

xpinyin 宏包

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1 简介

xpinyin 是一个 \LaTeX 宏包, 提供了为汉字自动注音的功能。

2 基本用法

xpinyin 支持采用 GBK 和 UTF-8 编码的 \TeX 源文件, 建议总是使用 UTF-8。如果使用 \LaTeX 或 \pdfLaTeX 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 \XeLaTeX , 则依赖 **xeCJK** 宏包。如果它们没有在 xpinyin 之前被载入, xpinyin 将根据编译方式自动选择, \LaTeX 或 \pdfLaTeX 将使用 CJKutf8。

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

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

\XeLaTeX 下的简单示例:

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

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

(pdf) \LaTeX 下的简单示例:

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

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

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

3 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}
```

liè wèi kàn guān nǐ dào cǐ shū cóng hé ér lái shuō qǐ gēn yóu suī jìn huāng táng xì àn zé shēn yǒu qù wèi dài zài xià jiāng cǐ lái lì zhù míng fāng shǐ
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
yuè zhè liǎo rán bù huò
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`scope 环境的命令形式。`\xpinyin` 可以在 `pinyin`scope 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¹中的 `UniHan_Readings.txt` 文件。对于多音字,一般来说这个文件选用的是常用读音。可以使用 `\setpinyin` 来设置多音字的首选读音。

`\xpinyinsetup` `\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

`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` = {}

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}}}
```

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

footnote	footnote = $\langle true false \rangle$
----------	---

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	\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。
---------------------------------	--

New: 2014/01/12

4 代码实现

```
1 \*package)
2 \@@=xpinyin)

3 \msg_new:nnn { xpinyin } { no-LuaTeX }
4 {
5   The~xpinyin~package~is~not~supported~in~LuaTeX.\\
6   You~must~change~your~typesetting~engine~to~\\
7   "xelatex"~or~"pdflatex"~or~"latex"~instead~of~"lualatex".
8 }
9 \luatex_if_engine:T { \msg_critical:nn { xpinyin } { no-LuaTeX } }

10 \RequirePackage { xparse }
11 \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。

```
12 \prop_new:N \c__xpinyin_tone_prop
13 \clist_map_inline:nn
14 {
15   { ā }{ \@tabacckludge= a } ,      { á }{ \@tabacckludge' a } ,
16   { ä }{ \@tabacckludge= v a } ,    { à }{ \@tabacckludge` a } ,
17   { õ }{ \@tabacckludge= o } ,      { ó }{ \@tabacckludge' o } ,
18   { ö }{ \@tabacckludge= v o } ,    { ò }{ \@tabacckludge` o } ,
19   { ē }{ \@tabacckludge= e } ,      { é }{ \@tabacckludge' e } ,
20   { ě }{ \@tabacckludge= v e } ,    { è }{ \@tabacckludge` e } ,
21   { ū }{ \@tabacckludge= u } ,      { ú }{ \@tabacckludge' u } ,
22   { ů }{ \@tabacckludge= v u } ,    { ù }{ \@tabacckludge` u } ,
23   { ě }{ \@tabacckludge' m } ,      { ñ }{ \@tabacckludge' n } ,
24   { ñ }{ \@tabacckludge' n } ,      { ñ }{ \@tabacckludge` n } ,
25   { ī }{ \@tabacckludge= { \i } } , { í }{ \@tabacckludge' { \i } } ,
26   { ĭ }{ \@tabacckludge= { \i } } , { ĭ }{ \@tabacckludge` { \i } } ,
27   { ü }{ \@tabacckludge= { \" u } } , { ũ }{ \@tabacckludge' { \" u } } ,
28   { ũ }{ \@tabacckludge= { \" u } } , { ũ }{ \@tabacckludge` { \" u } }
29   { ü }{ \@tabacckludge= { \" u } } , { ü }{ \@tabacckludge` { \" u } }
30 }
31 { \prop_gput:Nnn \c__xpinyin_tone_prop #1 }
```

(End definition for \c__xpinyin_tone_prop.)

__xpinyin_UTF_char:nn

```
32 \cs_new_protected_nopar:Npn \__xpinyin_UTF_char:nn #1#2
33 {
34   \cs_if_exist:cF { u8:#1 }
35   { \tl_const:cn { u8:#1 } {#2} }
36 }
```

(End definition for __xpinyin_UTF_char:nn.)

__xpinyin_GBK_char:nn

```
37 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char:nn #1#2
38 {
39   \__xpinyin_UTF_char:nn {#1} {#2}
40   \exp_args:Nx \__xpinyin_GBK_char_aux:nn { \tl_head:n {#1} } {#1}
41 }
42 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nn #1#2
43 { \exp_args:Nf \__xpinyin_GBK_char_aux:nnn { \int_eval:n { `#1 } } {#1} {#2} }
44 \cs_new_protected_nopar:Npn \__xpinyin_GBK_char_aux:nnn #1#2#3
```

```

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

```

(End definition for __xpinyin_GBK_char:nn.)

__xpinyin_save_UTF_cs:Nn

```

70 \group_begin:
71 \char_set_catcode_active:n { 126 }
72 \cs_new_protected_nopar:Npn \__xpinyin_save_UTF_cs:Nn #1#2
73 {
74   \group_begin:
75   \char_set_lccode:nn { 126 } {#2}
76   \tex_lowercase:D
77   {
78     \group_end:
79     \tl_gput_right:Nn \c__xpinyin_reset_UTF_cs_tl { \cs_set_eq:NN ~ #1 }
80   }
81 }
82 \group_end:
83 \tl_new:N \c__xpinyin_reset_UTF_cs_tl

```

(End definition for __xpinyin_save_UTF_cs:Nn.)

