

# xpinyin 宏包

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2022/07/14 v3.1\*

## 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. dd0cc20.

## 第 3 节 用户手册

`\pinyin` `\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}
```

liè wèi kàn guān nǐ dào cǐ shū cóng hé ér lái shǔ 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 shǐ yuè zhě liǎo rán bù huò  
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 `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}
```

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

`\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，

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

lǚ zi  
nǚ hái zi

`\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` {<key<sub>1</sub>>=<val<sub>1</sub>>, <key<sub>2</sub>>=<val<sub>2</sub>>, ... }

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

`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。

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

---

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

---

New: 2014-01-12

---

## 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 } { 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 \cs_if_exist:NF \NewDocumentCommand
19 { \RequirePackage { xparse } }

```

`\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   { õ } = { \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 { ṁ } = { \@tabacckludge' m } ,
39 { ṅ } = { \@tabacckludge' n } ,
40 { ñ } = { \v n } ,
41 { ñ } = { \@tabacckludge` n } ,
42 { ī } = { \@tabacckludge= { \i } } ,
43 { í } = { \@tabacckludge' { \i } } ,
44 { ĭ } = { \v { \i } } ,
45 { i } = { \@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 0 { } 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 \makexeCJKinactive
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 \CJKKosymbol \__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 \CJKKosymbol
404             \cs_set_eq:NN \CJKKosymbol \__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 \CJKKosymbol }

```

```

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: î \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: ù \else: ü \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:nmn
539   \cs_set_eq:NN \XPYUM \xpinyin_multiple:nmn
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 \cs_if_exist:NTF \ProcessKeyOptions
549   { \ProcessKeyOptions [ xpinyin ] }
550   {
551     \RequirePackage { l3keys2e }
552     \ProcessKeysOptions { xpinyin }
553   }

554 </package>

```

## 第 5 节 xpinyin.lua

```

555 <*lua>

556 xpinyin      = xpinyin or { }
557 local xpinyin = xpinyin

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

572 xpinyin = {
573   uchar      = unicode.utf8.char,
574   readings   = { },
575   fixreadings = {

为汉字“〇”增加拼音。
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:

```

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

```

590 %%
591 %%   $file
592 %%   $date
593 %%   $version
594 %%
595 %% by "texlua xpinyin.lua" on ]]
596 .. os.date("%Y-%m-%d %X ") .. xpinyin.tzoffset
597 .. "\n%%"
598 %COMMENT
599 }

600 local http_request = require("socket.http").request
601 local ltn12_sink_file = require("ltn12").sink.file
602 local zip_open = require("zip").open

```

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

```

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

```

下载 Unihan.zip。

```

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

```

往拼音表中加入项目。

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

```

649 function xpinyin.insert (unicode, prop, value)
650   local index = tonumber(unicode:match("%x+$"), 16)
651   if not xpinyin.readings[index] then
652     xpinyin.readings[index] = { }
653   end
654   xpinyin.readings[index][prop] = value
655 end

```

输出需要的格式文件。

```

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

```

将表按照索引排序,代码来源于 *Programming in Lua*。

```

674 function xpinyin.pairsByKeys (t, f)
675   local a = { }
676   for n in pairs(t) do a[#a + 1] = n end
677   table.sort(a, f)
678   local i = 0 -- iterator variable
679   return function () -- iterator function
680     i = i + 1
681     return a[i], t[a[i]]
682   end
683 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。

```

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

```

根据 XHC1983 和 HanyuPinyin 选出多音字。

```

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

```

```
707         t[#t + 1] = py
708     end
709 end
710 return xpinyin.unique(t), "HanyuPinyin"
711 end
712 end
```

删除掉数组中的重复元素。

```
713 function xpinyin.unique (t)
714     local rt = xpinyin.remove_duplicate(t)
715     if #rt > 1 then
716         return table.concat(rt, ",")
717     end
718 end
719 function xpinyin.remove_duplicate (t)
720     local ht = { }
721     local nt = { }
722     for i, v in ipairs(t) do
723         if not ht[v] then
724             nt[#nt + 1] = v
725             ht[v] = true
726         end
727     end
728     return nt
729 end
730 xpinyin.maketable()
731 xpinyin.output()
732 </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, 665, 668
\`	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
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