

# xpinyin 宏包

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2022/06/04 v3.0\*

## 第 1 节 简介

xpinyin 是一个 L<sup>A</sup>T<sub>E</sub>X 宏包, 提供了为汉字自动注音的功能。

## 第 2 节 基本用法

xpinyin 支持采用 GBK 和 UTF-8 编码的 T<sub>E</sub>X 源文件, 建议总是使用 UTF-8。如果使用 L<sup>A</sup>T<sub>E</sub>X 或 pdfL<sup>A</sup>T<sub>E</sub>X 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<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, 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, L<sup>A</sup>T<sub>E</sub>X 或 pdfL<sup>A</sup>T<sub>E</sub>X 将使用 CJKutf8。

xpinyin 还依赖 **l3kernel** 和 **l3packages**, 使用 (pdf)L<sup>A</sup>T<sub>E</sub>X 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<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X 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)L<sup>A</sup>T<sub>E</sub>X 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。

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\*ctex-kit rev. b319ff9.

## 第3节 用户手册

`pinyinscope` `\begin{pinyinscope} [⟨options⟩]`

.....

`\end{pinyinscope}`

为 `pinyinscope` 环境中的汉字自动注音。例如

```
1 \begin{pinyinscope}
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，方便阅者\xpinyin{了}{liao3}然不惑。
4 \end{pinyinscope}
```

liè wèi kàn guān nǐ dào cǐ shū cóng hé ér lái shuō qǐ gēn yóu suī jìn huāng táng xì àn zé shēn yǒu qù wèi dài zài xià jiāng cǐ lái lì zhù míng  
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，  
fāng shì yuē zhě kǎo rán bù huò  
方便阅者了然不惑。

可选项 `⟨options⟩` 用于局部设置拼音的格式，将在下面说明。

`\xpinyin` `\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 `pinyinscope` 环境的命令形式。`\xpinyin` 可以在 `pinyinscope` 环境和 `\xpinyin*` 中使用。例如，

cháng  
长  
zhēn shì yīn mèng huàn shí tōng líng  
甄士隐梦幻识通灵  
zhòng yào  
重要

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

`\pinyin` `\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，

lú zi

nǚ hái zi

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

`\setpinyin` `\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<sup>1</sup>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` `\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` `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` `vsep = {⟨dimen⟩}`

设置拼音的基线与汉字基线的间距，缺省值是 1 em。

`hsep` `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

<sup>1</sup><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}`

设置拼音的其他格式, 例如颜色等, 缺省值为空。

---

**multiple**    `multiple = {\format}`

设置多音字拼音的其他格式, 缺省值为空。可以通过这个选项来提醒校正多音字的拼音。注意这个选项会覆盖 format 设置的格式。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 (pinyin scope) 中临时取消对汉字的注音, 而 \enablepinyin 用于其后的恢复。

## 第 4 节 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 \ifpackageafter { expl3 } { 2019/03/05 } { }
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_lazy_or:nnF
15 { \sys_if_engine_xetex_p: }
16 { \sys_if_engine_pdftex_p: }
17 { \msg_critical:nn { xpinyin } { engine-not-supported } }
18 \RequirePackage { xparse }
19 \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。

```

20 \prop_const_from_keyval:Nn \c__xpinyin_tone_prop
21 {
22   { ā } = { \@tabacckludge= a } ,
23   { á } = { \@tabacckludge' a } ,
24   { ä } = { \v a } ,
25   { à } = { \@tabacckludge` a } ,
26   { õ } = { \@tabacckludge= o } ,

```

```

27 { ó } = { \@tabacckludge' o } ,
28 { ö } = { \v o } ,
29 { ò } = { \@tabacckludge` o } ,
30 { ē } = { \@tabacckludge= e } ,
31 { é } = { \@tabacckludge' e } ,
32 { ě } = { \v e } ,
33 { è } = { \@tabacckludge` e } ,
34 { ū } = { \@tabacckludge= u } ,
35 { ú } = { \@tabacckludge' u } ,
36 { ů } = { \v u } ,
37 { ù } = { \@tabacckludge` u } ,
38 { ě } = { \@tabacckludge' m } ,
39 { ě } = { \@tabacckludge' n } ,
40 { ě } = { \v n } ,
41 { ě } = { \@tabacckludge` n } ,
42 { ī } = { \@tabacckludge= { \i } } ,
43 { í } = { \@tabacckludge' { \i } } ,
44 { ĭ } = { \v { \i } } ,
45 { ï } = { \@tabacckludge` { \i } } ,
46 { ü } = { \" u } ,
47 { ū } = { \@tabacckludge= { \" u } } ,
48 { ú } = { \@tabacckludge' { \" u } } ,
49 { ů } = { \v { \" u } } ,
50 { ù } = { \@tabacckludge` { \" u } }
51 }