```

84 \bool_new:N \g__xpinyin_GBK_bool
85 \@ifpackageloaded { xeCJK }
86 { \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: } }
87 {
88   \@ifpackageloaded { CJKutf8 }
89   {
90     \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
91     \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
92   }
93   {
94     \@ifpackageloaded { CJK }
95     {
96       \RequirePackage { xCJK2uni }
97       \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_GBK_char:nn
98       \AtEndOfPackage
99       {
100         \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
101         { \c__xpinyin_reset_UTF_cs_tl }
102         \__xpinyin_adjust_CJK_hook:
103         \tl_use:N \c__xpinyin_reset_UTF_catcode_tl
104       }
105       \bool_gset_true:N \g__xpinyin_GBK_bool
106     }
107   }

```

```

108         \xetex_if_engine:TF
109         {
110             \RequirePackage { xeCJK }
111             \AtEndOfPackage { \__xpinyin_adjust_xeCJK_hook: }
112         }
113         {
114             \RequirePackage { CJKutf8 }
115             \prop_map_function:NN \c__xpinyin_tone_prop \__xpinyin_UTF_char:nn
116             \AtEndOfPackage { \__xpinyin_adjust_CJK_hook: }
117         }
118     }
119 }
120 }

```

\l__xpinyin_tmpa_box

\l__xpinyin_tmpb_box

```

121 \box_new:N \l__xpinyin_tmpa_box
122 \box_new:N \l__xpinyin_tmpb_box

```

(End definition for \l__xpinyin_tmpa_box and \l__xpinyin_tmpb_box.)

__xpinyin_width:Nn

```

123 \cs_new_protected:Npn \__xpinyin_width:Nn #1#2
124 {
125     \hbox_set:Nn \l__xpinyin_tmpa_box {#2}
126     #1 = \box_wd:N \l__xpinyin_tmpa_box
127 }

```

(End definition for __xpinyin_width:Nn.)

__xpinyin_leave_vmode:

```

128 \cs_if_exist:NTF \quitvmode
129 { \cs_new_eq:NN \__xpinyin_quit_vmode: \quitvmode }
130 {
131     \cs_new_protected_nopar:Npn \__xpinyin_quit_vmode:
132     {
133         \if_mode_vertical:
134         \exp_after:wN \tex_indent:D
135         \fi:
136     }
137 }

```

(End definition for __xpinyin_leave_vmode:.)

__xpinyin_make_pinyin_box:nnn

```

138 \cs_new_protected_nopar:Npn \__xpinyin_make_pinyin_box:nnn #1#2#3
139 {
140     \__xpinyin_leavevmode:
141     \hbox_overlap_right:n
142     {
143         \hbox_set:Nn \l__xpinyin_tmpa_box
144         { \__xpinyin_CJKsymbol_hook: \__xpinyin_save_CJKsymbol:n {#2} }
145         \hbox_set:Nn \l__xpinyin_tmpb_box
146         {
147             \color_group_begin: \color_ensure_current:
148             \l__xpinyin_pinyin_box_hook_tl
149             \__xpinyin_select_font:
150             \clist_if_exist:cTF { c__xpinyin_multiple_ #1 _clist }
151             { \l__xpinyin_multiple_tl \l__xpinyin_format_tl }
152             { \l__xpinyin_format_tl }
153             {#3}
154             \color_group_end:
155         }
156         \dim_compare:nNnT
157         { \box_wd:N \l__xpinyin_tmpb_box } >
158         { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
159         {
160             \box_resize:Nnn \l__xpinyin_tmpb_box
161             { \box_wd:N \l__xpinyin_tmpa_box + \l__xpinyin_CJKglue_dim }
162             { \box_ht:N \l__xpinyin_tmpb_box + \box_dp:N \l__xpinyin_tmpb_box }

```

```

163     }
164     \box_move_up:nn { \l__xpinyin_vsep_tl }
165     {
166         \hbox_to_wd:nn { \box_wd:N \l__xpinyin_tmpa_box }
167         { \tex_hss:D \box_use_clear:N \l__xpinyin_tmpb_box \tex_hss:D }
168     }
169 }
170 }
171 \tl_new:N \l__xpinyin_pinyin_box_hook_tl
172 \pdfTeX_if_engine:T
173 {
174     \tl_put_right:Nn \l__xpinyin_pinyin_box_hook_tl
175     { \cs_set_eq:NN \CJK@plane \tex_undefined:D }
176 }
177 \cs_generate_variant:Nn \__xpinyin_make_pinyin_box:nnn { x }

