

# xpinyin 宏包

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## 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 XeL<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. fafc2d9.

## 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，方使阅者\xpinyin{了}{liao3}然不惑。
4 \end{pinyinscope}
```

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` `\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，

长  
甄士隐梦幻识通灵  
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，

lǚ 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(`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 \ifpackagelater { expl3 } { 2017/12/16 } { }
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 { ǒ } = { \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 { ĭ } = { \@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_nopar: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_nopar: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_nopar: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_nopar: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         { \c_two } { ##1 }
73         { \c_three } { ##1##2 }
74         { \c_four } { ##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_nopar:Npn \__xpinyin_GBK_char_def:nnn #1#2#3
85 {
86   \cs_new_protected_nopar: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_nopar: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_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_to_wd_and_ht: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 }
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_drop: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 }

\__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 }

pinyinscope 196 \NewDocumentEnvironment { pinyinscope } { 0 { } }
197 {
198     \keys_set:nn { xpinyin } {#1}
199     \enablepinyin
200 }
201 { }

\xpinyin 202 \NewDocumentCommand \xpinyin { s 0 { } m }
203 {
204     \mode_leave_vertical:
205     \IfBooleanTF {#1}
206     {
207         \group_begin:
208         \keys_set:nn { xpinyin } {#2}
209         \enablepinyin
210         #3
211         \group_end:
212     }
213     {
214         \group_begin:
215         \keys_set:nn { xpinyin } {#2}
216         \bool_if:NF \l__xpinyin_enable_bool
217         { \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue } }
218         \__xpinyin_single_aux:nn {#3}
219     }
220 }

```

```

\l__xpinyin_enable_bool 221 \bool_new:N \l__xpinyin_enable_bool

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

\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 }

\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 }

\__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 }

\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 }

\l__xpinyin_CJKglue_dim 260 \dim_new:N \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 }

\__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 }

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

\__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 }

\__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 }

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

\__xpinyin_UTF_to_unicode:n 310 \cs_new_nopar:Npn \__xpinyin_UTF_to_unicode:n #1
\__xpinyin_UTFchar_to_unicode:n 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:NNNw #1 \q_stop } }
317 \cs_new_nopar:Npn \__xpinyin_UTF_viii_to_unicode:NNNw #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 }

\__xpinyin_GBK_to_unicode:n 323 \cs_new_nopar:Npn \__xpinyin_GBK_to_unicode:n #1
\__xpinyin_GBKchar_to_unicode:n 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} } }

\__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 }

\__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: \mode_leave_vertical:
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 }

\__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 \CJKsymbol \__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 \CJKsymbol
406             \cs_set_eq:NN \CJKsymbol \__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 \CJKsymbol }
416             \cs_set_protected_nopar:Npn \CJKsymbol #####1
417             { \__xpinyin_single_CJKsymbol:nn { #####1 } { ##1 } }
418         }
419     }
420 }

\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 }

\__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 }

\__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         \l__xpinyin_pre_tl
452         \__xpinyin_tone:Vn \l__xpinyin_tone_tl {#1}
453         \l__xpinyin_post_tl
454         \__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 { \__xpinyin_replace_v:n {#1} }
467     }
468     \__xpinyin_pinyin_aux:n
469 }

\__xpinyin_tone:nn 470 \cs_new_protected_nopar:Npn \__xpinyin_tone:nn #1#2
471 { \use:c { __xpinyin_num_to_tone_ #1 :Nn } {#1} {#2} }
472 \cs_generate_variant:Nn \__xpinyin_tone:nn { V }

```

```

__xpinyin_replace_v:n 473 \cs_new_nopar:Npn \__xpinyin_replace_v:n #1
474 {
475   \str_if_eq:nnTF {#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   }

__xpinyin_pinyin_init: 483 \cs_new_nopar:Npn \__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 }

__xpinyin_if_number:nTF 488 \prg_new_conditional:Npnn \__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 }

\l__xpinyin_first_bool 493 \bool_new:N \l__xpinyin_first_bool

\c__xpinyin_a_tl 494 \tl_const:Nn \c__xpinyin_a_tl { 3 }
\c__xpinyin_o_tl 495 \tl_const:Nn \c__xpinyin_o_tl { 2 }
\c__xpinyin_e_tl 496 \tl_const:Nn \c__xpinyin_e_tl { 2 }
\c__xpinyin_i_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 }

__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: ĭ \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 }

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

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

```

```

\xpinyin_customary:nnn 535 \cs_new_protected_nopar:Npn \xpinyin_customary:nnn #1#2#3
\xpinyin_multiple:nnn 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} }

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 }

550 \ProcessKeysOptions { xpinyin }
551 </package>

```

## 第 5 节 *xpinyin.lua*

```

552 <lua>
553 xpinyin = xpinyin or { }
554 local xpinyin = xpinyin

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

569 xpinyin = {
570   uchar = unicode.utf8.char,
571   readings = { },
572   fixreadings = {

为汉字“〇”增加拼音。
573   {"U+3007", "Mandarin", "líng"}
574 },

575 database = {
576   source = "http://www.unicode.org/Public/UNIDATA/UniHan.zip",
577   file = "UniHan_Readings.txt",
578   date = "Date: 2014-05-09 18:17:02 GMT [JHJ]",
579   version = "Unicode version: 7.0.0",
580   dbfile = "xpinyin.db"
581 },
582 preamble = [[
583 %<<COMMENT
584 %%
585 %% Do not edit this file!
586 %% Created from UniHan database:
587 %%
588 %% $file

```

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

```

589 %%      $date
590 %%      $version
591 %%
592 %% by "texlua xpinyin.lua" on ]]
593         .. os.date("%Y-%m-%d %X ") .. xpinyin.tzoffset
594         .. "\n%%"
595 %COMMENT
596 }

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

```

将 Unihan\_Readings.txt<sup>3</sup> 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

```

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

```

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 = { }
659     for index, pyt in xpinyin.pairsByKeys(xpinyin.readings) do
660         pinyin = assert(xpinyin.grep(pyt))
661         hanzi = xpinyin.uchar(index)
662         f:write("\XPYU{" .. hanzi, "}{" .. index, "}{" .. pinyin, "}\n")
663         pinyin = xpinyin.multiple(pyt)
664         if pinyin then
665             mt[#mt + 1] = "\XPYUM{" .. 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>
```

## 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
\'	503
\\	5, 6, 7, 662, 665
\`	503

### A

\AtBeginDocument	380
\AtEndOfPackage	106, 111, 118, 131, 136

### B

bool commands:	
\bool_gset_true:N	125
\bool_if:NTF	216, 226, 241, 251, 269, 361, 414, 443, 448
\bool_lazy_or:nnTF	14
\bool_new:N	104, 221, 493
\bool_set_false:N	246, 449
\bool_set_true:N	236, 435
box commands:	
\box_ht:N	172
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