```

```

\__xpinyin_UTF_char:nn 52 \cs_new_protected:Npn \__xpinyin_UTF_char:nn #1#2
53 {
54   \cs_if_exist:cF { u8:#1 }
55   { \tl_const:cn { u8:#1 } {#2} }
56 }

\__xpinyin_GBK_char:nn 57 \cs_new_protected:Npn \__xpinyin_GBK_char:nn #1#2
58 {
59   \__xpinyin_UTF_char:nn {#1} {#2}
60   \exp_args:Nx \__xpinyin_GBK_char_aux:nn { \tl_head:n {#1} } {#1}
61 }
62 \cs_new_protected:Npn \__xpinyin_GBK_char_aux:nn #1#2
63 { \exp_args:Nf \__xpinyin_GBK_char_aux:nnn { \int_eval:n { `#1 } } {#1} {#2} }
64 \cs_new_protected:Npn \__xpinyin_GBK_char_aux:nnn #1#2#3
65 {
66   \cs_if_exist:cF { __xpinyin_UTF_ #1 :w }
67   {
68     \exp_args:Nf \__xpinyin_GBK_char_def:nnn
69     {
70       \int_case:nn { \tl_count:n {#3} }
71       {
72         { 2 } { ##1 }
73         { 3 } { ##1##2 }
74         { 4 } { ##1##2##3 }
75       }
76     }
77     {#1} {#2}
78     \exp_args:Nc \__xpinyin_save_UTF_cs:Nn { __xpinyin_UTF_ #1 :w } {#1}
79     \tl_gput_right:Nx \c__xpinyin_reset_UTF_catcode_tl
80     { \char_set_catcode:nn {#1} { \char_value_catcode:n {#1} } }
81     \char_set_catcode_active:n {#1}
82   }
83 }
84 \cs_new_protected:Npn \__xpinyin_GBK_char_def:nnn #1#2#3
85 {
86   \cs_new_protected:cpn { __xpinyin_UTF_ #2 :w } #1
87   { \use:c { u8: \tl_to_str:n { #3#1 } } }
88 }
89 \tl_new:N \c__xpinyin_reset_UTF_catcode_tl

\__xpinyin_save_UTF_cs:Nn 90 \group_begin:
91 \char_set_catcode_active:n { 126 }

