool_if:nF</code>	14
<code>\bool_if:NT</code>	241
<code>\bool_if:NTF</code>	361, 443, 448
<code>\bool_new:N</code>	94, 221, 493
<code>\bool_set_false:N</code>	246, 449
<code>\bool_set_true:N</code>	236, 435
box commands:	
<code>\box_dp:N</code>	172
<code>\box_ht:N</code>	172
<code>\box_move_up:nn</code>	174
<code>\box_new:N</code>	131, 132
<code>\box_resize:Nnn</code>	170
<code>\box_use_clear:N</code>	177
<code>\box_wd:N</code>	136, 167, 168, 171, 176
C	
char commands:	
<code>\char_set_catcode:nn</code>	70
<code>\char_set_catcode_active:n</code>	71, 81
<code>\char_set_lccode:nn</code>	85
<code>\char_value_catcode:n</code>	70
<code>\CJKchartouni</code>	326
<code>\CJKglue</code>	216, 230, 231, 233, 243, 244
<code>\CJKosymbol</code>	398, 405, 406, 415, 416
<code>\CJKsymbol</code>	270, 281, 282, 285
CJKtu commands:	
<code>\CJKtu_sfd_map:nn</code>	324
clist commands:	
<code>\clist_if_exist:cTF</code>	160
<code>\clist_map_inline:nn</code>	23, 523
color commands:	
<code>\color_ensure_current:</code>	157
<code>\color_group_begin:</code>	157
<code>\color_group_end:</code>	164
cs commands:	
<code>\cs_generate_variant:Nn</code>	187, 195, 472
<code>\cs_gset_eq:cN</code>	295
<code>\cs_gset_nopar:cpn</code>	536, 538
<code>\cs_if_eq:NNT</code>	243
<code>\cs_if_exist:cF</code>	44, 56
<code>\cs_if_exist:NTF</code>	138
<code>\cs_if_exist_use:c</code>	458, 459
<code>\cs_if_exist_use:cF</code>	288
<code>\cs_if_exist_use:NF</code>	355
<code>\cs_new_eq:cN</code>	506
<code>\cs_new_eq:NN</code>	139, 329, 330, 331, 332, 333, 334, 351, 363, 364, 367, 368, 370, 371, 372, 376, 377, 378
<code>\cs_new_nopar:Npn</code> 308, 310, 315, 317, 323, 325, 473, 483, 507	
<code>\cs_new_protected:Npn</code>	133
<code>\cs_new_protected_nopar:cpn</code>	76
<code>\cs_new_protected_nopar:Npn</code>	
.....	42, 47, 52, 54, 74, 82, 141, 148, 188, 190, 222, 249, 261, 267, 273, 279, 284, 286, 299, 327, 359, 392, 394, 400, 409, 432, 439, 470, 500, 512, 535, 537
<code>\cs_new_protected_nopar:Npx</code>	352
<code>\cs_set_eq:NN</code>	89, 185, 230, 231, 244, 281, 282, 285, 398, 405, 406, 415, 540, 541
<code>\cs_set_protected_nopar:Npn</code>	270, 416
<code>\cs_undefine:N</code>	384, 385, 386
D	
dim commands:	
<code>\dim_compare:nNnT</code>	166
<code>\dim_new:N</code>	260
<code>\disablepinyin</code>	3, 7, 239, 258
E	
eleven commands:	
<code>\c_eleven</code>	257
else commands:	
<code>\else:</code>	491, 503, 510, 518
<code>\enablepinyin</code>	3, 7, 199, 208, 224
etex commands:	
<code>\etex_currentgrouptype:D</code>	257
<code>\etex_dimexpr:D</code>	302
exp commands:	
<code>\exp_after:wN</code>	144
<code>\exp_args:Nc</code>	68
<code>\exp_args:Nf</code>	53, 58
<code>\exp_args:No</code>	313
<code>\exp_args:Nx</code>	50
<code>\exp_last_unbraced:NNV</code>	294
<code>\exp_not:N</code>	354, 356
<code>\exp_not:n</code>	479, 481
<code>\exp_stop_f:</code>	490, 502, 509, 517
F	
fi commands:	
<code>\fi:</code>	145, 491, 503, 510, 518
file commands:	
<code>\file_input:n</code>	542
font	3, 13
<code>\fontsize</code>	301
footnote	3, 13
format	3, 13
four commands:	
<code>\c_four</code>	64
G	
group commands:	
<code>\group_begin:</code>	80, 84, 206, 213, 423, 539
<code>\group_end:</code>	88, 92, 210, 265, 430, 543

H		pysep	3, <u>13</u>
hbox commands:		Q	
\hbox_overlap_right:n	151	quark commands:	
\hbox_set:Nn	135, 153, 155	\quark_if_recursion_tail_stop_do:nn	441
