Package ‘tau’

October 14, 2022

Version 0.0-24
Encoding UTF-8
Title Text Analysis Utilities
Description Utilities for text analysis.
Suggests tm
License GPL-2
NeedsCompilation yes
Author Christian Buchta [aut],
        Kurt Hornik [aut, cre] (<https://orcid.org/0000-0003-4198-9911>),
        Ingo Feinerer [aut],
        David Meyer [aut]
Maintainer Kurt Hornik <Kurt.Hornik@R-project.org>
Depends R (>= 2.10)
Repository CRAN
Date/Publication 2021-07-21 11:07:16 UTC

R topics documented:

encoding ................................................................. 2
ligatures ................................................................. 3
readers ................................................................. 4
textcnt ................................................................. 5
util ................................................................. 8

Index 10
Adapt the (Declared) Encoding of a Character Vector

Description

Functions for testing and adapting the (declared) encoding of the components of a vector of mode character.

Usage

is.utf8(x)
is.ascii(x)
is.locale(x)

translate(x, recursive = FALSE, internal = FALSE)
fixEncoding(x, latin1 = FALSE)

Arguments

x a vector (of character).
recursive option to process list components.
internal option to use internal translation.
latin1 option to assume "latin1" if the declared encoding is "unknown".

Details

is.utf8 tests if the components of a vector of character are true UTF-8 strings, i.e. contain one or more valid UTF-8 multi-byte sequence(s).

is.locale tests if the components of a vector of character are in the encoding of the current locale.

translate encodes the components of a vector of character in the encoding of the current locale. This includes the names attribute of vectors of arbitrary mode. If recursive = TRUE the components of a list are processed. If internal = TRUE multi-byte sequences that are invalid in the encoding of the current locale are changed to literal hex numbers (see FIXME).

fixEncoding sets the declared encoding of the components of a vector of character to their correct or preferred values. If latin1 = TRUE strings that are not valid UTF-8 strings are declared to be in "latin1". On the other hand, strings that are true UTF-8 strings are declared to be in "UTF-8" encoding.

Value

The same type of object as x with the (declared) encoding possibly changed.

Note

Currently translate uses iconv and therefore is not guaranteed to work on all platforms.
Translate Unicode Latin Ligatures

Description

Translate Unicode “Latin ligature” characters to their respective constituents.

Usage

translateUnicode_latin_ligatures(x)

Arguments

x a character vector in UTF-8 encoding.
Details

In typography, a ligature occurs where two or more graphemes are joined as a single glyph. (See https://en.wikipedia.org/wiki/Typographic_ligature for more information.)

Unicode (http://www.unicode.org/) lists the following “Latin” ligatures:

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0132</td>
<td>LATIN CAPITAL LIGATURE IJ</td>
</tr>
<tr>
<td>0133</td>
<td>LATIN SMALL LIGATURE IJ</td>
</tr>
<tr>
<td>0152</td>
<td>LATIN CAPITAL LIGATURE OE</td>
</tr>
<tr>
<td>0153</td>
<td>LATIN SMALL LIGATURE OE</td>
</tr>
<tr>
<td>FB00</td>
<td>LATIN SMALL LIGATURE FF</td>
</tr>
<tr>
<td>FB01</td>
<td>LATIN SMALL LIGATURE FI</td>
</tr>
<tr>
<td>FB02</td>
<td>LATIN SMALL LIGATURE FL</td>
</tr>
<tr>
<td>FB03</td>
<td>LATIN SMALL LIGATURE FFI</td>
</tr>
<tr>
<td>FB04</td>
<td>LATIN SMALL LIGATURE FFL</td>
</tr>
<tr>
<td>FB05</td>
<td>LATIN SMALL LIGATURE LONG S T</td>
</tr>
<tr>
<td>FB06</td>
<td>LATIN SMALL LIGATURE ST</td>
</tr>
</tbody>
</table>

translate_Unicode_latin_ligatures translates these to their respective constituent characters.

---

readers

Read Byte or Character Strings

Description

Read byte or character strings from a connection.

Usage

readBytes(con)
readChars(con, encoding = "")

Arguments

con a connection object or a character string naming a file.
encoding encoding to be assumed for input.