```

```

92 \cs_new_protected:Npn \__xpinyin_save_UTF_cs:Nn #1#2
93 {
94   \group_begin:
95   \char_set_lccode:nn { 126 } {#2}
96   \tex_lowercase:D
97   {
98     \group_end:
99     \tl_gput_right:Nn \c__xpinyin_reset_UTF_cs_tl { \cs_set_eq:NN ~ #1 }
100   }
101 }
102 \group_end:
103 \tl_new:N \c__xpinyin_reset_UTF_cs_tl

104 \bool_new:N \g__xpinyin_GBK_bool
105 \@ifpackageloaded { xeCJK }
106 { \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: } }
107 {
108   \@ifpackageloaded { CJKutf8 }
109   {
110     \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
111     \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
112   }
113   {
114     \@ifpackageloaded { CJK }
115     {
116       \RequirePackage { xCJK2uni }
117       \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_GBK_char:nn
118       \AtEndOfPackage
119       {
120         \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
121         { \c__xpinyin_reset_UTF_cs_tl }
122         \__xpinyin_adjust_CJK_hook:
123         \tl_use:N \c__xpinyin_reset_UTF_catcode_tl
124       }
125       \bool_gset_true:N \g__xpinyin_GBK_bool
126     }
127     {
128       \sys_if_engine_xetex:TF
129       {
130         \RequirePackage { xeCJK }
131         \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: }
132       }
133       {
134         \RequirePackage { CJKutf8 }
135         \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
136         \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
137       }
138     }
139   }
140 }

\l__xpinyin_tmpa_box 141 \box_new:N \l__xpinyin_tmpa_box
\l__xpinyin_tmpb_box 142 \box_new:N \l__xpinyin_tmpb_box

\__xpinyin_width:Nn 143 \cs_new_protected:Npn \__xpinyin_width:Nn #1#2
144 {
145   \hbox_set:Nn \l__xpinyin_tmpa_box {#2}
146   #1 = \box_wd:N \l__xpinyin_tmpa_box
147 }

\__xpinyin_make_pinyin_box:nnn 148 \cs_new_protected: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             \l__xpinyin_pinyin_box_hook_tl
158             \__xpinyin_select_font:
159             \l__xpinyin_format_tl
160             \clist_if_exist:cT { c__xpinyin_multiple_ #1 _clist }
161             { \l__xpinyin_multiple_tl }
162             {#3}
163         }
164         \dim_compare:nNnT
165         { \box_wd:N \l__xpinyin_tmpb_box } >
166         { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
167         {
168             \box_resize_to_wd_and_ht:Nnn \l__xpinyin_tmpb_box
169             { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
170             { \box_ht:N \l__xpinyin_tmpb_box }
171         }
172         \box_move_up:nn { \l__xpinyin_vsep_tl }
173         {
174             \hbox_to_wd:nn { \box_wd:N \l__xpinyin_tmpa_box }
175             { \tex_hss:D \box_use_drop:N \l__xpinyin_tmpb_box \tex_hss:D }
176         }
177     }
178 }
179 \tl_new:N \l__xpinyin_pinyin_box_hook_tl
180 \sys_if_engine_pdftex:T
181 {
182     \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
183     { \cs_set_eq:NN \CJK@plane \tex_undefined:D }
184 }
185 \cs_generate_variant:Nn \__xpinyin_make_pinyin_box:nnn { x }

\__xpinyin_CJKsymbol:n 186 \cs_new_protected:Npn \__xpinyin_CJKsymbol:n #1
187 { \__xpinyin_CJKsymbol:xn { \__xpinyin_to_unicode:n {#1} } {#1} }
188 \cs_new_protected:Npn \__xpinyin_CJKsymbol:nn #1#2
189 {
190     \__xpinyin_make_pinyin_box:nnn {#1} {#2} { \use:c { c__xpinyin_ #1 _tl } }
191     \__xpinyin_save_CJKsymbol:n {#2}
192 }
193 \cs_generate_variant:Nn \__xpinyin_CJKsymbol:nn { x }

pinyinscope 194 \NewDocumentEnvironment { pinyinscope } { 0 { } }
195 {
196     \keys_set:nn { xpinyin } {#1}
197     \enablepinyin
198 }
199 { }

\xpinyin 200 \NewDocumentCommand \xpinyin { s O { } m }
201 {
202     \mode_leave_vertical:
203     \IfBooleanTF {#1}
204     {
205         \group_begin:
206         \keys_set:nn { xpinyin } {#2}
207         \enablepinyin
208         #3
209         \group_end:
210     }
211     {
212         \group_begin:
213         \keys_set:nn { xpinyin } {#2}
214         \bool_if:NF \l__xpinyin_enable_bool
215         { \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue } }
216         \__xpinyin_single_aux:nn {#3}
217     }
218 }

\l__xpinyin_enable_bool 219 \bool_new:N \l__xpinyin_enable_bool