\hbox_to_wd:nn	176	R	
hsep	2, <u>13</u>	ratio	2, <u>13</u>
I		recursion commands:	
\i	35, 36	\q_recursion_stop	437
if commands:		\q_recursion_tail	437
\if_case:w	502, 509, 517	\RequirePackage	20, 21, 106, 120, 124
\if_int_compare:w	490	S	
\if_mode_vertical:	143	scan commands:	
\IfBooleanTF	204	\scan_stop:	302
int commands:		\selectfont	306, 427
\int_case:nn	60	\setpinyin	2, <u>14</u> , 544
\int_compare:nNnF	292	skip commands:	
\int_compare:nNnT	257	\skip_horizontal:n	223
\int_compare:nNnTF	396, 402, 411, 457	space commands:	
\int_eval:n	53, 502, 509, 517	\c_space_tl	532
\int_from_hex:n	313	stop commands:	
\int_to_arabic:n	309, 312, 316, 324, 326	\q_stop	316, 317
K		str commands:	
keys commands:		\str_case:onTF	477, 514
\keys_define:nn	525, 526	\str_if_eq:nnTF	475
\keys_set:nn	198, 207, 214, 424, 522, 528	sys commands:	
M		\c_sys_engine_str	13
\makexeCJKinactive	354	\sys_if_engine_pdftex:T	182
msg commands:		\sys_if_engine_pdftex_p:	17
\msg_critical:nn	19	\sys_if_engine_xetex:TF	118
\msg_error:nn	11	\sys_if_engine_xetex_p:	16
\msg_new:nnn	3, 12	T	
multiple	3, <u>13</u>	\t	615
N		TeX and L ^A T _E X ₂ ϵ commands:	
\n	594, 638, 656, 662, 668	\ifpackagelater	10
\NewDocumentCommand	202, 224, 239, 421, 522, 544	\ifpackageloaded	95, 98, 104, 373, 382
\NewDocumentEnvironment	196	\@parboxrestore	252
\normalfont	304, 533	\@tabacckludge	
\nRetrieving	638	3, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 39
O		\a	3
one commands:		\begin	2
\c_one	490, 502, 509, 517	\CJK@plane	185, 313, 324
or commands:		\CJKglue	2
\or:	503, 510, 518	\CJKpunct@ps@plain	396, 402, 411
P		\CJKpunct@punctstyle	396, 402, 411
pdftex commands:		\disablepinyin	3, 3
\pdftex_quitvmode:D	138, 139	\enablepinyin	3
\pinyin	2, <u>11</u> , 421	\end	2
pinyinscope	2, <u>6</u>	\f@baselineskip	303
prg commands:		\f@series	348
\prg_do_nothing:	351, 372	\f@shape	348
\prg_new_conditional:Npnn	488	\f@size	302, 348
\prg_return_false:	491	\footnote	3
\prg_return_true:	491	\normalfont	1, 3
\ProcessKeysOptions	550	\pinyin	2, 3
prop commands:		\setpinyin	2, 2
\prop_gput:Nnn	41	\XeCJK@family	348
\prop_map_function:NN	100, 107, 125	\XeCJK@setfont	356
\prop_new:N	22	\xpinyin	2, 2, 2
		\xpinyin*	2, 2, 2

\xpinyinsetup	2	\l__xpinyin_current_coor_tl	290, 295
tex commands:		\xpinyin_customary:nnn	13, 535, 540
\tex_font:D	292, 295	\c__xpinyin_e_tl	13, 496
\tex_hss:D	177	\l__xpinyin_enable_bool	
\tex_indent:D	144		7, 215, 221, 226, 236, 241, 246, 269, 414
\tex_lowercase:D	86	\l__xpinyin_first_bool	12, 435, 443, 448, 449, 493
\tex_undefined:D	185	\l__xpinyin_font_tl	305, 340, 347, 425
three commands:		\l__xpinyin_footnote_bool	251, 527
\c_three	63	\l__xpinyin_format_tl	161, 162, 426
tl commands:		\g__xpinyin_GBK_bool	94, 115, 361
\tl_clear:N	464, 485, 486	__xpinyin_GBK_char:nn	4, 47, 107
\tl_const:cn	45	__xpinyin_GBK_char_aux:nn	50, 52
\tl_const:Nn	494, 495, 496, 497, 498, 499	__xpinyin_GBK_char_aux:nnn	53, 54
\tl_count:n	60	__xpinyin_GBK_char_def:nnn	58, 74
\tl_gput_right:Nn	89	__xpinyin_GBK_to_unicode:n	9, 323, 363
\tl_gput_right:Nx	69	__xpinyin_GBKchar_to_unicode:n	9, 325, 364
\tl_head:n	50	\l__xpinyin_hsep_tl	223, 228
\tl_if_empty:NF	228, 444	\c__xpinyin_i_tl	13, 497
\tl_if_empty:NTF	319	__xpinyin_if_number:n	488
\tl_if_exist:NTF	336	__xpinyin_if_number:NTF	12, 446
\tl_map_inline:nn	505	\l__xpinyin_item_tl	444, 463, 466, 477, 486
