

# Package ‘image.textlinedetector’

September 22, 2020

**Type** Package

**Title** Segment Images in Text Lines and Words

**Version** 0.1.2

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**Description** Find text lines in scanned images and segment the lines into words.

Includes implementations of the paper 'Novel A\* Path Planning Algorithm for Line Segmentation of Handwritten Documents' by Surinta O. et al (2014) <doi:10.1109/ICFHR.2014.37> available at <<https://github.com/smeucci/LineSegm>>, an implementation of 'A Statistical approach to line segmentation in handwritten documents' by Arivazhagan M. et al (2007) <doi:10.1117/12.704538>, and a wrapper for an image segmentation technique to detect words in text lines as described in the paper 'Scale Space Technique for Word Segmentation in Handwritten Documents' by Manmatha R. and Srimal N. (1999) paper at <doi:10.1007/3-540-48236-9\_3>, wrapper for code available at <<https://github.com/arthurflor23/text-segmentation>>.

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**URL** <https://github.com/DIGI-VUB/image.textlinedetector>

**Encoding** UTF-8

**LazyData** true

**Imports** Rcpp (>= 0.12.9), magick

**Suggests** opencv

**LinkingTo** Rcpp

**SystemRequirements** C++11 and OpenCV 3 or newer: libopencv-dev (Debian, Ubuntu) or opencv-devel (Fedora)

**RoxygenNote** 7.1.1

**NeedsCompilation** yes

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**Repository** CRAN

**Date/Publication** 2020-09-22 10:40:06 UTC

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image_textlines_astar	<i>Text Line Segmentation based on the A* Path Planning Algorithm</i>
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**Description**

Text Line Segmentation based on the A\* Path Planning Algorithm

**Usage**

```
image_textlines_astar(x, morph = FALSE, step = 2, mfactor = 5, trace = FALSE)
```

**Arguments**

x	an object of class magick-image
morph	logical indicating to apply a morphological 5x5 filter
step	step size of A-star
mfactor	multiplication factor in the cost heuristic of the A-star algorithm
trace	logical indicating to show the evolution of the line detection

**Value**

- a list with elements
- n: the number of lines found
  - overview: an opencv-image of the detected areas
  - paths: a list of data.frame's with the x/y location of the baseline paths
  - textlines: a list of opencv-image's, one for each rectangular text line area
  - lines: a data.frame with the x/y positions of the detected lines

**Examples**

```

library(opencv)
library(magick)
library(image.textlinedetector)
path <- system.file(package = "image.textlinedetector", "extdata", "example.png")
img <- image_read(path)
img <- image_resize(img, "x1000")
areas <- image_textlines_astar(img, morph = TRUE, step = 2, mfactor = 5, trace = TRUE)
areas <- lines(areas, img)
areas$n
areas$overview
areas$lines
areas$textlines[[2]]
areas$textlines[[4]]
combined <- lapply(areas$textlines, FUN=function(x) image_read(ocv_bitmap(x)))
combined <- do.call(c, combined)
combined
image_append(combined, stack = TRUE)

plt <- image_draw(img)
lapply(areas$paths, FUN=function(line){
  lines(x = line$x, y = line$y, col = "red")
})
dev.off()
plt

```

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image\_textlines\_crop    *Crop an image to extract only the region containing text*

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**Description**

Applies a sequence of image operations to obtain a region which contains relevant texts by cropping white space on the borders of the image. This is done in the following steps: morphological opening, morphological closing, blurring, canny edge detection, convex hull contours of the edges, keep only contours above the mean contour area, find approximated contour lines of the convex hull contours of these, dilation and thresholding.

**Usage**

```
image_textlines_crop(x)
```

**Arguments**

x                      an object of class magick-image

**Value**

an object of class magick-image

**Examples**

```
library(opencv)
library(magick)
library(image.textlinedetector)
path <- system.file(package = "image.textlinedetector", "extdata", "example.png")
img <- image_read(path)
image_info(img)
img <- image_textlines_crop(img)
image_info(img)
```

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image\_textlines\_flor    *Text Line Segmentation based on valley finding in projection profiles*

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**Description**

Text Line Segmentation based on valley finding in projection profiles

**Usage**

```
image_textlines_flor(
  x,
  light = TRUE,
  type = c("none", "niblack", "sauvola", "wolf")
)
```

**Arguments**

x	an object of class magick-image
light	logical indicating to remove light effects due to scanning
type	which type of binarisation to perform before doing line segmentation

**Value**

a list with elements

- n: the number of lines found
- overview: an opencv-image of the detected areas
- textlines: a list of opencv-image's, one for each text line area

**Examples**

```
library(opencv)
library(magick)
library(image.textlinedetector)
path <- system.file(package = "image.textlinedetector", "extdata", "example.png")
img <- image_read(path)
img <- image_resize(img, "1000x")
```

```

areas <- image_textlines_flor(img, light = TRUE, type = "sauvola")
areas <- lines(areas, img)
areas$n
areas$overview
combined <- lapply(areas$textlines, FUN=function(x) image_read(ocv_bitmap(x)))
combined <- do.call(c, combined)
combined
image_append(combined, stack = TRUE)

```

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image\_wordsegmentation

*Find Words by Connected Components Labelling*


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## Description

Filter the image using the gaussian kernel and extract components which are connected which are to be considered as words.

## Usage

```
image_wordsegmentation(x, kernelSize = 11L, sigma = 11L, theta = 7L)
```

## Arguments

x	an object of class opencv-image containing black/white binary data (type CV_8U1)
kernelSize	size of the kernel
sigma	sigma of the kernel
theta	theta of the kernel

## Value

a list with elements

- n: the number of lines found
- overview: an opencv-image of the detected areas
- words: a list of opencv-image's, one for each word area

## Examples

```

library(opencv)
library(magick)
library(image.textlinedetector)
path <- system.file(package = "image.textlinedetector", "extdata", "example.png")
img <- image_read(path)
img <- image_resize(img, "x1000")
areas <- image_textlines_flor(img, light = TRUE, type = "sauvola")
areas$overview
areas$textlines[[6]]

```

```

textwords <- image_wordsegmentation(areas$textlines[[6]])
textwords$n
textwords$overview
textwords$words[[2]]
textwords$words[[3]]

```

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lines.textlines	<i>Extract the polygons of the textlines</i>
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### Description

Extract the polygons of the textlines as a cropped rectangular image containing the image content of the line segmented polygon

### Usage

```

## S3 method for class 'textlines'
lines(x, image, crop = TRUE, channels = c("bgr", "gray"), ...)

```

### Arguments

x	an object of class textlines as returned by <a href="#">image_textlines_astar</a> or <a href="#">image_textlines_flor</a>
image	an object of class magick-image
crop	extract only the bounding box of the polygon of the text lines
channels	either 'bgr' or 'gray' to work on the colored data or on binary greyscale data
...	further arguments passed on

### Value

the object x where element textlines is replaced with the extracted polygons of text lines

### Examples

```
## See the examples in ?image_textlines_astar or ?image_textlines_flor
```

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