(End definition for \__xpinyin_make_pinyin_box:nnn.)

```

`__xpinyin_CJKsymbol:n`

```

178 \cs_new_protected_nopar:Npn \__xpinyin_CJKsymbol:n #1
179 { \__xpinyin_CJKsymbol:xn { \__xpinyin_to_unicode:n {#1} } {#1} }
180 \cs_new_protected_nopar:Npn \__xpinyin_CJKsymbol:nn #1#2
181 {
182     \__xpinyin_make_pinyin_box:nnn {#1} {#2} { \use:c { c__xpinyin_ #1 _tl } }
183     \__xpinyin_save_CJKsymbol:n {#2}
184 }
185 \cs_generate_variant:Nn \__xpinyin_CJKsymbol:nn { x }

(End definition for \__xpinyin_CJKsymbol:n.)

```

`pinyinscope`

```

186 \NewDocumentEnvironment { pinyinscope } { 0 { } }
187 {
188     \keys_set:nn { xpinyin } {#1}
189     \enablepinyin
190 }
191 { }

```

(End definition for `pinyinscope`. This function is documented on page 1.)

`\xpinyin`

```

192 \NewDocumentCommand \xpinyin { s O { } m }
193 {
194     \IfBooleanTF {#1}
195     {
196         \group_begin:
197         \keys_set:nn { xpinyin } {#2}
198         \enablepinyin
199         #3
200         \group_end:
201     }
202     {
203         \group_begin:
204         \keys_set:nn { xpinyin } {#2}
205         \bool_if:NF \l__xpinyin_enable_bool
206         { \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue } }
207         \__xpinyin_quit_vmode:
208         \__xpinyin_single_aux:nn {#3}
209     }
210 }

```

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

`\l__xpinyin_enable_bool`

```

211 \bool_new:N \l__xpinyin_enable_bool

```

(End definition for `\l__xpinyin_enable_bool`.)

`__xpinyin_CJKglue:`

```
212 \cs_new_protected_nopar:Npn \__xpinyin_CJKglue:
213 { \skip_horizontal:n { \l__xpinyin_hsep_tl } }
```

(End definition for __xpinyin_CJKglue:.)

`\enablepinyin`

```
214 \NewDocumentCommand \enablepinyin { }
215 {
216   \bool_if:NF \l__xpinyin_enable_bool
217   {
218     \tl_if_empty:NF \l__xpinyin_hsep_tl
219     {
220       \cs_set_eq:NN \__xpinyin_save_CJKglue: \CJKglue
221       \cs_set_eq:NN \CJKglue \__xpinyin_CJKglue:
222     }
223     \__xpinyin_width:Nn \l__xpinyin_CJKglue_dim { \CJKglue }
224     \__xpinyin_replace_CJKsymbol:
225     \__xpinyin_restore_footnote:
226     \bool_set_true:N \l__xpinyin_enable_bool
227   }
228 }
```

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

`\disablepinyin`

```
229 \NewDocumentCommand \disablepinyin { }
230 {
231   \bool_if:NT \l__xpinyin_enable_bool
232   {
233     \cs_if_eq:NNT \CJKglue \__xpinyin_CJKglue:
234     { \cs_set_eq:NN \CJKglue \__xpinyin_save_CJKglue: }
235     \__xpinyin_restore_CJKsymbol:
236     \bool_set_false:N \l__xpinyin_enable_bool
237   }
238 }
```

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

`__xpinyin_restore_footnote:`

```
239 \cs_new_protected_nopar:Npn \__xpinyin_restore_footnote:
240 {
241   \bool_if:NF \l__xpinyin_footnote_bool
242   { \tl_put_left:Nn \@parboxrestore { \l__xpinyin_restore_footnote_tl } }
243 }
```

(End definition for __xpinyin_restore_footnote:.)

`\l__xpinyin_restore_footnote_tl`

```
244 \tl_new:N \l__xpinyin_restore_footnote_tl
245 \tl_set:Nn \l__xpinyin_restore_footnote_tl
246 {
247   \int_compare:nNtT \etex_currentgrouptype:D = \c_eleven
248   { \disablepinyin }
249 }
```

(End definition for \l__xpinyin_restore_footnote_tl.)

`\l__xpinyin_CJKglue_dim`

```
250 \dim_new:N \l__xpinyin_CJKglue_dim
```

(End definition for \l__xpinyin_CJKglue_dim.)

_xpinyin_single_aux:nn

