

# 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. 52c78f6.

## 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(`pinyinscope`)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 } { 2017/07/19 } { }
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_new:N \c__xpinyin_tone_prop
21 \clist_map_inline:nn
22 {
23   { ā }{ \@tabacckludge= a } ,      { á }{ \@tabacckludge' a } ,
24   { ä }{ \@tabacckludge= v a } ,    { à }{ \@tabacckludge` a } ,
25   { ö }{ \@tabacckludge= o } ,      { ó }{ \@tabacckludge' o } ,
26   { õ }{ \@tabacckludge= v o } ,    { ò }{ \@tabacckludge` o } ,
27   { ē }{ \@tabacckludge= e } ,      { é }{ \@tabacckludge' e } ,

```

```

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

```

```

\__xpinyin_UTF_char:nn 40 \cs_new_protected_nopar:Npn \__xpinyin_UTF_char:nn #1#2
41 {
42   \cs_if_exist:cF { u8:#1 }
43   { \tl_const:cn { u8:#1 } {#2} }
44 }

\__xpinyin_GBK_char:nn 45 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char:nn #1#2
46 {
47   \__xpinyin_UTF_char:nn {#1} {#2}
48   \exp_args:Nx \__xpinyin_GBK_char_aux:nn { \tl_head:n {#1} } {#1}
49 }
50 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nn #1#2
51 { \exp_args:Nf \__xpinyin_GBK_char_aux:nnn { \int_eval:n { `#1 } } {#1} {#2} }
52 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nnn #1#2#3
53 {
54   \cs_if_exist:cF { __xpinyin_UTF_ #1 :w }
55   {
56     \exp_args:Nf \__xpinyin_GBK_char_def:nnn
57     {
58       \int_case:nn { \tl_count:n {#3} }
59       {
60         { \c_two } { ##1 }
61         { \c_three } { ##1##2 }
62         { \c_four } { ##1##2##3 }
63       }
64     }
65     {#1} {#2}
66     \exp_args:Nc \__xpinyin_save_UTF_cs:Nn { __xpinyin_UTF_ #1 :w } {#1}
67     \tl_gput_right:Nx \c__xpinyin_reset_UTF_catcode_tl
68     { \char_set_catcode:nn {#1} { \char_value_catcode:n {#1} } }
69     \char_set_catcode_active:n {#1}
70   }
71 }
72 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_def:nnn #1#2#3
73 {
74   \cs_new_protected_nopar:cpn { __xpinyin_UTF_ #2 :w } #1
75   { \use:c { u8: \tl_to_str:n { #3#1 } } }
76 }
77 \tl_new:N \c__xpinyin_reset_UTF_catcode_tl

```

```

\__xpinyin_save_UTF_cs:Nn 78 \group_begin:
79 \char_set_catcode_active:n { 126 }
80 \cs_new_protected_nopar:Npn \__xpinyin_save_UTF_cs:Nn #1#2
81 {
82   \group_begin:
83   \char_set_lccode:nn { 126 } {#2}
84   \tex_lowercase:D
85   {
86     \group_end:
87     \tl_gput_right:Nn \c__xpinyin_reset_UTF_cs_tl { \cs_set_eq:NN ~ #1 }
88   }
89 }
90 \group_end:
91 \tl_new:N \c__xpinyin_reset_UTF_cs_tl

```

```

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

\l__xpinyin_tmpa_box 129 \box_new:N \l__xpinyin_tmpa_box
\l__xpinyin_tmpb_box 130 \box_new:N \l__xpinyin_tmpb_box

\__xpinyin_width:Nn 131 \cs_new_protected:Npn \__xpinyin_width:Nn #1#2
132 {
133   \hbox_set:Nn \l__xpinyin_tmpa_box {#2}
134   #1 = \box_wd:N \l__xpinyin_tmpa_box
135 }

\__xpinyin_leave_vmode: 136 \cs_if_exist:NTF \pdfTeX_quitvmode:D
137 { \cs_new_eq:NN \__xpinyin_quit_vmode: \pdfTeX_quitvmode:D }
138 {
139   \cs_new_protected_nopar:Npn \__xpinyin_quit_vmode:
140   {
141     \if_mode_vertical:
142     \exp_after:wN \tex_indent:D
143     \fi:
144   }
145 }

\__xpinyin_make_pinyin_box:nnn 146 \cs_new_protected_nopar:Npn \__xpinyin_make_pinyin_box:nnn #1#2#3
147 {
148   \__xpinyin_leavevmode:
149   \hbox_overlap_right:n
150   {
151     \hbox_set:Nn \l__xpinyin_tmpa_box
152     { \__xpinyin_CJKsymbol_hook: \__xpinyin_save_CJKsymbol:n {#2} }
153     \hbox_set:Nn \l__xpinyin_tmpb_box
154     {
155       \color_group_begin: \color_ensure_current:

```