Details

Both functions first read the raw bytes from the input connection into a character string. readBytes then sets the Encoding of this to "bytes"; readChars uses iconv to convert from the specified input encoding to UTF-8 (replacing non-convertible bytes by their hex codes).

Value

For readBytes, a character string marked as "bytes". For readChars, a character string marked as "UTF-8" if containing non-ASCII characters.
See Also

Encoding

textcnt

Term or Pattern Counting of Text Documents

Description

This function provides a common interface to perform typical term or pattern counting tasks on text documents.

Usage

```r
textcnt(x, n = 3L, split = "[:space:][:punct:][:digit:]\+",
         tolower = TRUE, marker = "_", words = NULL, lower = 0L,
         method = c("ngram", "string", "prefix", "suffix"),
         recursive = FALSE, persistent = FALSE, useBytes = FALSE,
         perl = TRUE, verbose = FALSE, decreasing = FALSE)
```

## S3 method for class 'textcnt'

format(x, ...)

Arguments

- **x**: a (list of) vector(s) of character representing one (or more) text document(s).
- **n**: the maximum number of characters considered in ngram, prefix, or suffix counting (for word counting see details).
- **split**: the regular expression pattern (PCRE) to be used in word splitting (if NULL, do nothing).
- **tolower**: option to transform the documents to lowercase (after word splitting).
- **marker**: the string used to mark word boundaries.
- **words**: the number of words to use from the beginning of a document (if NULL, all words are used).
- **lower**: the lower bound for a count to be included in the result set(s).
- **method**: the type of counts to compute.
- **recursive**: option to compute counts for individual documents (default all documents).
- **persistent**: option to count documents incrementally.
- **useBytes**: option to process byte-by-byte instead of character-by-character.
- **perl**: option to use PCRE in word splitting.
- **verbose**: option to obtain timing statistics.
- **decreasing**: option to return the counts in decreasing order.
- **...**: further (unused) arguments.
Details

The following counting methods are currently implemented:

- **ngram**: Count all word n-grams of order 1, \ldots, n.
- **string**: Count all word sequence n-grams of order n.
- **prefix**: Count all word prefixes of at most length n.
- **suffix**: Count all word suffixes of at most length n.

The n-grams of a word are defined to be the substrings of length \( n = \min(\text{length(word)}, n) \) starting at positions 1, \ldots, \text{length(word)} - n. Note that the value of marker is pre- and appended to word before counting. However, the empty word is never marked and therefore not counted. Note that marker = "\1" is reserved for counting of an efficient set of ngrams and marker = "\2" for the set proposed by Cavnar and Trenkle (see references).

If method = "string" word-sequences of and only of length n are counted. Therefore, documents with less than n words are omitted.

By default all documents are preprocessed and counted using a single C function call. For large document collections this may come at the price of considerable memory consumption. If persistent = TRUE and recursive = TRUE documents are counted incrementally, i.e., into a persistent prefix tree using as many C function calls as there are documents. Further, if persistent = TRUE and recursive = FALSE the documents are counted using a single call but no result is returned until the next call with persistent = FALSE. Thus, persistent acts as a switch with the counts being accumulated until release. Timing statistics have shown that incremental counting can be order of magnitudes faster than the default.

Be aware that the character strings in the documents are translated to the encoding of the current locale if the encoding is set (see Encoding). Therefore, with the possibility of "unknown" encodings when in an "UTF-8" locale, or invalid "UTF-8" strings declared to be in "UTF-8", the code checks if each string is a valid "UTF-8" string and stops if not. Otherwise, strings are processed bytewise without any checks. However, embedded null bytes are always removed from a string. Finally, note that during incremental counting a change of locale is not allowed (and a change in method is not recommended).

Note that the C implementation counts words into a prefix tree. Whereas this is highly efficient for n-gram, prefix, or suffix counting it may be less efficient for simple word counting. That is, implementations which use hash tables may be more efficient if the dictionary is large.

format.textcnt pretty prints a named vector of counts (see below) including information about the rank and encoding details of the strings.