```
251 \cs_new_protected_nopar:Npn \_xpinyin_single_aux:nn #1#2
252 {
253   \_xpinyin_replace_CJKsymbol_single:n {#2}
254   #1
255   \group_end:
256 }
257 \cs_new_protected_nopar:Npn \_xpinyin_replace_CJKsymbol_single_aux:n #1
258 {
259   \bool_if:NF \l__xpinyin_enable_bool { \_xpinyin_replace_CJKsymbol: }
260   \cs_set_protected_nopar:Npn \CJKsymbol ##1
261     { \_xpinyin_single_CJKsymbol:nn {##1} {#1} }
262 }
263 \cs_new_protected_nopar:Npn \_xpinyin_single_CJKsymbol:nn #1#2
264 {
265   \_xpinyin_make_pinyin_box:xnn
266   { \_xpinyin_to_unicode:n {#1} } {#1} { \_xpinyin_pinyin:n {#2} }
267   \_xpinyin_save_CJKsymbol:n {#1}
268 }
```

(End definition for _xpinyin_single_aux:nn.)

_xpinyin_replace_CJKsymbol_aux:

```
269 \cs_new_protected_nopar:Npn \_xpinyin_replace_CJKsymbol_aux:
270 {
271   \cs_set_eq:NN \_xpinyin_save_CJKsymbol:n \CJKsymbol
272   \cs_set_eq:NN \CJKsymbol \_xpinyin_CJKsymbol:n
273 }
```

(End definition for _xpinyin_replace_CJKsymbol_aux:.)

_xpinyin_restore_CJKsymbol_aux:

```
274 \cs_new_protected_nopar:Npn \_xpinyin_restore_CJKsymbol_aux:
275 { \cs_set_eq:NN \CJKsymbol \_xpinyin_save_CJKsymbol:n }
```

(End definition for _xpinyin_restore_CJKsymbol_aux:.)

_xpinyin_select_font_xetex:

```
276 \cs_new_protected_nopar:Npn \_xpinyin_select_font_xetex:
277 {
278   \cs_if_exist_use:cF { \l__xpinyin_coor_tl }
279   {
280     \tl_set:Nx \l__xpinyin_current_coor_tl { \l__xpinyin_coor_tl }
281     \_xpinyin_select_font_aux:
282     \int_compare:nNnF { \XeTeXfonttype \tex_font:D } = \c_zero
283     {
284       \exp_last_unbraced:NNV
285       \cs_gset_eq:cN \l__xpinyin_current_coor_tl \tex_font:D
286     }
287   }
288 }
```

(End definition for _xpinyin_select_font_xetex:.)

_xpinyin_select_font_aux:

```
289 \cs_new_protected_nopar:Npn \_xpinyin_select_font_aux:
290 {
291   \fontsize
292   { \l__xpinyin_ratio_tl \etex_dimexpr:D \f@size pt \scan_stop: }
293   { \f@baselineskip }
294   \normalfont
295   \l__xpinyin_font_tl
296   \selectfont
297 }
```

(End definition for _xpinyin_select_font_aux:.)


```

\__xpinyin_to_unicode_xetex:n

298 \cs_new_nopar:Npn \__xpinyin_to_unicode_xetex:n #1
299   { \int_to_arabic:n { `#1 } }

(End definition for \__xpinyin_to_unicode_xetex:n.)

\__xpinyin_UTF_to_unicode:n
\__xpinyin_UTFchar_to_unicode:n 300 \cs_new_nopar:Npn \__xpinyin_UTF_to_unicode:n #1
301   {
302     \int_to_arabic:n
303     { \exp_args:No \int_from_hex:n { \CJK@plane } * "100 + #1 }
304   }
305 \cs_new_nopar:Npn \__xpinyin_UTFchar_to_unicode:n #1
306   { \int_to_arabic:n { \__xpinyin_UTF_viii_to_unicode:NNNw #1 \q_stop } }
307 \cs_new_nopar:Npn \__xpinyin_UTF_viii_to_unicode:NNNw #1#2#3#4 \q_stop
308   {
309     \tl_if_empty:nTF {#4}
310     { ( `#1 - "E0 ) * "1000 + ( `#2 - "80 ) * "40 + ( `#3 - "80 ) }
311     { ( `#1 - "F0 ) * "4000 + ( `#2 - "80 ) * "1000 + ( `#3 - "80 ) * "40 + ( `#4 - "80 ) }
312   }

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

\__xpinyin_GBK_to_unicode:n
\__xpinyin_GBKchar_to_unicode:n 313 \cs_new_nopar:Npn \__xpinyin_GBK_to_unicode:n #1
314   { \int_to_arabic:n { " \CJKtu_sfd_map:nn { \CJK@plane } {#1} } }
315 \cs_new_nopar:Npn \__xpinyin_GBKchar_to_unicode:n #1
316   { \int_to_arabic:n { " \CJKchartouni {#1} } }

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

\__xpinyin_adjust_xeCJK_hook:

317 \cs_new_protected_nopar:Npn \__xpinyin_adjust_xeCJK_hook:
318   {
319     \cs_new_eq:NN \__xpinyin_select_font: \__xpinyin_select_font_xetex:
320     \cs_new_eq:NN \__xpinyin_to_unicode:n \__xpinyin_to_unicode_xetex:n
321     \cs_new_eq:NN \__xpinyin_char_to_unicode:n \__xpinyin_to_unicode:n
322     \cs_new_eq:NN \__xpinyin_restore_CJKsymbol: \__xpinyin_restore_CJKsymbol_aux:
323     \cs_new_eq:NN \__xpinyin_replace_CJKsymbol: \__xpinyin_replace_CJKsymbol_aux:
324     \cs_new_eq:NN \__xpinyin_replace_CJKsymbol_single:n
325     \__xpinyin_replace_CJKsymbol_single_aux:n
326     \tl_if_exist:NTF \l_xeCJK_current_font_tl
327     {
328       \tl_set:Nn \l__xpinyin_coord_tl
329       {
330         ( \tl_to_str:N \l__xpinyin_font_tl ) /
331         \l_xeCJK_current_font_tl/\l__xpinyin_ratio_tl
332       }
333     }
334     {
335       \tl_set:Nn \l__xpinyin_coord_tl
336       {
337         ( \tl_to_str:N \l__xpinyin_font_tl ) /
338         \xeCJK@family/\f@series/\f@shape/\f@size/\l__xpinyin_ratio_tl
339       }
340     }
341     \cs_new_eq:NN \__xpinyin_leavevmode: \prg_do_nothing:
342     \cs_new_protected_nopar:Npx \__xpinyin_CJKsymbol_hook:
343     {
344       \exp_not:N \makeXeCJKinactive
345       \cs_if_exist_use:NF \xeCJK_select_font:
346       { \exp_not:N \xeCJK@setfont }
347     }
348   }

(End definition for \__xpinyin_adjust_xeCJK_hook:.)

```

_xpinyin_adjust_CJK_hook:

```

349 \cs_new_protected_nopar:Npn \_xpinyin_adjust_CJK_hook:
350 {
351   \bool_if:NTF \g__xpinyin_GBK_bool
352   {
353     \cs_new_eq:NN \_xpinyin_to_unicode:n \_xpinyin_GBK_to_unicode:n
354     \cs_new_eq:NN \_xpinyin_char_to_unicode:n \_xpinyin_GBKchar_to_unicode:n
355   }
356   {
357     \cs_new_eq:NN \_xpinyin_to_unicode:n \_xpinyin_UTF_to_unicode:n
358     \cs_new_eq:NN \_xpinyin_char_to_unicode:n \_xpinyin_UTFchar_to_unicode:n
359   }
360   \cs_new_eq:NN \_xpinyin_select_font: \_xpinyin_select_font_aux:
361   \cs_new_eq:NN \_xpinyin_leavevmode: \_xpinyin_quit_vmode:
362   \cs_new_eq:NN \_xpinyin_CJKsymbol_hook: \prg_do_nothing:
363   \@ifpackageloaded { CJKpunct }
364   { \_xpinyin_adjust_CJKpunct_hook: }
365   {
366     \cs_new_eq:NN \_xpinyin_restore_CJKsymbol: \_xpinyin_restore_CJKsymbol_aux:
367     \cs_new_eq:NN \_xpinyin_replace_CJKsymbol: \_xpinyin_replace_CJKsymbol_aux:
368     \cs_new_eq:NN \_xpinyin_replace_CJKsymbol_single:n
369       \_xpinyin_replace_CJKsymbol_single_aux:n
370     \AtBeginDocument
371     {
372       \@ifpackageloaded { CJKpunct }
373       {
374         \cs_undefine:N \_xpinyin_restore_CJKsymbol:
375         \cs_undefine:N \_xpinyin_replace_CJKsymbol:
376         \cs_undefine:N \_xpinyin_replace_CJKsymbol_single:n
377         \_xpinyin_adjust_CJKpunct_hook:
378       } { }
379     }
380   }
381 }

```

(End definition for _xpinyin_adjust_CJK_hook:.)

_xpinyin_adjust_CJKpunct_hook:

```

382 \cs_new_protected_nopar:Npn \_xpinyin_adjust_CJKpunct_hook:
383 {
384   \cs_new_protected_nopar:Npn \_xpinyin_restore_CJKsymbol:
385   {
386     \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
387     { \_xpinyin_restore_CJKsymbol_aux: }
388     { \cs_set_eq:NN \CJKsymbol \_xpinyin_save_CJKsymbol:n }
389   }
390   \cs_new_protected_nopar:Npn \_xpinyin_replace_CJKsymbol:
391   {
392     \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
393     { \_xpinyin_replace_CJKsymbol_aux: }
394     {
395       \cs_set_eq:NN \_xpinyin_save_CJKsymbol:n \CJKsymbol
396       \cs_set_eq:NN \CJKsymbol \_xpinyin_CJKsymbol:n
397     }
398   }
399   \cs_new_protected_nopar:Npn \_xpinyin_replace_CJKsymbol_single:n ##1
400   {
401     \int_compare:nNnTF { \CJKpunct@punctstyle } = { \CJKpunct@ps@plain }
402     { \_xpinyin_replace_CJKsymbol_single_aux:n { ##1 } }
403     {
404       \bool_if:NF \l__xpinyin_enable_bool
405       { \cs_set_eq:NN \_xpinyin_save_CJKsymbol:n \CJKsymbol }
406       \cs_set_protected_nopar:Npn \CJKsymbol ####1
407       { \_xpinyin_single_CJKsymbol:nn { ####1 } { ##1 } }
408     }
409   }
410 }

```

(End definition for _xpinyin_adjust_CJKpunct_hook:.)

\pinyin