\tl_new:N	79, 93, 181, 254	__xpinyin_leave_vmode:	5
\tl_put_left:Nn	252	__xpinyin_leavevmode:	150, 351, 371
\tl_put_right:Nn	110, 184, 460	__xpinyin_make_pinyin_box:nnn	6, 148, 187, 192
\tl_put_right:Nx	466	__xpinyin_make_pinyin_box:xnn	275
\tl_set:cn	546	\xpinyin_multiple:nnn	13, 537, 541
\tl_set:Nn	255, 338, 345, 436, 462	\l__xpinyin_multiple_tl	161
\tl_set:Nx	290	__xpinyin_num_to_tone:Nn	13, 500, 506, 520
\tl_set_eq:NN	463	__xpinyin_num_to_tone_i:Nn	507
\tl_to_str:N	340, 347, 458	__xpinyin_num_to_tone_v:Nn	512
\tl_to_str:n	77, 459, 490	\c__xpinyin_o_tl	13, 495
\tl_use:N	113	__xpinyin_pinyin:n	11, 276, 429, 432, 548
two commands:		__xpinyin_pinyin_aux:n	11, 437, 439, 468
\c_two	62	\l__xpinyin_pinyin_box_hook_tl	110, 158, 181, 184
		__xpinyin_pinyin_init:	12, 434, 454, 483
		\l__xpinyin_post_tl	453, 460, 464, 485
		\l__xpinyin_pre_tl	451, 463, 485, 514
		\l__xpinyin_pysep_tl	444, 450
		__xpinyin_quit_vmode:	139, 141, 217, 371
		\l__xpinyin_ratio_tl	302, 341, 348
		__xpinyin_replace_CJKsymbol:	
			234, 269, 333, 377, 385, 400
		__xpinyin_replace_CJKsymbol_aux:	8, 279, 333, 377, 403
		__xpinyin_replace_CJKsymbol_single:n	
			263, 334, 378, 386, 409
		__xpinyin_replace_CJKsymbol_single_aux:n	
			267, 335, 379, 412
		__xpinyin_replace_v:n	12, 466, 473
		\c__xpinyin_reset_UTF_catcode_tl	69, 79, 113
		\c__xpinyin_reset_UTF_cs_tl	89, 93, 111, 428
		__xpinyin_restore_CJKsymbol:	245, 332, 376, 384, 394
		__xpinyin_restore_CJKsymbol_aux:	8, 284, 332, 376, 397
		__xpinyin_restore_footnote:	8, 235, 249
		\l__xpinyin_restore_footnote_tl	8, 252, 254, 255
		__xpinyin_save_CJKglue:	230, 244
		__xpinyin_save_CJKsymbol:n	
			154, 193, 277, 281, 285, 398, 405, 415
		\l__xpinyin_save_tl	436, 443
		__xpinyin_save_UTF_cs:Nn	4, 68, 82
		__xpinyin_select_font:	159, 329, 370
		__xpinyin_select_font_aux:	9, 291, 299, 370
		__xpinyin_select_font_xetex:	9, 286, 329
xeCJK commands:			
\l_xeCJK_current_font_tl	336, 341		
\xeCJK_select_font:	355		
xetex commands:			
\xetex_fonttype:D	292		
\xpinyin	2, 7, 202		
xpinyin commands:			
\c__xpinyin_a_tl	13, 494		
__xpinyin_adjust_CJK_hook:	10, 101, 112, 126, 359		
__xpinyin_adjust_CJKpunct_hook:	10, 374, 387, 392		
__xpinyin_adjust_xeCJK_hook:	9, 96, 121, 327		
__xpinyin_char_to_unicode:n	331, 364, 368, 547		
__xpinyin_CJKglue:	7, 222, 231, 243		
\l__xpinyin_CJKglue_dim	8, 168, 171, 216, 233, 260		
__xpinyin_CJKsymbol:n	6, 188, 282, 406		
__xpinyin_CJKsymbol:nn	190, 195		
__xpinyin_CJKsymbol:xn	189		
__xpinyin_CJKsymbol_hook:	154, 352, 372		
\l__xpinyin_coor_tl	288, 290, 338, 345		

_xpinyin_single_aux:nn	8, 218, 261	_xpinyin_UTF_to_unicode:n	9, 310, 367
_xpinyin_single_CJKsymbol:nn	271, 273, 417	_xpinyin_UTF_viii_to_unicode:NNW	316, 317
\l_xpinyin_tmpa_box	5, 131, 135, 136, 153, 168, 171, 176	_xpinyin_UTFchar_to_unicode:n	9, 315, 368
\l_xpinyin_tmpb_box	5, 132, 155, 167, 170, 172, 177	\c_xpinyin_v_tl	13, 499
_xpinyin_to_unicode:n	189, 276, 330, 331, 363, 367	\l_xpinyin_vsep_tl	174
_xpinyin_to_unicode_xetex:n	9, 308, 330	_xpinyin_width:Nn	5, 133, 216, 233
_xpinyin_tone:Nn	12, 470, 472	\xpinyinsetup	2, 13, 522
_xpinyin_tone:Vn	452	\XPYU	540
\c_xpinyin_tone_prop	3, 22, 41, 100, 107, 125	\XPYUM	541
\l_xpinyin_tone_tl	452, 458, 462, 486		
\c_xpinyin_u_tl	13, 498		
_xpinyin_UTF_char:nn	4, 42, 49, 100, 125		
		Z	
		zero commands:	
		\c_zero	292