```

```

\__xpinyin_CJKglue: 220 \cs_new_protected:Npn \__xpinyin_CJKglue:
221 { \skip_horizontal:n { \l__xpinyin_hsep_tl } }

\enablepinyin 222 \NewDocumentCommand \enablepinyin { }
223 {
224   \bool_if:NF \l__xpinyin_enable_bool
225   {
226     \tl_if_empty:NF \l__xpinyin_hsep_tl
227     {
228       \cs_set_eq:NN \__xpinyin_save_CJKglue: \CJKglue
229       \cs_set_eq:NN \CJKglue \__xpinyin_CJKglue:
230     }
231     \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue }
232     \__xpinyin_replace_CJKsymbol:
233     \__xpinyin_restore_footnote:
234     \bool_set_true:N \l__xpinyin_enable_bool
235   }
236 }

\disablepinyin 237 \NewDocumentCommand \disablepinyin { }
238 {
239   \bool_if:NT \l__xpinyin_enable_bool
240   {
241     \cs_if_eq:NNT \CJKglue \__xpinyin_CJKglue:
242     { \cs_set_eq:NN \CJKglue \__xpinyin_save_CJKglue: }
243     \__xpinyin_restore_CJKsymbol:
244     \bool_set_false:N \l__xpinyin_enable_bool
245   }
246 }

\__xpinyin_restore_footnote: 247 \cs_new_protected:Npn \__xpinyin_restore_footnote:
248 {
249   \bool_if:NF \l__xpinyin_footnote_bool
250   { \tl_put_left:Nn \@parboxrestore { \l__xpinyin_restore_footnote_tl } }
251 }

\l__xpinyin_restore_footnote_tl 252 \tl_new:N \l__xpinyin_restore_footnote_tl
253 \tl_set:Nn \l__xpinyin_restore_footnote_tl
254 {
255   \int_compare:nNnT \tex_currentgrouptype:D = { 11 }
256   { \disablepinyin }
257 }

\l__xpinyin_CJKglue_dim 258 \dim_new:N \l__xpinyin_CJKglue_dim

\__xpinyin_single_aux:nn 259 \cs_new_protected:Npn \__xpinyin_single_aux:nn #1#2
260 {
261   \__xpinyin_replace_CJKsymbol_single:n {#2}
262   #1
263   \group_end:
264 }
265 \cs_new_protected:Npn \__xpinyin_replace_CJKsymbol_single_aux:n #1
266 {
267   \bool_if:NF \l__xpinyin_enable_bool { \__xpinyin_replace_CJKsymbol: }
268   \cs_set_protected:Npn \CJKsymbol ##1
269   { \__xpinyin_single_CJKsymbol:nn {##1} {#1} }
270 }
271 \cs_new_protected:Npn \__xpinyin_single_CJKsymbol:nn #1#2
272 {
273   \__xpinyin_make_pinyin_box:xnn
274   { \__xpinyin_to_unicode:n {#1} } {#1} { \__xpinyin_pinyin:n {#2} }
275   \__xpinyin_save_CJKsymbol:n {#1}
276 }

\__xpinyin_replace_CJKsymbol_aux: 277 \cs_new_protected:Npn \__xpinyin_replace_CJKsymbol_aux:
278 {
279   \cs_set_eq:NN \__xpinyin_save_CJKsymbol:n \CJKsymbol
280   \cs_set_eq:NN \CJKsymbol \__xpinyin_CJKsymbol:n
281 }

```

```

\__xpinyin_restore_CJKsymbol_aux: 282 \cs_new_protected:Npn \__xpinyin_restore_CJKsymbol_aux:
283 { \cs_set_eq:NN \CJKsymbol \__xpinyin_save_CJKsymbol:n }

\__xpinyin_select_font_xetex: 284 \cs_new_protected:Npn \__xpinyin_select_font_xetex:
285 {
286   \cs_if_exist_use:cF { \l__xpinyin_coor_tl }
287   {
288     \tl_set:Nx \l__xpinyin_current_coor_tl { \l__xpinyin_coor_tl }
289     \__xpinyin_select_font_aux:
290     \int_compare:nNnF { \tex_XeTeXfonttype:D \tex_font:D } = \c_zero_int
291     {
292       \exp_last_unbraced:NNV
293       \cs_gset_eq:cN \l__xpinyin_current_coor_tl \tex_font:D
294     }
295   }
296 }

\__xpinyin_select_font_aux: 297 \cs_new_protected:Npn \__xpinyin_select_font_aux:
298 {
299   \fontsize
300   { \l__xpinyin_ratio_tl \tex_dimexpr:D \f@size pt \scan_stop: }
301   { \f@baselineskip }
302   \normalfont
303   \l__xpinyin_font_tl
304   \selectfont
305 }

\__xpinyin_to_unicode_xetex:n 306 \cs_new:Npn \__xpinyin_to_unicode_xetex:n #1
307 { \int_to_arabic:n { `#1 } }

\__xpinyin_UTF_to_unicode:n 308 \cs_new:Npn \__xpinyin_UTF_to_unicode:n #1
\__xpinyin_UTFchar_to_unicode:n 309 {
310   \int_to_arabic:n
311   { \exp_args:No \int_from_hex:n { \CJK@plane } * "100 + #1 }
312 }
313 \cs_new:Npn \__xpinyin_UTFchar_to_unicode:n #1
314 { \int_to_arabic:n { \__xpinyin_UTF_viii_to_unicode:NNNw #1 \q_stop } }
315 \cs_new:Npn \__xpinyin_UTF_viii_to_unicode:NNNw #1#2#3#4 \q_stop
316 {
317   \tl_if_empty:nTF {#4}
318   { ( `#1 - "E0 ) * "1000 + ( `#2 - "80 ) * "40 + ( `#3 - "80 ) }
319   { ( `#1 - "F0 ) * "4000 + ( `#2 - "80 ) * "1000 + ( `#3 - "80 ) * "40 + ( `#4 - "80 ) }
320 }

\__xpinyin_GBK_to_unicode:n 321 \cs_new:Npn \__xpinyin_GBK_to_unicode:n
\__xpinyin_GBKchar_to_unicode:n 322 { \CJKtu_sfd_map:nn { \CJK@plane } }
323 \cs_new:Npn \__xpinyin_GBKchar_to_unicode:n
324 { \CJKtu_char_to_unicode:n }

\__xpinyin_adjust_xeCJK_hook: 325 \cs_new_protected:Npn \__xpinyin_adjust_xeCJK_hook:
326 {
327   \cs_new_eq:NN \__xpinyin_select_font: \__xpinyin_select_font_xetex:
328   \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_to_unicode_xetex:n
329   \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_to_unicode:n
330   \cs_new_eq:NN \__xpinyin_restore_CJKsymbol: \__xpinyin_restore_CJKsymbol_aux:
331   \cs_new_eq:NN \__xpinyin_replace_CJKsymbol: \__xpinyin_replace_CJKsymbol_aux:
332   \cs_new_eq:NN \__xpinyin_replace_CJKsymbol_single:n
333   \__xpinyin_replace_CJKsymbol_single_aux:n
334   \tl_if_exist:NTF \l_xeCJK_current_font_tl
335   {
336     \tl_set:Nn \l__xpinyin_coor_tl
337     {
338       ( \tl_to_str:N \l__xpinyin_font_tl ) /
339       \l_xeCJK_current_font_tl/\l__xpinyin_ratio_tl
340     }
341   }
342   {
343     \tl_set:Nn \l__xpinyin_coor_tl