```
411 \NewDocumentCommand \pinyin { 0 { } m }
412 {
413   \group_begin:
414   \keys_set:nn { xpinyin } {#1}
415   \l__xpinyin_font_tl
416   \l__xpinyin_format_tl { }
417   \selectfont
418   \c__xpinyin_reset_UTF_cs_tl
419   \__xpinyin_pinyin:n {#2}
420   \group_end:
421 }
```

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

__xpinyin_pinyin:n

```
422 \cs_new_protected_nopar:Npn \__xpinyin_pinyin:n #1
423 {
424   \__xpinyin_pinyin_init:
425   \bool_set_true:N \l__xpinyin_first_bool
426   \tl_set:Nn \l__xpinyin_save_tl {#1}
427   \__xpinyin_pinyin_aux:n #1 \q_recursion_tail \q_recursion_stop
428 }
```

(End definition for __xpinyin_pinyin:n.)

__xpinyin_pinyin_aux:n

```
429 \cs_new_protected_nopar:Npn \__xpinyin_pinyin_aux:n #1
430 {
431   \quark_if_recursion_tail_stop_do:nn {#1}
432   {
433     \bool_if:NTF \l__xpinyin_first_bool { \l__xpinyin_save_tl }
434     { \tl_if_empty:NF \l__xpinyin_item_tl { \l__xpinyin_pysep_tl \l__xpinyin_item_tl } }
435   }
436   \__xpinyin_if_number:nTF {#1}
437   {
438     \bool_if:NTF \l__xpinyin_first_bool
439     { \bool_set_false:N \l__xpinyin_first_bool }
440     { \l__xpinyin_pysep_tl }
441     \l__xpinyin_pre_tl
442     \__xpinyin_tone:Nn \l__xpinyin_tone_tl {#1}
443     \l__xpinyin_post_tl
444     \__xpinyin_pinyin_init:
445   }
446   {
447     \int_compare:nNnTF
448     { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:N \l__xpinyin_tone_tl _tl } } >
449     { 0 \cs_if_exist_use:c { c__xpinyin_ \tl_to_str:n {#1} _tl } }
450     { \tl_put_right:Nn \l__xpinyin_post_tl {#1} }
451     {
452       \tl_set:Nn \l__xpinyin_tone_tl {#1}
453       \tl_set_eq:NN \l__xpinyin_pre_tl \l__xpinyin_item_tl
454       \tl_clear:N \l__xpinyin_post_tl
455     }
456     \tl_put_right:Nx \l__xpinyin_item_tl { \__xpinyin_replace_v:n {#1} }
457   }
458   \__xpinyin_pinyin_aux:n
459 }
```

(End definition for __xpinyin_pinyin_aux:n.)

__xpinyin_tone:Nn

```
460 \cs_new_protected_nopar:Npn \__xpinyin_tone:Nn #1#2
461 { \use:c { __xpinyin_num_to_tone_ #1 :Nn } {#1} {#2} }
462 \cs_generate_variant:Nn \__xpinyin_tone:Nn { V }
```

(End definition for __xpinyin_tone:Nn.)

__xpinyin_replace_v:n

```
463 \cs_new_nopar:Npn \__xpinyin_replace_v:n #1
464 {
465   \str_if_eq:nnTF {#1} { v }
466   {
467     \str_case:onTF { \l__xpinyin_item_tl }
468     { { l } { } { n } { } { } { L } { } { N } { } }
469     { \exp_not:n { ü } } { u }
470   }
471   { \exp_not:n {#1} }
472 }
```

(End definition for __xpinyin_replace_v:n.)

__xpinyin_pinyin_init:

```
473 \cs_new_nopar:Npn \__xpinyin_pinyin_init:
474 {
475   \tl_clear:N \l__xpinyin_pre_tl   \tl_clear:N \l__xpinyin_post_tl
476   \tl_clear:N \l__xpinyin_item_tl  \tl_clear:N \l__xpinyin_tone_tl
477 }
```

(End definition for __xpinyin_pinyin_init:.)

__xpinyin_if_number:nTF

```
478 \prg_new_conditional:Npnn \__xpinyin_if_number:n #1 { TF }
479 {
480   \if_int_compare:w \c_one < 1 \tl_to_str:n {#1} \exp_stop_f:
481   \prg_return_true: \else: \prg_return_false: \fi:
482 }
```

(End definition for __xpinyin_if_number:nTF.)

\l__xpinyin_first_bool

```
483 \bool_new:N \l__xpinyin_first_bool
```

(End definition for \l__xpinyin_first_bool.)

\c__xpinyin_a_tl