Value

Either a single vector of counts of mode integer with the names indexing the patterns counted, or a list of such vectors with the components corresponding to the individual documents. Note that by default the counts are in prefix tree (byte) order (for method = "suffix" this is the order of the reversed strings). Otherwise, if decreasing = TRUE the counts are sorted in decreasing order. Note that the (default) order of ties is preserved (see sort).
textcnt

Note

The C functions can be interrupted by CTRL-C. This is convenient in interactive mode but comes at the price that the C code cannot clean up the internal prefix tree. This is a known problem of the R API and the workaround is to defer the cleanup to the next function call.

The C code calls translateChar for all input strings which is documented to release the allocated memory no sooner than when returning from the Call/External interface. Therefore, in order to avoid excessive memory consumption it is recommended to either translate the input data to the current locale or to process the data incrementally.

useBytes may not be fully functional with R versions where strsplit does not support that argument.

If useBytes = TRUE the character strings of names will never be declared to be in an encoding.

Author(s)

Christian Buchta

References


Examples

```r
## the classic
txt <- "The quick brown fox jumps over the lazy dog."

##
textcnt(txt, method = "ngram")
textcnt(txt, method = "prefix", n = 5L)

r <- textcnt(txt, method = "suffix", lower = 1L)
data.frame(counts = unclass(r), size = nchar(names(r)))
format(r)

## word sequences

textcnt(txt, method = "string")

## inefficient

textcnt(txt, split = "", method = "string", n = 1L)

## incremental

textcnt(txt, method = "string", persistent = TRUE, n = 1L)
textcnt(txt, method = "string", n = 1L)

## subset

textcnt(txt, method = "string", words = 5L, n = 1L)

## non-ASCII

txt <- "The quick br\xfcn f\xf6x j\xfbmps \xf5ver the lazy d\xf6xf8g."

Encoding(txt) <- "latin1"
```
## implicit translation

```r
r <- textcnt(txt, method = "suffix")
table(Encoding(names(r)))
```

## efficient sets

```r
textcnt("is", n = 3L, marker = "\1")
textcnt("is", n = 4L, marker = "\1")
textcnt("corpus", n = 5L, marker = "\1")
```

## CT sets

```r
textcnt("corpus", n = 5L, marker = "\2")
```

---

### Preprocessing of Text Documents

#### Description

Functions for common preprocessing tasks of text documents,

#### Usage

```r
tokenize(x, lines = FALSE, eol = "\n")
remove_stopwords(x, words, lines = FALSE)
```

#### Arguments

- **x**
  a vector of character.
- **eol**
  the end-of-line character to use.
- **words**
  a vector of character (tokens).
- **lines**
  assume the components are lines of text.

#### Details

`tokenize` is a simple regular expression based parser that splits the components of a vector of character into tokens while protecting infix punctuation. If `lines = TRUE` assume `x` was imported with `readLines` and end-of-line markers need to be added back to the components.

`remove_stopwords` removes the tokens given in `words` from `x`. If `lines = FALSE` assumes the components of both vectors contain tokens which can be compared using `match`. Otherwise, assumes the tokens in `x` are delimited by word boundaries (including infix punctuation) and uses regular expression matching.

#### Value

The same type of object as `x`. 
Examples

txt <- """It's almost noon," it@dot.net said."
## split
x <- tokenize(txt)
# reconstruct
x <- paste(x, collapse = "")

if (require("tm", quietly = TRUE)) {
  words <- readLines(system.file("stopwords", "english.dat",
                              package = "tm"))
  remove_stopwords(x, words)
  remove_stopwords(t, words, lines = TRUE)
} else
  remove_stopwords(t, words = c("it", "it's"), lines = TRUE)
Index

* IO
  readers, 4

* character
  encoding, 2
  ligatures, 3
  textcnt, 5
  util, 8

* utilities
  encoding, 2
  ligatures, 3
  textcnt, 5
  util, 8
  connection, 4
  Encoding, 3–6
  encoding, 2

  fixEncoding (encoding), 2
  format.textcnt (textcnt), 5

  iconv, 3, 4
  is.ascii (encoding), 2
  is.locale (encoding), 2
  is.utf8 (encoding), 2

  ligatures, 3
  readBytes (readers), 4
  readChars (readers), 4
  readers, 4
  remove_stopwords (util), 8

  sort, 6

  textcnt, 5
  tokenize (util), 8
  translate (encoding), 2
  translate_Unicode_latin_ligatures (ligatures), 3

  util, 8