```



```

344         {
345             ( \tl_to_str:N \l__xpinyin_font_tl ) /
346             \xeCJK@family/\f@series/\f@shape/\f@size/\l__xpinyin_ratio_tl
347         }
348     }
349     \cs_new_eq:NN \__xpinyin_leavevmode: \prg_do_nothing:
350     \cs_new_protected:Npx \__xpinyin_CJKsymbol_hook:
351     {
352         \exp_not:N \makeexeCJKinactive
353         \cs_if_exist_use:NF \xeCJK_select_font:
354         { \exp_not:N \xeCJK_setfont }
355     }
356 }

\__xpinyin_adjust_CJK_hook: 357 \cs_new_protected:Npn \__xpinyin_adjust_CJK_hook:
358 {
359     \bool_if:NTF \g__xpinyin_GBK_bool
360     {
361         \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_GBK_to_unicode:n
362         \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_GBKchar_to_unicode:n
363     }
364     {
365         \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_UTF_to_unicode:n
366         \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_UTFchar_to_unicode:n
367     }
368     \cs_new_eq:NN \__xpinyin_select_font: \__xpinyin_select_font_aux:
369     \cs_new_eq:NN \__xpinyin_leavevmode: \mode_leave_vertical:
370     \cs_new_eq:NN \__xpinyin_CJKsymbol_hook: \prg_do_nothing:
371     \@ifpackageloaded { CJKpunct }
372     { \__xpinyin_adjust_CJKpunct_hook: }
373     {
374         \cs_new_eq:NN \__xpinyin_restore_CJKsymbol: \__xpinyin_restore_CJKsymbol_aux:
375         \cs_new_eq:NN \__xpinyin_replace_CJKsymbol: \__xpinyin_replace_CJKsymbol_aux:
376         \cs_new_eq:NN \__xpinyin_replace_CJKsymbol_single:n
377             \__xpinyin_replace_CJKsymbol_single_aux:n
378         \AtBeginDocument
379         {
380             \@ifpackageloaded { CJKpunct }
381             {
382                 \cs_undefine:N \__xpinyin_restore_CJKsymbol:
383                 \cs_undefine:N \__xpinyin_replace_CJKsymbol:
384                 \cs_undefine:N \__xpinyin_replace_CJKsymbol_single:n
385                 \__xpinyin_adjust_CJKpunct_hook:
386             } { }
387         }
388     }
389 }

\__xpinyin_adjust_CJKpunct_hook: 390 \cs_new_protected:Npn \__xpinyin_adjust_CJKpunct_hook:
391 {
392     \cs_new_protected:Npn \__xpinyin_restore_CJKsymbol:
393     {
394         \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
395         { \__xpinyin_restore_CJKsymbol_aux: }
396         { \cs_set_eq:NN \CJKsymbol \__xpinyin_save_CJKsymbol:n }
397     }
398     \cs_new_protected:Npn \__xpinyin_replace_CJKsymbol:
399     {
400         \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
401         { \__xpinyin_replace_CJKsymbol_aux: }
402         {
403             \cs_set_eq:NN \__xpinyin_save_CJKsymbol:n \CJKsymbol
404             \cs_set_eq:NN \CJKsymbol \__xpinyin_CJKsymbol:n
405         }
406     }
407     \cs_new_protected:Npn \__xpinyin_replace_CJKsymbol_single:n ##1
408     {
409         \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }

```

```

410         { \__xpinyin_replace_CJKsymbol_single_aux:n { ##1 } }
411     {
412         \bool_if:NF \l__xpinyin_enable_bool
413         { \cs_set_eq:NN \__xpinyin_save_CJKsymbol:n \CJKsymbol }
414         \cs_set_protected:Npn \CJKsymbol ####1
415         { \__xpinyin_single_CJKsymbol:nn { ####1 } { ##1 } }
416     }
417 }
418 }

\pinyin 419 \NewDocumentCommand \pinyin { 0 { } m }
420 {
421     \group_begin:
422     \keys_set:nn { xpinyin } {#1}
423     \l__xpinyin_font_tl
424     \l__xpinyin_format_tl { }
425     \selectfont
426     \c__xpinyin_reset_UTF_cs_tl
427     \__xpinyin_pinyin:n {#2}
428     \group_end:
429 }

\__xpinyin_pinyin:n 430 \cs_new_protected:Npn \__xpinyin_pinyin:n #1
431 {
432     \__xpinyin_pinyin_init:
433     \bool_set_true:N \l__xpinyin_first_bool
434     \tl_set:Nn \l__xpinyin_save_tl {#1}
435     \__xpinyin_pinyin_aux:n #1 \q_recursion_tail \q_recursion_stop
436 }

\__xpinyin_pinyin_aux:n 437 \cs_new_protected:Npn \__xpinyin_pinyin_aux:n #1
438 {
439     \quark_if_recursion_tail_stop_do:nn {#1}
440     {
441         \bool_if:NTF \l__xpinyin_first_bool { \l__xpinyin_save_tl }
442         { \tl_if_empty:NF \l__xpinyin_item_tl { \l__xpinyin_pysep_tl \l__xpinyin_item_tl } }
443     }
444     \__xpinyin_if_number:nTF {#1}
445     {
446         \bool_if:NTF \l__xpinyin_first_bool
447         { \bool_set_false:N \l__xpinyin_first_bool }
448         { \l__xpinyin_pysep_tl }
449         \l__xpinyin_pre_tl
450         \__xpinyin_tone:Vn \l__xpinyin_tone_tl {#1}
451         \l__xpinyin_post_tl
452         \__xpinyin_pinyin_init:
453     }
454     {
455         \int_compare:nNnTF
456         { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:N \l__xpinyin_tone_tl _tl } } >
457         { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:n {#1} _tl } }
458         { \tl_put_right:Nn \l__xpinyin_post_tl {#1} }
459         {
460             \tl_set:Nn \l__xpinyin_tone_tl {#1}
461             \tl_set_eq:NN \l__xpinyin_pre_tl \l__xpinyin_item_tl
462             \tl_clear:N \l__xpinyin_post_tl
463         }
464         \tl_put_right:Nx \l__xpinyin_item_tl { \__xpinyin_replace_v:n {#1} }
465     }
466     \__xpinyin_pinyin_aux:n
467 }

\__xpinyin_tone:nn 468 \cs_new_protected:Npn \__xpinyin_tone:nn #1#2
469 { \use:c { __xpinyin_num_to_tone_ #1 :Nn } {#1} {#2} }
470 \cs_generate_variant:Nn \__xpinyin_tone:nn { V }

\__xpinyin_replace_v:n 471 \cs_new:Npn \__xpinyin_replace_v:n #1
472 {