```
\c__xpinyin_o_tl 484 \tl_const:Nn \c__xpinyin_a_tl { 3 }
\c__xpinyin_e_tl 485 \tl_const:Nn \c__xpinyin_o_tl { 2 }
\c__xpinyin_i_tl 486 \tl_const:Nn \c__xpinyin_e_tl { 2 }
\c__xpinyin_u_tl 487 \tl_const:Nn \c__xpinyin_i_tl { 1 }
\c__xpinyin_v_tl 488 \tl_const:Nn \c__xpinyin_u_tl { 1 }
489 \tl_const:Nn \c__xpinyin_v_tl { 1 }
```

(End definition for \c__xpinyin_a_tl and others.)

__xpinyin_num_to_tone:Nn

```
490 \cs_new_protected_nopar:Npn \__xpinyin_num_to_tone:Nn #1#2
491 {
492   \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
493   \= {#1} \or: \'{#1} \or: \v {#1} \or: \` {#1} \else: #1 \fi:
494 }
495 \tl_map_inline:nn { a o e u }
496 { \cs_new_eq:cN { __xpinyin_num_to_tone_ #1 :Nn } \__xpinyin_num_to_tone:Nn }
497 \cs_new_nopar:Npn \__xpinyin_num_to_tone_i:Nn #1#2
498 {
499   \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
500   ī \or: í \or: ï \or: i \else: i \fi:
501 }
502 \cs_new_protected_nopar:Npn \__xpinyin_num_to_tone_v:Nn #1#2
503 {
504   \str_case:onTF { \l__xpinyin_pre_tl }
505   { { l } { } { n } { } { L } { } { N } { } }
506   {
507     \if_case:w \int_eval:n { #2 - \c_one } \exp_stop_f:
508     ū \or: ú \or: ũ \or: ù \else: ü \fi:
509   }
510   { \__xpinyin_num_to_tone:Nn u {#2} }
511 }
```

(End definition for `__xpinyin_num_to_tone:Nn`.)

`\xpinyinsetup`

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

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

```
ratio
vsep 513 \clist_map_inline:nn
hsep 514 { ratio , vsep , hsep , pysep , font , format , multiple }
pysep 515 { \keys_define:nn { xpinyin } { #1 .tl_set:c = { l__xpinyin_ #1 _tl } } }
font 516 \keys_define:nn { xpinyin }
format 517 { footnote .bool_set:N = \l__xpinyin_footnote_bool }
multiple 518 \keys_set:nn { xpinyin }
footnote 519 {
520     ratio    = .4 ,
521     vsep     = 1 em ,
522     pysep    = \c_space_tl ,
523     font     = \normalfont ,
524 }
```

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

`\xpinyin_customary:nnn`

`\xpinyin_multiple:nnn`

```
525 \cs_new_protected_nopar:Npn \xpinyin_customary:nnn #1#2#3
526 { \cs_gset_nopar:cpn { c__xpinyin_ #2 _tl } {#3} }
527 \cs_new_protected_nopar:Npn \xpinyin_multiple:nnn #1#2#3
528 { \cs_gset_nopar:cpn { c__xpinyin_multiple_ #2 _clist } {#3} }
```

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

```
529 \group_begin:
530   \cs_set_eq:NN \XPYU \xpinyin_customary:nnn
531   \cs_set_eq:NN \XPYUM \xpinyin_multiple:nnn
532   \file_input:n { xpinyin-database.def }
533 \group_end:
```

`\setpinyin`

```
534 \NewDocumentCommand \setpinyin { m m }
535 {
536   \tl_set:cn
537     { c__xpinyin_ \__xpinyin_char_to_unicode:n {#1} _tl }
538     { \__xpinyin_pinyin:n {#2} }
539 }
```

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

```
540 \ProcessKeysOptions { xpinyin }
```

```
541 \</package>
```

5 xpinyin.lua

```
542 <lua>
543 xpinyin = xpinyin or {}
544 local xpinyin = xpinyin

    计算时区2。
545 xpinyin.tzoffset = "+0000"
546 do
547   -- Compute the difference in seconds between local time and UTC.
548   local function get_timezone()
549     local now = os.time()
550     return os.difftime(now, os.time(os.date("!*t", now)))
551   end
552   -- Return a timezone string in ISO 8601:2000 standard form (+hhmm or -hhmm)
553   local function get_tzoffset(timezone)
554     local h, m = math.modf(timezone / 3600)
```

²<http://lua-users.org/wiki/TimeZone>

```

555     return string.format("%.4d", 100 * h + 60 * m)
556 end
557 xpinyin.tzoffset = get_tzoffset(get_timezone())
558 end
559 xpinyin = {
560     svnid      = "$Id: xpinyin.dtx 746 2014-12-23 13:58:49Z sobenlee@gmail.com $",
561     uchar      = unicode.utf8.char,
562     ugsub      = unicode.utf8.gsub,
563     readings   = { },
564     fixreadings = {

```

为汉字“〇”增加拼音。