```

156         \l__xpinyin_pinyin_box_hook_tl
157         \__xpinyin_select_font:
158         \clist_if_exist:cTF { c__xpinyin_multiple_ #1 _clist }
159         { \l__xpinyin_multiple_tl \l__xpinyin_format_tl }
160         { \l__xpinyin_format_tl }
161         {#3}
162         \color_group_end:
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: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 + \box_dp: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_clear: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_nopar:Npn \__xpinyin_CJKsymbol:n #1
187 { \__xpinyin_CJKsymbol:xn { \__xpinyin_to_unicode:n {#1} } {#1} }
188 \cs_new_protected_nopar: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 }

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

\xpinyin 200 \NewDocumentCommand \xpinyin { s O { } m }
201 {
202     \IfBooleanTF {#1}
203     {
204         \group_begin:
205         \keys_set:nn { xpinyin } {#2}
206         \enablepinyin
207         #3
208         \group_end:
209     }
210     {
211         \group_begin:
212         \keys_set:nn { xpinyin } {#2}
213         \bool_if:NF \l__xpinyin_enable_bool
214         { \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue } }
215         \__xpinyin_quit_vmode:
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_nopar: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_nopar: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 \etex_currentgrouptype:D = \c_eleven
256   { \disablepinyin }
257 }

\l__xpinyin_CJKglue_dim 258 \dim_new:N \l__xpinyin_CJKglue_dim

\__xpinyin_single_aux:nn 259 \cs_new_protected_nopar: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_nopar:Npn \__xpinyin_replace_CJKsymbol_single_aux:n #1
266 {
267   \bool_if:NF \l__xpinyin_enable_bool { \__xpinyin_replace_CJKsymbol: }
268   \cs_set_protected_nopar:Npn \CJKsymbol ##1
269   { \__xpinyin_single_CJKsymbol:nn {##1} {#1} }
270 }
271 \cs_new_protected_nopar: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_nopar: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_nopar:Npn \__xpinyin_restore_CJKsymbol_aux:
283 { \cs_set_eq:NN \CJKsymbol \__xpinyin_save_CJKsymbol:n }

\__xpinyin_select_font_xetex: 284 \cs_new_protected_nopar: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 { \xetex_fonttype:D \tex_font:D } = \c_zero
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_nopar:Npn \__xpinyin_select_font_aux:
298 {
299   \fontsize
300   { \l__xpinyin_ratio_tl \etex_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_nopar:Npn \__xpinyin_to_unicode_xetex:n #1
307 { \int_to_arabic:n { `#1 } }

\__xpinyin_UTF_to_unicode:n 308 \cs_new_nopar: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_nopar:Npn \__xpinyin_UTFchar_to_unicode:n #1
314 { \int_to_arabic:n { \__xpinyin_UTF_viii_to_unicode:NNW #1 \q_stop } }
315 \cs_new_nopar:Npn \__xpinyin_UTF_viii_to_unicode:NNW #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_nopar:Npn \__xpinyin_GBK_to_unicode:n #1
\__xpinyin_GBKchar_to_unicode:n 322 { \int_to_arabic:n { " \CJKtu_sfd_map:nn { \CJK@plane } {#1} } }
323 \cs_new_nopar:Npn \__xpinyin_GBKchar_to_unicode:n #1
324 { \int_to_arabic:n { " \CJKchartouni {#1} } }

\__xpinyin_adjust_xeCJK_hook: 325 \cs_new_protected_nopar: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_nopar: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_nopar: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: \__xpinyin_quit_vmode:
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_nopar:Npn \__xpinyin_adjust_CJKpunct_hook:
391 {
392     \cs_new_protected_nopar: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_nopar: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_nopar: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_nopar: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_nopar: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_nopar: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_nopar: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_nopar: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_nopar: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 < 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_nopar:Npn \__xpinyin_num_to_tone:Nn #1#2
499 {
500 \if_case:w \int_eval:n { #2 - \c_one } \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_nopar:Npn \__xpinyin_num_to_tone_i:Nn #1#2
506 {
507 \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
508 ī \or: í \or: ĭ \or: ï \else: i \fi:
509 }
510 \cs_new_protected_nopar: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 - \c_one } \exp_stop_f:
516 ū \or: ú \or: ŭ \or: û \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_nopar:Npn \xpinyin_customary:nnn #1#2#3
\xpinyin_multiple:nnn 534 { \cs_gset_nopar:cpn { c__xpinyin_ #2 _tl } {#3} }
535 \cs_new_protected_nopar:Npn \xpinyin_multiple:nnn #1#2#3
536 { \cs_gset_nopar:cpn { c__xpinyin_multiple_ #2 _clist } {#3} }

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

\"	35, 36, 37
\'	501
\\	5, 6, 7, 660, 663
\`	501

### A

\AtBeginDocument	378
\AtEndOfPackage	94, 99, 106, 119, 124

### B

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