```

```

473 \str_if_eq:nnTF {#1} { v }
474 {
475 \str_case:onTF { \l__xpinyin_item_tl }
476 { { l } { } { n } { } { L } { } { N } { } }
477 { \exp_not:n { ü } { u }
478 }
479 { \exp_not:n {#1} }
480 }

__xpinyin_pinyin_init: 481 \cs_new:Npn \__xpinyin_pinyin_init:
482 {
483 \tl_clear:N \l__xpinyin_pre_tl \tl_clear:N \l__xpinyin_post_tl
484 \tl_clear:N \l__xpinyin_item_tl \tl_clear:N \l__xpinyin_tone_tl
485 }

__xpinyin_if_number:nTF 486 \prg_new_conditional:Npnn \__xpinyin_if_number:n #1 { TF }
487 {
488 \if_int_compare:w \c_one_int < 1 \tl_to_str:n {#1} \exp_stop_f:
489 \prg_return_true: \else: \prg_return_false: \fi:
490 }

\l__xpinyin_first_bool 491 \bool_new:N \l__xpinyin_first_bool

\c__xpinyin_a_tl 492 \tl_const:Nn \c__xpinyin_a_tl { 3 }
\c__xpinyin_o_tl 493 \tl_const:Nn \c__xpinyin_o_tl { 2 }
\c__xpinyin_e_tl 494 \tl_const:Nn \c__xpinyin_e_tl { 2 }
\c__xpinyin_i_tl 495 \tl_const:Nn \c__xpinyin_i_tl { 1 }
\c__xpinyin_u_tl 496 \tl_const:Nn \c__xpinyin_u_tl { 1 }
\c__xpinyin_v_tl 497 \tl_const:Nn \c__xpinyin_v_tl { 1 }

__xpinyin_num_to_tone:Nn 498 \cs_new_protected:Npn \__xpinyin_num_to_tone:Nn #1#2
499 {
500 \if_case:w \int_eval:n { #2 - 1 } \exp_stop_f:
501 \= {#1} \or: \'{#1} \or: \v {#1} \or: \` {#1} \else: #1 \fi:
502 }
503 \tl_map_inline:nn { a o e u }
504 { \cs_new_eq:cN { __xpinyin_num_to_tone_ #1 :Nn } \__xpinyin_num_to_tone:Nn }
505 \cs_new:Npn \__xpinyin_num_to_tone_i:Nn #1#2
506 {
507 \if_case:w \int_eval:n { #2 - 1 } \exp_stop_f:
508 ī \or: í \or: ĭ \or: ï \else: i \fi:
509 }
510 \cs_new_protected:Npn \__xpinyin_num_to_tone_v:Nn #1#2
511 {
512 \str_case:onTF { \l__xpinyin_pre_tl }
513 { { l } { } { n } { } { L } { } { N } { } }
514 {
515 \if_case:w \int_eval:n { #2 - 1 } \exp_stop_f:
516 ū \or: ú \or: ũ \or: ü \else: u \fi:
517 }
518 { \__xpinyin_num_to_tone:Nn u {#2} }
519 }

\xpinyinsetup 520 \NewDocumentCommand \xpinyinsetup { m } { \keys_set:nn { xpinyin } {#1} }

ratio 521 \clist_map_inline:nn
vsep 522 { ratio , vsep , hsep , pysep , font , format , multiple }
hsep 523 { \keys_define:nn { xpinyin } { #1 .tl_set:c = { l__xpinyin_ #1 _tl } } }
pysep 524 \keys_define:nn { xpinyin }
font 525 { footnote .bool_set:N = \l__xpinyin_footnote_bool }
format 526 \keys_set:nn { xpinyin }
multiple 527 {
footnote 528 ratio = .4 ,
529 vsep = 1 em ,
530 pysep = \c_space_tl ,
531 font = \normalfont ,
532 }

```

```

\xpinyin_customary:nnn 533 \cs_new_protected:Npn \xpinyin_customary:nnn #1#2
\xpinyin_multiple:nnn 534 { \cs_gset_nopar:cpn { c__xpinyin_ #2 _tl } }
535 \cs_new_protected:Npn \xpinyin_multiple:nnn #1#2
536 { \cs_gset_nopar:cpn { c__xpinyin_multiple_ #2 _clist } }

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

\setpinyin 542 \NewDocumentCommand \setpinyin { m m }
543 {
544   \tl_set:cn
545   { c__xpinyin_ \__xpinyin_char_to_unicode:n {#1} _tl }
546   { \__xpinyin_pinyin:n {#2} }
547 }

548 \ProcessKeysOptions { xpinyin }
549 </package>