```

565     {"U+3007", "Mandarin", "líng"},

```

修改汉字“女”的错误拼音。

```

566     {"U+5973", "HanyuPinlu", "nǚ(1129) rǚ(37)"}
567 },
568 database = {
569     source    = "http://www.unicode.org/Public/UNIDATA/UniHan.zip",
570     file      = "UniHan_Readings.txt",
571     date      = "Date: 2014-05-09 18:17:02 GMT [JHJ]",
572     version   = "Unicode version: 7.0.0",
573     dbfile    = "xpinyin.db"
574 },

```

UniHan 的 kHanyuPinlu 数据把韵母 ou 的音调都标在了 u 上。

```

575     outones = {
576         oū = "ōu" ,
577         óu = "óu" ,
578         ǒu = "ǒu" ,
579         òu = "òu"
580     },

```

DocStrip 会将一行开头的 %% 替换成 \MetaPrefix, 因此我们在行首加了空格, 需要把它去掉。

```

581     preamble = string.gsub([[
582         %%
583         %% Do not edit this file!
584         %% Created from UniHan database:
585         %%
586         %% $file
587         %% $date
588         %% $version
589         %%
590         %% by "texlua xpinyin.lua" on ]]
591         .. os.date("%Y-%m-%d %X ") .. xpinyin.tzoffset
592         .. "\n%%", "[ ]+(%%%%)", "%1")
593     ])

```

将 UniHan_Readings.txt³ 保存到一张表里面。

```

594 function xpinyin.maketable (txt)
595     local f = io.open(txt or xpinyin.database.file, "r")
596     if not f then
597         local source = xpinyin.database.source
598         local zfilename = source:match("[^/]+$")
599         local zfile = zip.open(zfilename)
600         if not zfile then
601             xpinyin.download(source, zfilename)
602             zfile = assert(zip.open(zfilename))
603         end
604         f = assert(zfile:open(xpinyin.database.file))
605         zfile:close()
606     end
607     local s, prop
608     for line in f:lines() do
609         s = line:explode("\t")
610         if #s == 3 then
611             prop = s[2]:sub(2)
612             if prop == "Mandarin" or
613                prop == "HanyuPinyin" or

```

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

```

614         prop == "XHC1983" or
615         prop == "HanyuPinlu" then
616             xpinyin.insert(s[1], prop, s[3])
617         end
618     elseif line:find("Date") then
619         xpinyin.database.date = line:match("^[%s]*(.*)")
620     elseif line:find("Unicode version:") then
621         xpinyin.database.version = line:match("^[%s]*(.*)")
622     end
623 end
624 f:close()
625 if xpinyin.fixreadings then
626     for _, s in pairs(xpinyin.fixreadings) do
627         xpinyin.insert(s[1], s[2], s[3])
628     end
629 end
630 end

```

下载 Unihan.zip。

```

631 function xpinyin.download (source, zip)
632     print("\nRetrieving Unihan Database from\n", source)
633     local unihan_data = assert(socket.http.request(source), "download failed")
634     local f = assert(io.open(zip, "wb"), "Unihan file (" .. zip .. ") not writable")
635     f:write(unihan_data)
636     f:close()
637 end

```

往拼音表中加入项目。

```

638 function xpinyin.insert (unicode, prop, value)
639     local index = tonumber(unicode:sub(3), 16)
640     if not xpinyin.readings[index] then
641         xpinyin.readings[index] = { }
642     end
643     xpinyin.readings[index][prop] = value
644 end

```

输出需要的格式文件。

```

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

```

将表按照索引排序,代码来源于 *Programming in Lua*。

```

663 function xpinyin.pairsByKeys (t, f)
664     local a = { }
665     for n in pairs(t) do a[#a + 1] = n end
666     table.sort(a, f)
667     local i = 0 -- iterator variable
668     return function () -- iterator function
669         i = i + 1
670         return a[i], t[a[i]]
671     end
672 end

```

按照 HanyuPinlu、Mandarin、XHC1983、HanyuPinyin 的顺序选择最常用的拼音。

```

673 function xpinyin.grep (pyt)
674     if pyt.HanyuPinlu then

```

```

675     return xpinyin.ugsub(pyt.HanyuPinlu:match("[^%()]+"), "o[ūúǔù]$", xpinyin.outones),
676     "HanyuPinlu"
677 elseif pyt.Mandarin then
678     return pyt.Mandarin:match("%S+"), "Mandarin"
679 elseif pyt.XHC1983 then
680     return pyt.XHC1983:match(":(%S+)"), "XHC1983"
681 elseif pyt.HanyuPinyin then
682     return pyt.HanyuPinyin:match(":([^,%s]+)"), "HanyuPinyin"
683 end
684 end

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

    删除掉数组中的重复元素。
705 function xpinyin.unique (t)
706     local rt = xpinyin.remove_duplicate(t)
707     if #rt > 1 then
708         return table.concat(rt, ",")
709     end
710 end

711 function xpinyin.remove_duplicate (t)
712     local ht = { }
713     local nt = { }
714     for i, v in ipairs(t) do
715         if not ht[v] then
716             nt[#nt + 1] = v
717             ht[v] = true
718         end
719     end
720     return nt
721 end

722 xpinyin.maketable()
723 xpinyin.output()
724 </lua>

```


代码索引

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

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