```

## 第 5 节 *xpinyin.lua*

```

550 <*lua>
551 xpinyin = xpinyin or { }
552 local xpinyin = xpinyin

    计算时区2。
553 xpinyin.tzoffset = "+0000"
554 do
555   -- Compute the difference in seconds between local time and UTC.
556   local function get_timezone()
557     local now = os.time()
558     return os.difftime(now, os.time(os.date("!*t", now)))
559   end
560   -- Return a timezone string in ISO 8601:2000 standard form (+hhmm or -hhmm)
561   local function get_tzoffset(timezone)
562     local h, m = math.modf(timezone / 3600)
563     return string.format("%+.4d", 100 * h + 60 * m)
564   end
565   xpinyin.tzoffset = get_tzoffset(get_timezone())
566 end

567 xpinyin = {
568   uchar = unicode.utf8.char,
569   readings = { },
570   fixreadings = {

为汉字“〇”增加拼音。
571   {"U+3007", "Mandarin", "líng"}
572 },

573 database = {
574   source = "http://www.unicode.org/Public/UNIDATA/UniHan.zip",
575   file = "UniHan_Readings.txt",
576   date = "Date: 2014-05-09 18:17:02 GMT [JHJ]",
577   version = "Unicode version: 7.0.0",
578   dbfile = "xpinyin.db"
579 },
580 preamble = [[
581 %<<COMMENT
582 %%
583 %% Do not edit this file!
584 %% Created from UniHan database:
585 %%
586 %% $file

```

<sup>2</sup><http://lua-users.org/wiki/TimeZone>

```

587 %%      $date
588 %%      $version
589 %%
590 %% by "texlua xpinyin.lua" on ]]
591         .. os.date("%Y-%m-%d %X ") .. xpinyin.tzoffset
592         .. "\n%%"
593 %COMMENT
594 }

595 local http_request = require("socket.http").request
596 local ltn12_sink_file = require("ltn12").sink.file
597 local zip_open = require("zip").open

```

将 Unihan\_Readings.txt<sup>3</sup> 保存到一张表里面。

```

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

```

下载 Unihan.zip。

```

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

```

往拼音表中加入项目。

```

644 function xpinyin.insert (unicode, prop, value)
645     local index = tonumber(unicode:match("%x+$"), 16)
646     if not xpinyin.readings[index] then

```

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

```

647     xpinyin.readings[index] = { }
648 end
649 xpinyin.readings[index][prop] = value
650 end

```

输出需要的格式文件。

```

651 function xpinyin.output (db)
652     local f = assert(io.open(db or xpinyin.database.dbfile, "w"))
653     local preamble = xpinyin.preamble:gsub("%$(%w+)", xpinyin.database)
654     f:write(preamble, "\n")
655     local hanzi, pinyin
656     local mt = { }
657     for index, pyt in xpinyin.pairsByKeys(xpinyin.readings) do
658         pinyin = assert(xpinyin.grep(pyt))
659         hanzi = xpinyin.uchar(index)
660         f:write("\XPYU{" .. hanzi, "}{" .. index, "}{" .. pinyin, "}\n")
661         pinyin = xpinyin.multiple(pyt)
662         if pinyin then
663             mt[#mt + 1] = "\XPYUM{" .. hanzi .. "}{" .. index .. "}{" .. pinyin .. "}"
664         end
665     end
666     f:write(table.concat(mt, "\n"), "\n")
667     f:close()
668 end

```

将表按照索引排序,代码来源于 *Programming in Lua*。

```

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

```

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

```

根据 XHC1983 和 HanyuPinyin 选出多音字。

```

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

```

```
706 end
707 end

    删除掉数组中的重复元素。
708 function xpinyin.unique (t)
709     local rt = xpinyin.remove_duplicate(t)
710     if #rt > 1 then
711         return table.concat(rt, ",")
712     end
713 end
714 function xpinyin.remove_duplicate (t)
715     local ht = { }
716     local nt = { }
717     for i, v in ipairs(t) do
718         if not ht[v] then
719             nt[#nt + 1] = v
720             ht[v] = true
721         end
722     end
723     return nt
724 end
725 xpinyin.maketable()
726 xpinyin.output()
727 </lua>
```

## 代码索引

意大利体的数字表示描述对应索引项的页码;带下划线的数字表示定义对应索引项的代码行号;罗马字体的数字表示使用对应索引项的代码行号。

### Symbols

\"	46, 47, 48, 49, 50
\'	501
\\	5, 6, 7, 660, 663
\`	501

### A

\AtBeginDocument	378
\AtEndOfPackage	106, 111, 118, 131, 136

### B

#### bool commands:

\bool_gset_true:N	125
\bool_if:NTF	214, 224, 239, 249, 267, 359, 412, 441, 446
\bool_lazy_or:nnTF	14
\bool_new:N	104, 219, 491
\bool_set_false:N	244, 447
\bool_set_true:N	234, 433

#### box commands:

\box_ht:N	170
\box_move_up:nn	172
\box_new:N	141, 142
\box_resize_to_wd_and_ht:Nnn	168
\box_use_drop:N	175
\box_wd:N	146, 165, 166, 169, 174

### C

#### char commands:

\char_set_catcode:nn	80
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